GREECO
Territorial Potentials for a Greener Economy

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This basic report exists only in an electronic version.

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Introduction

The main goal of this document is to briefly introduce a working concept of territorial potentials for a green economy within the scope of GREECO project.

Therefore, the document first introduces some conceptual issues related to the challenge of defining territorial potentials and a description of the best alternatives that in our perspective exist to operationalise this notion within the complementary top-down and bottom-up analyses performed in GREECO.

This conceptual discussion is followed by a methodological description whose main objective is to propose a feasible strategy to assess of territorial potentials within the case studies and sector analysis developed in GREECO project. Section 2 describes how a limited number of non-policy factors promoting or hindering-back the development of green economies have been selected and characterised in this project. Furthermore, this section elaborates on the objectives and challenges related to data collection, and puts forward a coherent approach for selecting, validating and collecting indicators.

Section 3.1 delivers an overview of the green growth factors found within sector assessments and case studies of GREECO project. These elements have been the basis for the preliminary attempt to assess regional green economic potentials at the EU level introduced on Section 3.2

Executive summary

Concept

1. Basing on (1) the standard definition of 'potential', (2) the understanding of the concept of territorial potentials found in policy-framework and (3) the conceptual developments of previous studies, territorial potential for the green economy can be defined as follows:

   A combination of external forces, i.e. territorial challenges, and intrinsic features of territories, i.e. territorial capital, that jointly and dynamically produce a theoretical and mutable opportunity for future growth, improvement or expansion of the green economy in its diverse and concurrent manifestations (i.e. intensified growth, enhanced sustainability, increased social inclusion, and stronger territorial cohesion).

2. Thus, GREECO interprets the regional potential for a green economy as the combination of the *factors* (i.e. drivers, barriers, enablers and hindering conditions) that encourage or prevent regions and territories to successfully start or consolidate a transition to a green economy. Identifying and characterising those factors is crucial for assessing territorial potentials.

Approach

3. GREECO has described the potential of main factors to contribute to green economic development at the regional level within sectors and case studies. Here, the analysis of factors has at least covered all the spheres mentioned as being part of the green economy, namely economic, environmental, social and territorial.

4. Furthermore, the analysis of the drivers and enabling conditions fostering or holding back the green economy transition is a policy-oriented exercise and thus it has been structured taking into account the capacity of policy action to act upon them.

5. Well-designed policy mixes can speed up transition towards a green economy by strengthening the territorial assets present in the region. They can also slow it down putting barriers on such transition by imposing ill-designed combinations of measures preventing creativity and innovation. As a result, when it comes to identifying territorial potentials, policies themselves can be considered green economy factors.

6. However, this document focuses on non-policy factors. Policies themselves have been analysed within Vol 5 of this report.

7. The amount of non-policy factors related to the green economy within most sectors analysed in GREECO could be extremely large. No meaningful green economy-related analysis can be performed unless this list of potential factors is restricted.

Operationalisation

8. By definition, selecting a subset of key factors implies developing a ranking of factors and choosing those that have a greater influence on the concerned sectors and case studies.

9. The selection of the most relevant factors has relied on the evidence collected or produced within the project. This has included, inter alia, (1) indirect assessments of the theoretical and economic green development potentials for some sectors (such as the renewable energy potentials); (2) previous studies analysing sector or regional

potentials, as well as; (3) the questionnaires, opinions and feedback received from stakeholders within case study regions, including insights on job creation and GVA generations.

10. For the sake of simplicity and usability for policy-making, the analysis will mainly target those factors that are specific to the green part of the economy, regardless of their comparative relevance in relation to other un-specific factors. Transversal factors affecting the economy as a whole have been described within sectors and case studies, but not analysed in-depth, regardless of their overall impact on the green economy.
11. A complete characterisation of non-policy factors according to their potential to contribute to green economic development at the regional level has been the basis for selecting headline factors. The characterisation has been simplified to three possible impacts (positive, neutral and negative) on each of the spheres included in the green economy concept (economic, environmental, social and territorial).
12. In absence of additional territorial evidence from previous impact assessments or similar documents, this simplified characterisation has also been used to choose the most influential factors. The criterion was to pick those factors showing a stronger positive or negative impact as those being more influential.
13. Factors can have different –sometimes conflicting– interpretations depending on the expected impact on the four spheres of the green economy, as well as on the sectors and territories under analysis. This is what GREECO calls "trade-offs of factors" and "externalities of factors", respectively. Both the externalities of factors (i.e. the potentially conflicting effects of factors on other sectors and territories), and the trade-offs of factors (i.e. the potentially conflicting effects of factors on the different green economy spheres) have been assessed, at least superficially, within sector reports and case studies.
14. This analysis of trade-offs and externalities of factors acknowledges the importance of searching for synergies between factors and avoiding conflicting effects between potential policy measures.
15. Likewise, non-policy factors may have synergies or neutralise each other's effect. In fact, the countless possible interactions that can take place between the vast array of forces boosting or hindering back the transition to a greener economy within European regions creates a number of potentially conflicting scenarios that have been discussed as far as possible within sector reports and case studies.
16. As far as territorial potentials for a greener economy are concerned, it is their *joint effect* of factors what really matters.
17. Another relevant distinction that has been made is the one between direct or proximate versus indirect or underlying factors. Only those forces that actually *trigger* a change have been considered. The underlying factors have been described, but GREECO mainly analyses data on the proximate/direct forces.
18. Along these lines, the vast majority of the demand-driven factors related to environmental degradation have been considered as underlying or indirect forces rather than proximate green growth factors, as it cannot be established a direct cause-effect relationship between environmental degradation and green growth.
19. Furthermore, the analysis of territorial potentials within case studies and sector analysis involved characterising non-policy green growth factors against two additional dimensions, including:
    a. From a territorial perspective, were classified as being internal (factors to be found within regions, such as territorial endowments), or external (factors

impacting territories that could also have an impact on the green economies, such as energy costs).

b. Finally, factors were classified according to the type of market force involved, i.e. supply-side or demand-side drivers.

20. The relative importance of a driver for a sector or within a case study area has been reported in different formats, either as a ratio scale (quantitative information), an ordinal scale (ranking) or a nominal scale (listing), according to author's judgement. This has been a precondition to select some headline factors as a necessary step towards the elaboration of regional typologies.

21. There are factors that cannot be easily (or directly) influenced by the actions of local and regional policy-makers, in the short to medium terms, such as (1) the environmental resources; (2) certain aspects of human resources; (3) certain aspects of territorial dynamics; (4) certain aspects of technology and innovation, and; (5) certain aspects of the institutional framework.

22. There is another category of factors that may be addressed more directly by local authorities and policy-makers in the short or medium terms. This category includes different kinds of policies introducing targets, setting the right price of an economic good or forbidding a certain type of individual or company behaviour incompatible with green economy.

23. Sector reports and case studies have based on this characterisation. They reflect on the potential links between the two types of factors in a persuasive way. This is partly included in the policy assessment and implied:

    a. determining to what extent the non-policy factors can be modified by policy action;

    b. identifying the optimal policy responses needed to take advantage of positive factors and to tackle barriers affecting sectors and case studies;

    c. determining whether such policies are already in place within specific sectors and case studies and report if they are working properly, and;

    d. proposing new policy mixes or amendments on current ones within sectors or case study areas (i.e. policy recommendations).

Delivery

24. The most relevant green economy factors, related indicators and data providers used in GREECO project are presented in the following table :

Green economy factors	Indicator	Source
Good governance: institutions, policies and regulations	European Quality of Government Index (2009)	Quality of Government Institute at The University of Gothenburg (Nicholas Charron, Dijkstra, & Lapuente, 2014).
Key economic instruments: access to funding and financial support	Public/private support to SMEs for increased resource efficiency and/or the production of green products and services (2013)	Flash Eurobarometer 381 SMEs, resource efficiency and green markets (EC, 2013b).
Territorial assets and physical conditions	Onshore wind, PV and biomass energy potentials (TOE per capita per year) at NUTS-2 level	New indicator developed in GREECO project
	Percentage of Natura 2000 area by NUTS-2 region (2009)	INBALUD project based on EEA data (Geoville, 2012)

Access to technology	Accumulated patents in selected environmental technologies per million inhabitants at NUTS-2 level (2005-2010).	OECD Regions and cities database.
	Share of patents in selected environmental technologies over total number of patents (2005-2010).	OECD Regions and cities database.
	Number of green clusters per million inhabitants (2013)	New indicator developed in GREECO project.
Expected market demand	Estimated annual CO2 emissions savings potential for the building sector in 2050 (Mt per square km per thousand inhabitants)	New indicator developed in GREECO project.
Human resources, knowledge and skills	Percentage of persons aged 25-64 and 20-24 with upper secondary or tertiary education attainment, by NUTS-2 regions (2011).	Eurostat Regional Database (edat_lfse_13)
Environmental awareness and voluntary actions	Weighted share of municipalities that have signed the Covenant of Majors and have also submitted an Action Plan by mid- 2013.	New indicator developed in GREECO project.

25. As far as the construction of a regional typology based on territorial green economic potentials is concerned, the approach followed in GREECO relies on the list of drivers and indicators identified within the project.

26. For the sake of delivering operational regional typologies usable for effective policymaking, all the indicators included in the analysis:

    a. enable the provision of a regionally differentiated picture (i.e. are spatially mutable), and

    b. capture as far as possible the spatially explicit processes or features associated to the development of green economies.

27. Still, the layer of relevant regional data related to the green economy factors is extremely thin. Data issues include:

    a. A total lack of information for relevant factors.

    b. Information only partially available, either because data coverage was incomplete from geographical and/or temporal perspectives, because data was provided in an old NUTS version, or because data was territorially incoherent, meaning that figures were available with almost complete ESPON coverage but at different territorial levels for different countries.

    c. Factors for which indirect or proxy indicators were only available due to (1) the lack of specific data for certain green growth drivers; (2) the intrinsic difficulty in measuring certain green growth factors, and; (3) the non-specificity of certain factors for the green subset of the economy.

28. However, GREECO project has made an attempt to provide the best possible data-driven assessment of green economic potentials. In particular, data gaps had to be filled as far as possible, and NUTS versions had to be harmonised. Record of all these processes has of course been kept. In any case, lower accuracy of the analysis could be expected in those regions where estimates had to be used for a larger number of variables.

29. All indicators were combined to generate the Green Economy Theoretical Potentials Index (IGETP). The IGETP was generated as an arithmetic sum of the weighted averages of all the 7 factors considered in the analysis. All factors are weighted identically. However, this option could be discussed.

30. The synthesis map shows a quite uneven territorial distribution of theoretical green economy development potentials across Europe.

31. Potentials seem to be higher in the Pentagon, particularly Germany's Southernmost and North-eastern regions, Nordic countries, in particular within the most urbanised Swedish and Finish regions, plus the remote and sparsely populated Upper Norrland (Övre Norrland) region in Sweden, and the Baltic countries, in particular Estonia.

32. Medium to high IGETP scores can be found in some specific NUTS-2 regions located in the British Isles, New Member States and around the Mediterranean Basin.

33. Most regions located within the Mediterranean countries and New Member States show medium to low and low theoretical green economy development potentials. In particular, IGETP scores are particularly low in most Italian and Romanian regions.

34. The remaining areas show medium to low IGETP scores.

35. The spatial variation of the IGETP is of course tightly related to the spatial variability of the different components combined in such index. The interpretation of the results should be done differently for those regions showing particularly high or low scores, on the one hand, and those regions showing intermediate IGETP scores, on the other hand:

    a. In those areas where overall green economy potentials are unequivocally high or low, interpretation of results is easier and policy-oriented decisions can be taken assuming that all the most important green economy factors perform in a structurally similar way.

    b. Areas where IGETP scores are intermediate include regions where different combinations of green economy factors are possible. In these areas, interpretation of results is much more difficult and it cannot lead to relevant policy recommendations unless the different components combined in the IGETP are analysed separately.

36. Besides, the sensitivity analysis performed on IGETP scores showed that small variations in the number of variables included and the weights used could lead to quite different results.

37. These constraints have two methodological implications:

    a. first, it implies that this specific typology probably relies on a too narrow number of indicators to qualify as something more than a preliminary research output, and;

    b. second, the IGETP may hide factor-specific information relevant for descriptive and normative purposes. This is particularly important, as basing decisions on synthetic indexes might lead to undesired outputs.

38. In order to avoid these drawbacks, the typology should be analysed jointly with the different components included in it.

39. In general terms, the use of benchmarks of indicators is arguably preferable to synthetic indexes that combine several intrinsically diverse dimensions. Panels of indicators enable a better policy interpretation of research outputs and allow for a more accurate design of policies compared to synthetic indexes.

40. Variability of green economy factors according to the “level of regional development” is low. This implies that internal variability within specific categories of regions is, in general terms, higher than in-between groups.

41. Differences are higher for the governance-related factors (including good governance and institutions; key economic instruments and financial support, and; environmental awareness and voluntary actions), than for the so-called structural factors (including territorial assets and physical conditions; access to technology; expected market demand, and; human resources knowledge and technology).

42. This implies that, from a development perspective, green economy drivers are not concentrated within any specific category of regions. Regions seem to be, if not equally, at least similarly endowed to start or consolidate transitions to a greener economy, regardless of their present level of development.

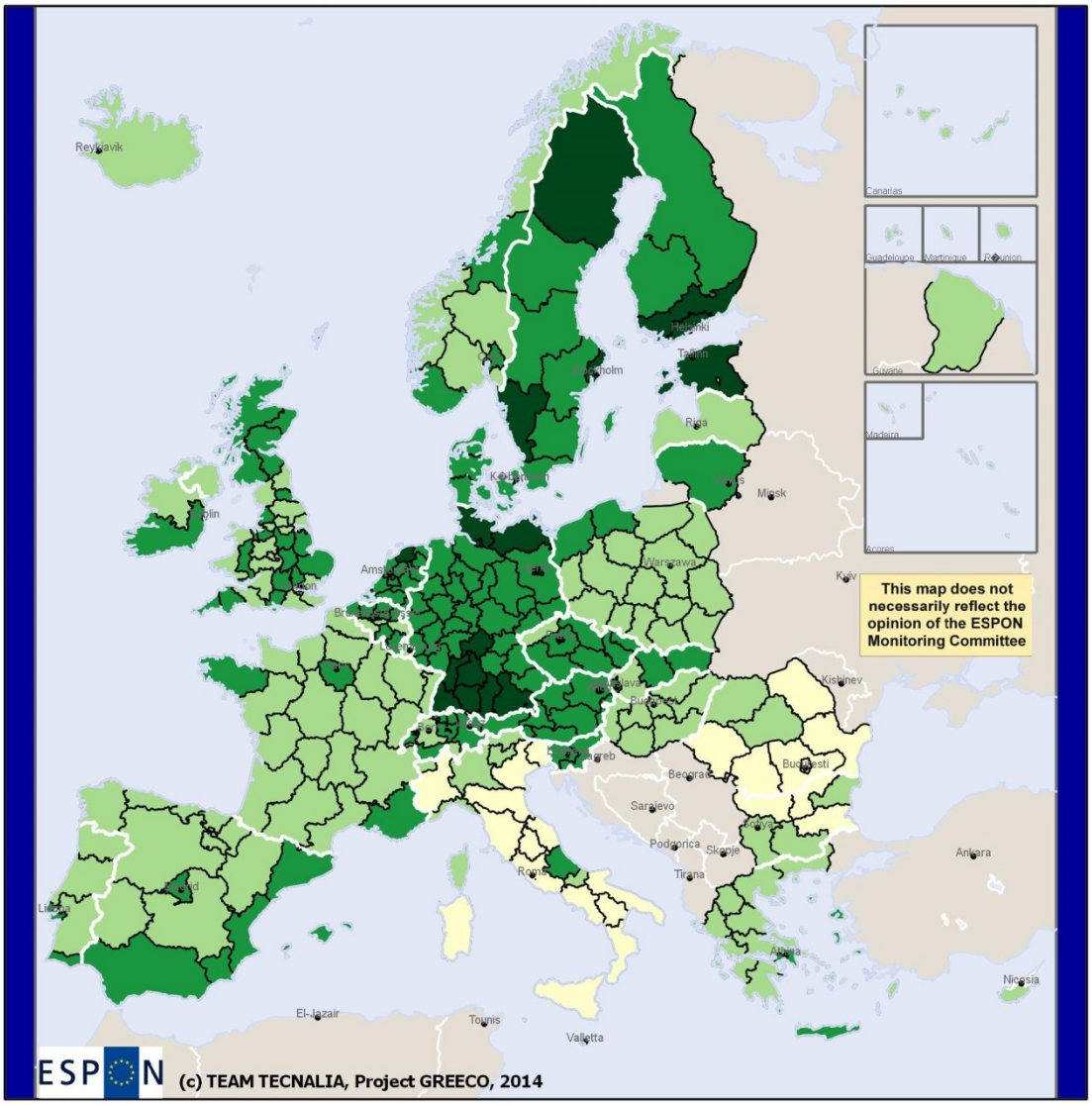
43. The relation between IGETP and deflated GDP per capita seems to be positive for all types of regions, with the only exception of transition regions, where there does not seem to be a specific relationship in either direction.

44. The relation between regional unemployment rates and IGETP scores is negative, which implies that the higher the estimated IGETP, the smaller unemployment rates are at the regional level. The exceptions are NUTS-2 regions located in New Member States, where IGETP scores and unemployment rates do not show any specific correlation pattern.

45. Even if its statistical relevance is limited, this differentiated behaviour is symptomatic of a higher level of complexity of the mechanisms activated by green economy factors within New Member States in comparison to other areas. This calls for a more detailed assessment in such regions.

46. Concentrating resources in improving those factors linked to green economy potentials could indirectly help the most vulnerable regions to reduce their poverty rates.

47. Several pieces of territorial evidence collected in the GREECO project suggest that investing in greening the economy can create favourable conditions for the implementation of a number of win-win policy strategies that in the worst case could contribute to improve environmental conditions alone and, in the best and most probable case, could improve quality of life, economic wealth and wellbeing in many, not only mutually compatible, but also synergic respects.



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Regional level: NUTS 2, version 2010
Source: Tecnalia, 2014
Classification method: Manual breaks based on intrerquartile ranges (IQR).

Theoretical green economy development potentials

- High green economy development potentials (> Quartile 0.75 + 0.5 IQR)
- Medium to high green economy development potentials (Median to Quartile 0.75 + 0.5 IQR)
- Medium to low green economy development potentials (Quartile 0.25 - 0.5 IQR to Median)
- Low green economy development potentials (< Quartile 0.25 - 0.5 IQR)
- No data available

A tentative regional typology of territorial potentials for a greener economy at NUTS-2 level, including the number of non-estimated variables used in the classification

Section 1 - Concepts

1.1. Territorial potentials: a formal definition

The Oxford English Dictionary defines potential as "the latent qualities or abilities that may be developed and lead to future success or usefulness" [*mass noun*], and "the possibility of something happening or of someone doing something in the future" [*count noun*][1].

The definition above includes two different but correlated conceptual strands: the first one introduces the idea of some *internal* qualities or abilities that could be developed, whereas the second one projects those latent qualities into the future as a possibility of change. From a conceptual perspective, the two strands are highly correlated, as the presence of the "latent qualities" may also be understood as a prerequisite for "something happening".

Indeed, it is the combination of both strands the one that creates a conceptual foundation for a working concept of territorial potentials. However, these two components should be complemented with a third additional *external* element:

From a territorial perspective, places are endowed with a given array of socio-economic, cultural and natural assets, as well as some location advantages, technologies and traditions that influence their potential to perform and evolve in a given way. These are the "latent qualities" mentioned in the definition above. But these *internal* factors, being a condition for "something happening", are not necessarily enough to unleash change. On the contrary, territorial potentials in relation to specific transitions or transformations depend also on *external* forces, or, more precisely, on the *manifestation* of these external forces in a given territory, and on how external forces interface with local factors, giving place to stable or instable situations, thus decreasing or increasing the possibility of something happening, that respectively favour stagnation or change.

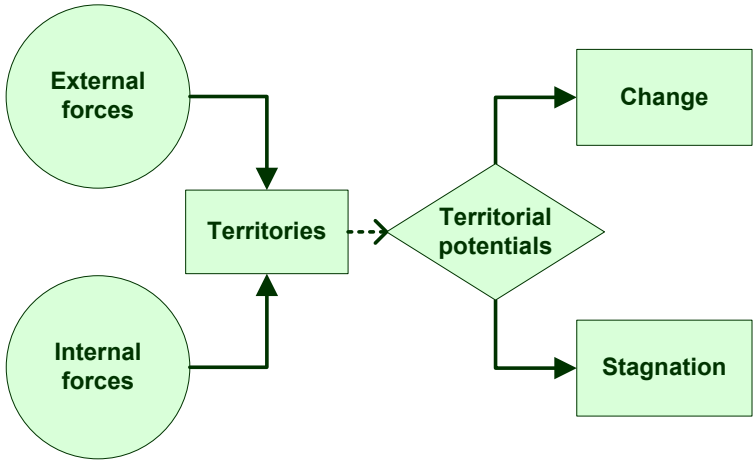


Figure 1 A visual representation of the role of territorial potentials in territorial development

Such external forces typically are global trends like globalisation, increased migration flows, a changing geopolitical context, energy and raw material scarcity, new technologies

[1] http://oxforddictionaries.com/definition/english/potential

developed elsewhere, climate change, etc. All these grand challenges have different territorial impacts, imposing burdens to some places, but also offering opportunities. Quite paradoxically, the new opportunities induced by external forces can be very place-specific. Thus, it is the overlap of internal assets and the manifestation of external forces on different spatial contexts the one that eventually determines "the possibility of something happening" on specific territories, and accordingly territorial potentials.

The Editorial of Vol. 21, No. 5 of European Planning Studies by Lagendijk & Pijpers (2013) provides a good summary on the evolution of the academic debate on the role played by internal and external conditions or stimuli to shape the 'development potentialities' of regions over time. B. I. Tóth (2014) completes this overview with a comprehensive discussion on the role attributed in literature to *territorial capital*, mostly presented as synonym to *territorial potential*.

Against this background, the main challenge of the GREECO project as far as territorial potentials are concerned has been to identify the most relevant internal and external factors that might condition regional performance with regard to the green economy in the short and medium terms, as well as to characterise the varied dialectics and potentially contradictory effects that emerge from the interaction of such factors on specific territories, yielding different combinations of territorial potentials for a green economy.

In other words, the main goal of GREECO project is to unveil, analyse and interpret the most relevant weaknesses and strengths (mainly internal factors), as well as opportunities and threats (mainly external factors) that characterise different groups of ESPON regions with regard to green growth.

1.2. The notion of territorial potentials in selected policy documents

The formal interpretation of territorial potentials introduced above is also supported by recent academic and policy developments in Europe. One of the most inspiring policy references that shaped the working concept of territorial potentials in GREECO has been the Territorial Agenda of the European Union 2020 - Towards an Inclusive, Smart and Sustainable Europe of Diverse Regions (TA2020). This action-oriented policy framework characterises territorial cohesion as "a set of principles for harmonious, balanced, efficient, sustainable territorial development" that "enables equal opportunities for citizens and enterprises, wherever they are located, to make the most of their *territorial potentials*" (EU, 2011).

The TA2020 argues that diversity of territories, including distinctive identities of local and regional communities, is *a potential for development* in itself (EU, 2011). In this vein, the TA2020 also stresses that natural and cultural heritage are parts of territorial capital and identity, whereas "ecological values, environmental quality and cultural assets are crucial to well-being and to economic prospects and offer *unique development opportunities*" (ibid., p. 6).

Furthermore, the TA2020 claims that territorial challenges can be transformed into potentials for sustainable and harmonious territorial development through wisely conceived win-win strategies. Exemplary of such territorial challenges transformed into potentials through tailor-made strategies are rising energy prices and emissions, which "draw attention

to the need for sustainable energy solutions such as realising the potential of renewable energy resources and shifting towards greener, low carbon economic activities" (ibid., p. 4).

As a result, territories with common or complementary potentials or challenges are encouraged by TA2020 to join forces and collaborate by sharing experience, exploring their comparative advantages together creating additional development potential. "In this way, potentials such as valuable natural, landscape and cultural heritage, city networks and labour markets divided by borders can be better utilized" (ibid., p. 8).

Six are the territorial priorities mentioned in the TA2020:

1. *Promoting polycentric and balanced territorial development* as an important precondition of territorial cohesion and a strong factor in territorial competitiveness.
2. *Encouraging integrated development in cities, rural and specific regions* to foster synergies and better exploit local territorial assets.
3. *Territorial integration in cross-border and transnational functional regions* as a key factor in global competition facilitating better utilisation of territorial potentials and the protection of natural environment.
4. *Ensuring global competitiveness of the regions based on strong local economies*, preventing the drain of human capital and reducing vulnerability to external development shocks.
5. *Improving territorial connectivity for individuals, communities and enterprises* as an important precondition of territorial cohesion, a strong factor of territorial competitiveness and an essential condition for sustainable development.
6. *Managing and connecting ecological, landscape and cultural values of regions*, including joint risk management, as an essential condition for long term sustainable development.

From a TA2020 perspective, achieving the above objectives calls for the adoption of *place-based* policy approach to territorial cohesion that contributes to *unleash territorial potential* through "development strategies based on local and regional knowledge of needs, and building on the specific assets and factors which contribute to the competitiveness of places. Within this logic, places can utilize their *territorial capital to realise optimal solutions for long-term development*, and contribute in this way to the achievement of the Europe 2020 Strategy objectives which contribute to the competitiveness of places" (ibid., p 2).

This latter notion linking the effectiveness of long-term development strategies to the existence of a particular territorial asset base (i.e. territorial capital), recalls the formal definition of *potential* (the "latent qualities or abilities that may be developed and lead to future success"). Furthermore, the definition also links to the "specific assets and factors which contribute to the competitiveness of places". In both cases the notion of territorial potentials seems to be very much related to the broader concept of territorial capital, including both tangible and intangible factors.

This is reinforced by the background document of the TA2020 (EU, 2011) in which it is quoted a document by the OECD where the concept of territorial capital is linked to that of territorial potential in the following terms: "territorial development is based on the recognition that prosperity is increasingly a matter of how well each city, each region, can achieve its potential. Territorial capital refers to the stock of assets which form the basis for endogenous development in each city and region, as well as to the institutions, modes of decision-making and professional skills to make best use of those assets." (OECD, 2001)

In the OECD definition above, the territorial potential is understood as a means to generate a *maximum* socio-economic benefit through the mobilisation of territorial capital. This conceptualisation of territorial potential as the *best possible* situation or enhanced status

achievable by regions can be also found in some research projects, such as the ESPON PURR project: “The potential of a region is, (…), what (maximum) development level the region might achieve.” (ESPON, 2011)

Implicitly, this approach rests on the idea that the stock of assets that determines endogenous development is static, defining a given maximum development threshold. This principle, which might hold for some forms of territorial capital such as certain kinds of natural resources and ecosystem services, does not hold for the larger part of the stock. In fact, in most cases the maximum development level that a region could achieve is not a constant value. It changes as territorial capital evolves, in part due to how “the institutions, modes of decision-making and professional skills make best use of those assets” (OECD, 2001). Otherwise the overall idea of territorial development becomes a chimerical goal for some regions with low levels of territorial assets at a given point in time. On the contrary, **the territorial potential of a given territory relies on the utilization of its un-mobilised territorial capital through well-designed place-based strategies** that may, in turn, increase the quantity and / or quality of the territorial assets driving (green) growth.

In fact, according to the TA2020 the place-based policy approach should rest on an *evidence-informed* policy making principle accompanied by a broader outlook on the territorial potential involving a European perspective, which can reveal common solutions and support the utilisation of their territorial potential by sharing experience. In this respect, from a TA2020 perspective “Cohesion Policy is a key framework through which the EU can address territorial development challenges and helps unleash territorial potential at local, regional, national and transnational levels” (ibid., p.6).

This way, the strategy adopted by the TA2020 in response to the challenge of unlocking regional potentials was based on a place-based policy approach as introduced by F. Barca in his renowned report for the European Commission entitled “Agenda for a reformed cohesion policy - A place-based approach to meeting European Union challenges and expectations”, the so-called “**Barca report**” (Barca, 2009a).

As emerges from Mr Barca’s interpretation of the approach, “a place-based development policy is a long-term development strategy aimed at reducing the *underutilisation of resources* and social exclusion of specific places, through the production of integrated bundles of public goods and services, determined by *extracting and aggregating people’s knowledge and preferences* in these places and turning them into projects, and exogenously promoted through a system of grants subject to conditionalities and multilevel governance” (Barca, 2009b).

Thus, the Barca report introduced yet another conceptual element to the characterisation of territorial potentials, such as the notion of *underutilisation* of local resources. This idea links to the principle of the latent qualities or abilities that are found in the formal definition of “potential”, reinforcing at the same time the need for specific and tailor-made strategic responses (i.e. place-based) capable of unlocking such underutilised resources. The place-based strategic response implies taking advantage of local *knowledge and initiative*, which in turn are also part of the underutilised local resources.

On these grounds, the Barca report proposed reforming regional policy governance making a clear and explicit distinction between policy interventions aimed at increasing income and growth (“efficiency” objectives in the terminology of the Report) and those aimed at reducing inequalities (“social inclusion” objectives in the Report), not least in order to be able to monitor and evaluate the results. Likewise, the reform should come hand-in-hand with a greater coherence with the place-based or territorial policy concept and concentrating on a few issues of key importance for the EU and its people. Accordingly, the Barca report proposed to reform the regional policy governance basing on ten “pillars”:

- An innovative concentration on core priorities and a conservative territorial allocation
- A new strategic framework for cohesion policy
- A new contractual relationship, implementation and reporting aimed at results
- A strengthened governance for the core priorities
- Promoting additional, innovative and flexible spending
- Promoting experimentalism and mobilising local actors
- Promoting the learning process: a move towards prospective impact evaluation
- Refocusing and strengthening the role of the Commission as a centre of competence
- Addressing financial management and control
- Reinforcing the high-level political system of checks and balances.

The **Fifth report on economic, social and territorial cohesion** issued in November 2010 (EC, 2010) was the first cohesion report to include the territorial dimension alongside social and economic dimensions within EU Cohesion Policy. As such, the Fifth Cohesion Report, incorporated most of the ideas previously put forward by the Barca report, suggesting to further strengthening the regional and urban dimension of cohesion policy and its partnership principle. The report stresses the importance of access to services, "functional geographies" and territorial analysis, advocating the adoption of "flexible geographies" (EC, 2010).

By doing so the Fifth Cohesion Report paid more attention to climate change and the economic opportunities derived from the environment by emphasising the ways in which *territorial specificities* shape development opportunities within regions. For instance, the Fifth cohesion report argued how achieving the Europe 2020 target for renewable energy production would require very different responses, ranging from a focus on solar, wind or biofuels depending on *socio-economic and natural conditions* in different regions. The report also mentions the large *potentials* for increased energy efficiency, especially in buildings and transport in urban areas, and it raises specific concerns in Eastern Member states, particularly in terms of waste and water management. Thus, the Fifth Cohesion Report made also a strong link with territorial potentials basing on the *territorial specificities*, proposing the following measures to increase the effectiveness of cohesion policy in the future:

- focusing resources on a few priorities closely linked to the Europe 2020 strategy;
- defining clear and measurable targets;
- strengthening regulatory and institutional frameworks;
- conditionality and incentives;
- increasing the leverage effect of investments;
- private sector finance;
- simplification of the management rules;
- concentrating on the poorest Member States and regions.

More recently, the **Seventh progress report on economic, social and territorial cohesion** has reinforced the place-based approach to cohesion policy, stressing the urban and regional dimension of the Europe 2020 strategy by showing how cities and regions are faced with different combinations of development problems and *growth potentials*. This fact favours the adopting an integrated approach within cohesion policy that can be adjusted to local needs and opportunities (EC, 2011c).

A similar claim is made by Böhme et al. in a 2011 report entitled "**How to strengthen the territorial dimension of 'Europe 2020' and the EU Cohesion Policy**". The authors argue that the links of TA 2020 to the Cohesion Policy and other policies remain very vague, whereas "smart, sustainable and inclusive growth can only be attained if policy making takes into account the territorial diversity of *development potentials* and challenges within Europe" (Böhme, Doucet, Komornicki, Zaucha, & Świątek, 2011). Thus, the report claim that "to avoid

'Europe 2020' simply reproducing the Lisbon strategy failure, due attention must be paid to the territorial dimension of, and potential for, smart, sustainable and inclusive growth" (ibid. p.21). This implies reinforcing the dialogue between territorial/spatial and development/macro-economic policies and "spelling out" the Europe 2020 priorities and headline targets "for the different territories in line with their *potentials* and specificities" (ibid. p.22).

1.3. The new cohesion policy: from territorial potentials to a greener economy

The idea of a cohesion policy as a key tool to unleash regional potentials is also present in the 2014-2020 legislative proposals for the new EU Cohesion Policy 2014-2020, which was adopted by the European Commission (EC) on 6 October 2011[2]. The EC's proposal for the next multi-annual financial framework is supported by a EUR 325.1 billion budget that seeks to increase the effectiveness and efficiency of structural instruments for delivering the Europe 2020 Strategy. The future EU Cohesion Policy 2014-2020 will invest in all EU regions, adapting the level of support and the national contribution to their level of development:

1. Less Developed regions (GDP < 75% of EU-27 average)
2. Transition regions (GDP 75% to 90% of EU-27 average)
3. More Developed regions (GDP > 90% of EU-27 average)

In parallel, the EU Cohesion Policy 2014-2020 will concentrate resources on key growth sectors as outlined in the Europe 2020 strategy:

- Investments under the European Regional Development Fund (ERDF) will be concentrated on innovation and research, the digital agenda, support for small and medium sized businesses (SMEs) and the low-carbon economy, depending on the category of each region (Less Developed: 50%, Transition: 60%, and More Developed: 80%).
- Remarkably, on low-carbon economy (energy efficiency and renewables) there will be separate obligations to dedicate ERDF resources (Less Developed regions: 12%, Transition and More developed regions: 20%). This investment priority renders the idea of the relevance that achieving a greener economy has achieved in EU policy agenda.
- At least 23.1% of the Cohesion Policy budget (i.e. around € 70 billion) will be allocated to investments under the European Social Fund (ESF) to finance training and life-long learning, fight poverty and promote social inclusion.
- Around € 66 billion will be focused on priority Trans-European transport links and key environmental infrastructure projects through the Cohesion Fund, which can also boost the development of green economic activities related to environmental management.

[2] The legislative package issued on 6 October 2011 has been discussed in the so-called *Trilogues* (trilateral negotiations between the European Commission, the Council and the European Parliament) during 2012-2013. The final adoption of the new legislative frame is expected for autumn 2013.

- Last but not least, the urban dimension of the policy will be enhanced by earmarking a minimum amount of resources under the ERDF to be spent for integrated projects in cities.

For the sake of **simplification and effectiveness**, the legislative package on the EU Cohesion Policy 2014-2020 includes a specific Regulation (EC, 2013a) setting out unified common rules (one set of rules instead of five) governing the European Regional Development Fund (ERDF), the European Social Fund (ESF), the Cohesion Fund (CF), the European Agricultural Fund for Rural Development (EAFRD) and the European Maritime and Fisheries Fund (EMFF). Additionally, three specific regulations for the ERDF, the ESF and the Cohesion Fund are also included, as well as two regulations dealing with the European territorial cooperation goal and the European grouping of territorial cooperation (EGTC).

Furthermore, a **Common Strategic Framework** translates the objectives and priorities of Europe 2020 into investment priorities for the ERDF, CF, ESF, EAFRD and the EMFF, which will ensure an integrated use of the funds to deliver common objectives. The Common Strategic Framework will also set out coordination mechanisms with other relevant Union policies and instruments. All these measures aim at establishing a common strategy for more coordination and less overlap.

The Regulation also reinforces **coordination with other EU policies and instruments** related to the green economy, such as LIFE programme, in particular with Integrated Projects in the areas of nature, water, waste, air, climate change mitigation and climate change adaptation. Additionally, the Regulation seeks to build synergies with two instruments in connected areas, such as the Connecting Europe facility (CEF), mentioning that priority will be given to projects in terms of their contribution to mobility, sustainability, to reducing greenhouse gas emissions, and to the Single European Transport Area. Another relevant area of strengthened coordination is employment and social policy, represented by the European Globalisation Adjustment Fund (EGF) and the Programme for Social Change and Innovation (PSCI), as well as with the European Union Solidarity Fund (EUSF). The Youth employment initiative has subsequently been integrated into the package following the agreement at the European Council in February 2013.

Additionally, the **principle of partnership** with regional and local authorities, economic and social partners and bodies representing civil society is also key element in the new policy. Partnership Contracts shall be agreed between the EC and each EU country, bringing together all the country's commitments to delivering European objectives and targets. In turn, the adoption of a European Code of Conduct on Partnership will ensure that partners are involved in the preparation, implementation, monitoring and evaluation of Partnership Contracts and programmes in a consistent manner.

Overall, it could be said that the key features of future EU Cohesion Policy are a (1) **reinforced strategic dimension** of the policy to ensure that EU investment are targeted on Europe's long-term goals for growth and jobs, i.e. the Europe 2020 Strategy (e.g. by supporting integrated programming and through more coherent planning and implementation arrangements), and (2) a **strong emphasis on results and accountability** (e.g. by fixing **clear, transparent, measurable aims and targets** for accountability and results, **introducing conditions before funds can be channelled** to ensure more effective investments rewarding performance, **monitoring progress** towards agreed objectives, and simplifying delivery).

When it comes down to regional potentials, Chapter 2 of the EU Regulation framing the new Cohesion Policy, which deals with community-led local development, mentions that LEADER initiatives designed in relation to the EAFRD shall "be designed taking into consideration local needs and *potential*, and include innovative features in the local context, networking and, where appropriate, cooperation" (EC, 2013a, Article 28). According to Article 29, local development strategies should include "an analysis of the development needs and potential

of the area, including an analysis of strengths, weaknesses, opportunities and threats" (ibid. 2013a).

All in all, the implications of the EU Cohesion Policy 2014-2020 for the green economy will be potentially strong. On top of the abovementioned nexus with territorially-bound potentials, the Regulation explicitly mentions sustainable development as one of the horizontal principles and cross-cutting policy options driving the new Cohesion Policy.

According to the abovementioned Regulation, "Member States and the Commission shall ensure that environmental protection requirements, resource efficiency, climate change mitigation and adaptation, disaster resilience and risk prevention and management are promoted in the preparation and implementation of Partnership Contracts and programmes. Member States shall provide information on the support for climate change objectives using the methodology adopted by the Commission" (EC, 2013a, Article 8) .

Additionally, the Regulation mentions that co-financing rate from the Funds to a priority axis may be modulated to take account of protection and improvement of the environment, mainly through the application of the precautionary principle, the principle of preventive action and the polluter pays principle, among other criteria (EC, 2013a, Article 111).

The Common Strategic Framework elements related to the coherence and consistency with the economic policies of Member States and the Union, coordination mechanisms among the CSF Funds and with other relevant Union policies and instruments, horizontal principles and cross-cutting policy objectives and arrangements to address territorial challenges are presented in Annex 1. Among these elements, some are particularly relevant for sustainable development and green growth.

Along these lines, the Regulation establishes Member States are requested to "give particular attention to prioritising growth-friendly expenditure, including spending on education, research, innovation and energy efficiency and expenditure to facilitate the access of SMEs to finance and to ensure environmental sustainability, the management of natural resources and climate action, and to ensuring the effectiveness of such spending" (EC, 2013a, Annex 1).

In particular, managing authorities are requested to undertake actions for the benefit of the environment by implementing the following actions:

a) directing investments towards the most resource-efficient and sustainable options,

b) avoiding investments that may have a significant negative environmental or climate impact, and supporting actions to mitigate any remaining impacts,

c) taking a long-term perspective when 'life-cycle' costs of alternative options for investment are compared, and;

d) increasing the use of green public procurement.

The specific green economy initiatives related to the core group of projects mentioned in this Annex as those that should attract the largest share of investments made with the support of the CSF Funds are (1) all those with climate change mitigation potential, as well as be resilient to the impact of climate change and natural disasters such as increased risks of flooding, heat waves and extreme weather events.; (2) those preserving and managing biodiversity, and; (3) those related to innovative water and waste management.

Last but not least, ex ante conditionalities linked to environmental targets and strategies are also identified in order to qualify for CSF. These include a vast array of instruments potentially relevant for green growth, such as ordinary environmental assessment for major projects and Strategic Environmental Assessment for regulations, taking into account climate change adaptation and mitigation needs, and risk disaster resilience.

1.4. GREECO interpretation of territorial potentials

All the formal and policy documents mentioned in previous sections have delivered a number of interpretations of the concept of territorial potential that can be summarised as follows:

- In the Oxford English Dictionary: “the latent qualities or abilities that may be developed and lead to future success or usefulness” [mass noun].
- In the Oxford English Dictionary: “the possibility of something happening or of someone doing something in the future” [count noun].
- In ESPON PURR project: “what (maximum) development level the region might achieve”.
- In the Barca Report: “underutilised local resources”.
- In the TA2020: “specific assets and factors which contribute to the competitiveness of places”, or “territorial capital to realise optimal solutions for long-term development”.

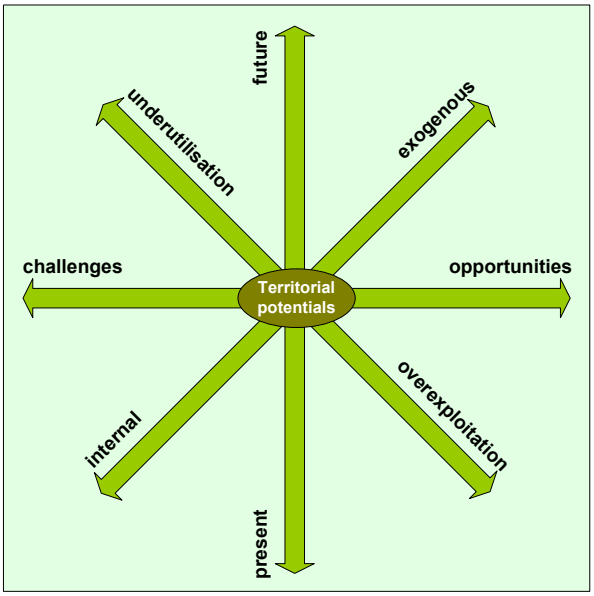


Figure 2 Conceptual dimensions involved in the notion of territorial potentials

Combining all the above conceptual elements in a stand-alone definition, it can be said that territorial potential for the green may be defined as:

> ***A combination of territorial factors (including external as well as internal forces) that produce a theoretical and mutable opportunity for future growth, improvement or expansion of the green economy in its diverse and concurrent***

manifestations (i.e. intensified growth, enhanced sustainability, increased social inclusion, and stronger territorial cohesion).

Against this background, the territorial factors have been defined in GREECO as territorial perspectives that condition the development of regions based on greener activities. Generally speaking, they are non-uniformly distributed and are place-based (because they are 'located in space'); which means that they account for the basis of how European regions differ in both their 'pre-conditions' and their 'possible effects' for a transition towards a green economy.

In a nutshell, as reflected in the Inception and Interim Reports, GREECO understands the regional potential for a green economy as the *combination* of the *factors* that encourage or prevent regions and territories to successfully start or consolidate a transition to a green economy. Accordingly, the regional potential for green economy development is defined by the presence or manifestation (or otherwise the absence) within regions of the green growth factors identified by the literature review, case studies and sector reports. Identifying and characterising such territorial factors has been instrumental in assessing territorial potentials.

Section 2 - Methodology

The extremely complex territorial structures that lay under the concept of territorial potentials makes impossible to produce a one-size-fits-all research strategy. On the contrary, a flexible and tailor-made approach to territorial potentials for the green economy within sector analyses and case studies seems more appropriate that a rigid methodological structure. This kind of flexible approach is the one implemented in GREECO project, as illustrated below.

2.1. Assessing the territorial potentials for a green economy within sector reports and case studies

2.1.1. Linking concepts and methods

As it emerges from the conceptual discussion, there is a tight link between non-policy "drivers, barriers enablers and hindering conditions" on the one hand, and policy intervention, on the other hand. Appropriate policies can speed up transition towards a green economy by strengthening the territorial assets present in the region or slow it down putting barriers on such transition by imposing ill-designed combinations of measures impeding creativity and innovation (UNEP, 2011a). As a result, when it comes to identifying territorial potentials, policies themselves can be considered drivers, barriers enablers and hindering conditions (hereafter *factors*) boosting or hindering back the green economy (ibid.). This principle is illustrated in the figure below:

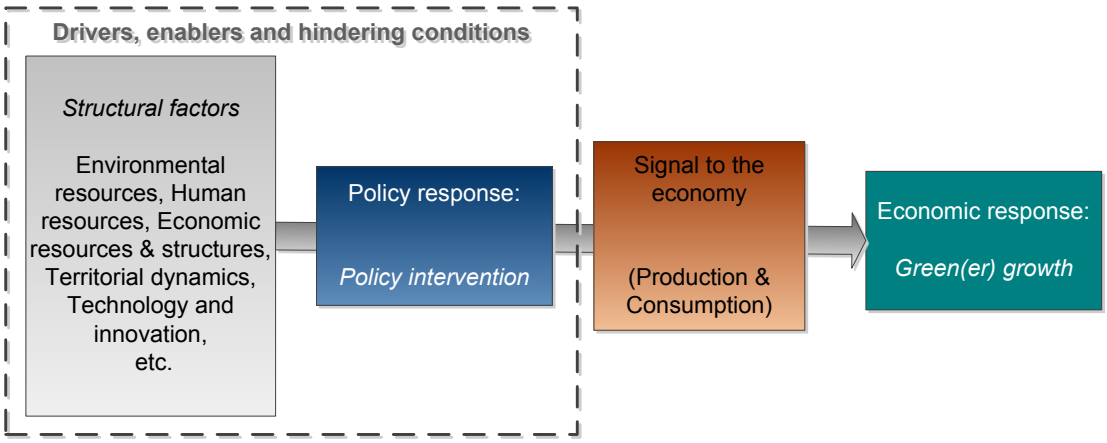


Figure 3 GREECO understanding of driving forces and enabling conditions of green growth

Accordingly, the objective of GREECO sector reports and case studies with regard to identifying green growth factors has been twofold: on the one hand, these analyses have identified and characterised the structural factors conditioning green growth within sectors and case studies; on the other hand, the policies affecting green growth have also been pin pointed and assessed as factors of much relevance conditioning territorial potentials.

However, considering that policy-related factors have been analysed in-depth within the policy analysis task of GREECO project, this document focuses on non-policy factors, namely *those territorial assets, structures and conditions that boost or hinder back green growth within European territories and regions*.

2.1.2. Selecting headline factors

The amount of non-policy factors related to the green economy within most sectors analysed in GREECO is extremely large. No meaningful green economy-related analysis could have been performed unless the list of potential factors was narrowed down to a reasonable number of five to ten factors per sector and case study.

This decision allowed sector reports and case studies (1) to deliver targeted policy messages for each sector and case study, as well as; (2) to allow for different combinations of such factors within the top-down assessment of factors performed in GREECO project in a way that a reasonable number of tailor-made policy recommendations could also be delivered with a cross-cutting territorial perspective.

Against this background, in GREECO the selection of the most relevant factors has mainly relied on the evidence collected or produced within the project. This included, inter alia, (1) indirect assessments of the theoretical and economic green development potentials for some sectors (such as the renewable energy potentials), (2) previous studies analysing sector or regional potentials, as well as (3) the questionnaires, opinions and feedback received from stakeholders within case study regions, including insights on job creation and generation of GVA.

2.1.3. Setting the scene for a qualitative interpretation of the relevance of non-policy factors

By definition, selecting a subset of factors for each sector and case study implies developing a ranking of drivers and choosing those that have a greater influence on the concerned sectors and case studies. In this vein, authors of case studies and sector reports made an attempt to select factors according to their relevance in relation to all the conceptual elements collected in the analyses.

A comprehensive assessment of this kind would have ideally implied developing some kind of (territorial) impact assessment based on models, surveys or alternative methods. These should take account of the potential impact of the different forces on different territories within the context of the green economy. The mechanisms of impact propagation can be

separated into two categories: market effects (e.g., turnover; increased Gross Value Added) and non-market effects (e.g., impacts on the territorial / social cohesion of a given region, or environmental impact).

Because of the time lag or their indirect nature, impacts cannot easily be calculated, considering that complex impact assessment methods fall far beyond the scope and resources of this specific project. However, where possible and where studies have been done, the authors of the sector analysis and the case studies have elaborated on the potential effects of specific factors of the green economy.

This has been mainly done through surveys and questionnaires with relevant stakeholders within case studies. The questionnaires covered both factual evidence (e.g., how many new jobs have been created in relation to one specific policy programme?), as well as local perception on the green economy development within case study areas (e.g., how many jobs could be created in the future in relation to a given factor?).

When analysing values for impact indicators, authors paid particular attention to causality. To what extent do observed territorial trends relate to the green economy and what other factors may have had an influence on it?

Nonetheless, whatever method is used to discuss impacts within specific case studies and sector assessments, for conceptual coherence the analysis of factors has at least covered the four spheres of the green economy according to GREECO project, namely economic, environmental, social and territorial. Thus, the analysis informed on the influence (positive, negative or neutral) that each relevant factor has on the concerned dimensions.

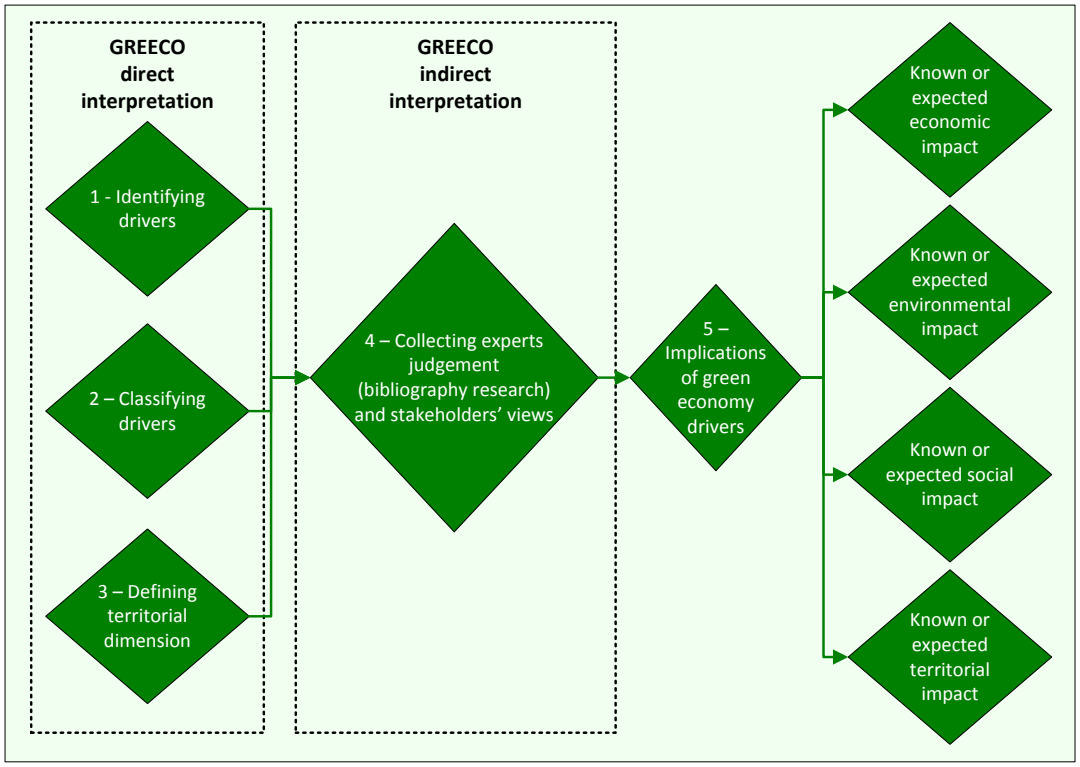


Figure 4 Characterisation and assessment of green growth factors within sector analyses and case studies

2.1.4. Characterisation of non-policy factors according to their specificity for the green economy

Some factors affect transversally all economic sectors regardless of their greenness. For instance, the overall quality of government action, being a crucial aspect enabling green growth, can be said to impact the economic activity in general. On the contrary, some other forces are specific to green products and services (e.g. eco-innovation capacities or tradition).

Thus, despite that it cannot be aprioristically argued that the most relevant green economy drivers are specific to this portion of the economy, focusing the analysis on such unspecific factors would not shed light on those elements of especial relevance for the project. It should be considered in this respect that the ultimate goal of GREECO is contributing to identify the right policy mixes that could support a stronger and faster transition to a greener economy at the regional and local levels across Europe.

Accordingly, for the sake of conceptual coherence and policy relevance, within sector analyses and case studies the analysis has mainly targeted those factors that are *specific* to the green part of the economy, regardless of their impact in comparison to other un-specific factors.

2.1.5. Characterisation of non-policy factors according to their provable impact on the green economy spheres

Authors have described the potential of main factors to contribute to green economic development at the regional level within sector analyses and case studies by providing a synthetic characterisation of factors according to their potential to contribute to green economic development at the regional and local levels.

For operational reasons, the characterisation has been simplified to three possible impacts (positive, neutral and negative) on all the spheres included in the green economy concept, as illustrated in the following table:

	Environmental (sustainability)	**Economic (growth)**	**Social (inclusion)**	**Territorial (cohesion)**
Classification of selected non-policy factors according to their potential / provable impact on the different spheres of the green economy	Positive / Neutral / Negative	Positive / Neutral / Negative	Positive / Neutral / Negative	Positive / Neutral / Negative

Basing on the table above, impacts of non-policy factors on the different spheres of the green economy have been characterised in the following terms:

Potential contribution of selected non-policy factors on the different spheres of the green economy (impacts can be positive, negative or neutral)	**Positive weak (+)**	**Positive average (++ or +++)**	**Positive strong (++++)**
	Less than two of the dimensions of the green economy considered in GREECO (i.e. economic, environmental, social and territorial) and related indicators are impacted positively. **No dimension is impacted negatively**.	**Two or three** of the dimensions of the green economy considered in GREECO (i.e. economic, environmental, social and territorial) and related indicators are impacted positively. **No dimension is impacted negatively**.	**All** the dimensions of the green economy considered in GREECO (i.e. economic, environmental, social and territorial) and related indicators are impacted positively.
	Negative weak (-)	**Negative average (--)**	**Negative strong (--- or ----)**
	One or less of the dimensions of the green economy considered in GREECO (i.e. economic, environmental, social and territorial) and related indicators are impacted negatively. **No dimension is impacted positively**.	**Two** of the dimensions of the green economy considered in GREECO (i.e. economic, environmental, social and territorial) and related indicators are impacted negatively. **No dimension is impacted positively**.	**More than two** of the dimensions of the green economy considered in GREECO (i.e. economic, environmental, social and territorial) and related indicators are impacted negatively. **No dimension is impacted positively**.

Table 1 Characterisation of the impacts of non-policy factors on the different spheres of the green economy

This classification has been also used to choose the most influential (headline) factors. Those factors showing a stronger positive (++++) or negative (--- or ----) impact have been chosen as those being more influential for green growth within each sector report and case study assessment.

2.1.6. In-depth characterisation of headline factors

Based on previous selection criteria, each relevant factor has been further assessed by means of a full characterisation. This characterisation, instrumental for validating the selection of indicators itself and for designing effective policy mixes, has been done within sectors and case studies according to a number of criteria, including the following elements:

Characterisation of non-policy factors according to their externalities and trade-offs

In some cases the analysed factors showed a clear-cut effect on the greening of the involved sector or case study, being easily labelled either as drivers or barriers, respectively boosting or hindering green growth. Still, in a number of situations the final impact of factors showed contradictory effects on the different spheres, sectors and territories under analysis.

This issue has a twofold interpretation and consequently has been addressed from two different perspectives:

1. On the one hand, authors have elaborated on the potential impacts of factors on the different green economy spheres (i.e. economic, environmental, social and territorial). For example, one factor could have a positive impact on environmental sustainability and economic growth but increase at the same time spatial segregation, undermining territorial cohesion. These (potentially conflicting) effects of factors on the different green economy spheres have been labelled as *trade-offs*.

Trade-offs (+…/-…)
These are factors that have mixed positive/negative implications on the different spheres of the green economy (i.e. positive in one of the dimensions of the green economy considered in GREECO, namely economic, environmental, social and territorial, and negative in one or more of these dimensions). The number of plus and minus symbols in the numerator and denominator of the fraction symbolising trade-offs is equal to the number of dimensions impacted positively and negatively, respectively, considering that neutral impacts can also occur and should not be represented with any specific symbol.

2. On the other hand, authors have elaborated on the possible impacts of factors on other sectors / regions. Whereas in some cases green growth factors are tightly linked to one specific sector, (e.g. wind energy potentials) or case study (e.g. a clean-tech cluster located in an specific area), in some others such factors impact more than one sector, such as technological and managing capacities within the public and public sectors, or may be present not only in one area but also in other regions, such as consumer awareness on green products. Furthermore, some factors have a clearly positive influence in one sector or within one case study but bring negative effects on other sectors or regions (e.g. water scarcity can create business opportunities in some sectors[3] but can also be a barrier for other sectors to grow, typically organic farming). These (potentially conflicting) effects of factors on sectors and territories have been labelled as *externalities* and have been assessed, at least superficially, within sector reports and case studies.

Externalities
These are factors that have mixed positive/negative implications on other sectors or regions (i.e. factors that have a positive influence in one sector or within one case study but bring about negative effects on other sectors or regions (e.g. water scarcity can create business opportunities in some sectors but can be at the same time a barrier for other sectors to grow, typically organic farming).

[3] http://www.nytimes.com/2011/03/22/business/energy-environment/22iht-rbog-innovation-22.html?pagewanted=all&_r=0

Thus, this analysis of trade-offs and externalities acknowledges the importance of searching for synergies between factors and avoiding conflicting effects between potential policy measures.

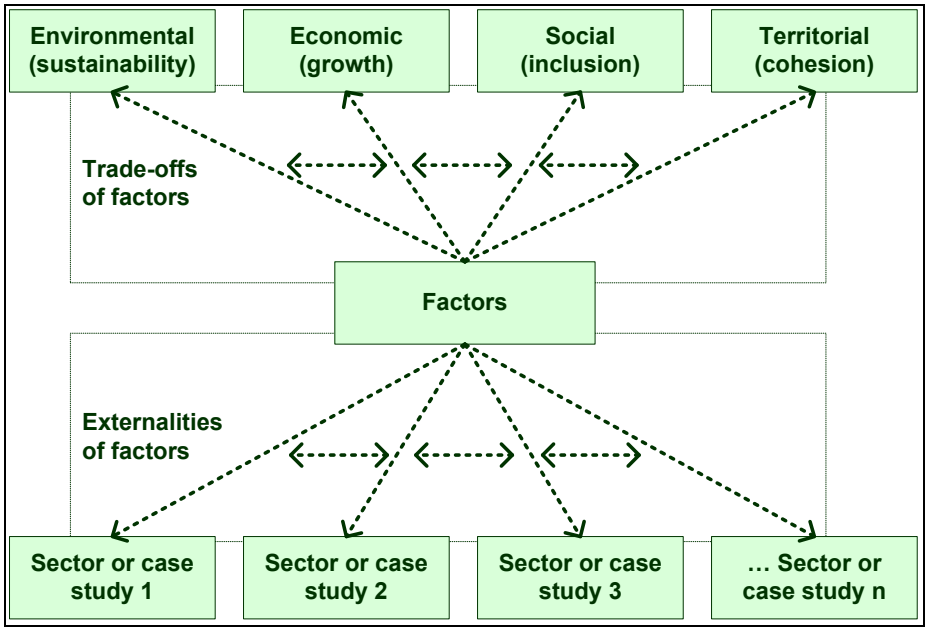


Figure 5 illustration of trade-offs and externalities of green economy factors

Characterisation of non-policy factors according to their mutual interactions

The countless possible interactions between factors themselves may create a number of potentially conflicting scenarios in some areas. For example, a given region might have good theoretical conditions for the development of environmental technologies and related activities in terms of training and qualification of the population. Still, the absence of long term private investment schemes might prevent these activities, which sometimes are very capital intensive, to become profitable and flourish. It is the *joint effect* of all these forces, rather than the impact of any of them taken in isolation, the one that eventually determines territorial potentials for green growth.

Accordingly, in most cases the assessed factors have not been interpreted as stand-alone cause-effect forces driving green growth. On the contrary, linkages with and dependences to other factors have also been considered. These linkages between factors become apparent as project reports and case studies progressed, and eventually lead to powerful policy messages.

Characterisation of non-policy factors according to the causal level of operation (proximate/direct versus underlying/indirect factors)

In relation to previous point, a meaningful distinction that was made in GREECO is the one between *direct* versus *underlying* factors, despite that it is quite difficult to discern between the two types of forces both from a conceptual and operational perspectives. Furthermore, it is even more difficult to establish a clear link between underlying (or predisposing) factors of green growth than between direct forces.

For instance, when it comes to capturing territorial potentials in terms of assessing the *maximum* level of development that a sector or region might achieve, one of the most relevant causal forces that could be mentioned is the degree of "greenness" that a given sector or regional economy have already achieved, respectively, and how the previous development of green activities can condition future potentials. This issue can be tackled from two different points of view:

- From one perspective, assuming that the entire sector or regional economy can be 100% green in all cases, the farther a given area is from completing the transition to a green economy, the larger market-driven incentives its productive forces will have to start or speed-up such transition, and thus the larger theoretical potentials sectors or regions have to shift paradigm.
- From a different perspective, though, the same situation may lead to a potentially conflicting interpretation, as it can be argued that the more tradition a given sector or area has in terms of delivering green products and services, the more theoretical potentials these hold to innovate within those or related green products and services and thus become more competitive in a globalised economy.

Whereas under the first interpretation the *relative* share of green activities is considered more influential, under the second reading it is the *absolute* perspective the one to prevail, assuming that any given economic activity can always grow in absolute terms, regardless of its relative market share.

In any case, as far as the analysis of regional potentials is concerned, what really matters is the provable *direct* cause-effect influence that each green growth factor found has on a given sector or region at a given time. For instance, focusing on relative shares, it could be argued that remediation activities are favoured by the mere presence of specific environmental problems. Take for example water pollution. If the overall quality of water resources within a region is of extremely bad quality, the theoretical potential of water remediation and related activities within that region could be expected to be large.

Still, theoretical potentials derived from *underlying conditions* or problems such as environmental degradation could or could not unleash the implicit economic potential of environmental restoration activities, depending on whether the environmental issue is perceived as a political priority in a specific point of time and space. If the problem ranks high in the policy agenda because the environmental awareness is high, or the area is forced to endorse a regulation designed within an upper level of governance, then the concerned public authorities will allocate resources to tackle the environmental issue, creating the *proximate conditions* for the economic potential to emerge. Otherwise the environmental problem remains a theoretical potential, but does not become an effective economic opportunity.

The main challenge in this respect is how to discern what are proximate factors from what are underlying forces. From this perspective, it can be argued that there is no better master than reality and observation. Following to previous example, it becomes evident as within our civilisation we have tolerated much environmental degradation for centuries. It has been only since the last few decades that Western society in general has started to pay attention and invest resources in environmental restoration. This same logic does not even apply yet to some on-going environmental problems (take the example of climate change mitigation).

From the *evidence* above it follows that environmental damage cannot be considered a direct driver *per se*, simply because environmental damage has been present for a long time (and still is) without inducing any economic or even social response. If environmental degradation was a powerful driver by itself, we would have *already*

achieved a green economy. Accordingly, environmental degradation can be seen as the *underlying justification* for a green growth. But it cannot be considered a direct factor *triggering* economic activity. Similarly, the environmental awareness of population can be seen as a prerequisite for green growth, considering that in its absence environmental degradation is not even perceived as a problem to be tackled. But awareness has not itself the capacity to activate any economic response, neither (Csutora, 2012). The proximate factors inducing a measurable economic turnover that really have the capacity to induce an economic response in this specific case are policies (mainly regulations) and financial resources, both of which could be captured through the combined public/private investment in environmental restoration.

Thus, in order to avoid conceptual pitfalls, the factors reported in GREECO's sector analyses and case studies are in all cases of proximate/direct nature, unless an existing policy agenda at the EU or national levels clearly supports the idea that this theoretical-to-effective transformation will likely occur in the mid-term.

Along these lines, most part of the demand-driven factors related to environmental degradation have not been considered as proximate green growth factors but as underlying or indirect forces. On top of the justification provided above, it should be considered as well that the inclusion of such factors would also be very controversial from a policy perspective, as it could deliver the misleading policy message that "*the worse the environmental situation in a given territory is the more green growth potential that area has*", which is not totally true.

Characterisation of non-policy factors according to the spatial level of operation (internal versus external factors)

As it has been stated above, the possibility of something happening in the future (e.g. a successful transition to a green economy) does not only depend on the presence of *latent* or *internal* qualities or abilities of regions (i.e. territorial assets). On the contrary, things might also change or develop as a response to stimuli external to local agents of change. Typically, these are powerful forces associated to global trends, processes or dynamics such as the evolution of international energy prices, or the accumulated impacts of climate change. For this reason, these are factors that can increase or reduce territorial potentials but are usually beyond the control of regional and local authorities. Similarly, these factors are generally neutral from a spatial perspective (although their *manifestation* on different territories tends to be distinct). This distinction between internal and external factors has been made explicit both within GREECO's sector reports and case studies, particularly within the latter.

Characterisation of non-policy factors according to the type of market force involved

Some factors, such as an increasing popularity of environmentally friendly products, can be considered demand-side factors creating market stimulus for green products or services for specific sectors. On the contrary, other factors like environmental assets or good access to information, knowledge and technology are mainly supply-side factors that encourage (or discourage) green growth, such as agricultural potentials encourage or discourage organic farming or the presence of a specialised research centre enables the development of new green technologies within a given region. These considerations have been made explicit too within the analysis performed in GREECO project.

2.2. Delivering policy recommendations: making the link between policy and non-policy factors

As claimed in previous sections of this document, one of the core objectives of the analysis of green growth factors in GREECO has been to determine to what extent such factors can be influenced by policy action:

- On the one hand, there are factors that cannot be easily (or directly) influenced by the actions of local and regional policy-makers, in the short to medium terms. Still, such factors largely condition the behaviour of the sectors and thus their transition towards a green(er) economy. They include at least the following categories: (1) the environmental resources; (2) certain aspects of human resources (those skills for which there is a longer time lag between strategic educational planning and local availability of expertise, let alone migration of experts to bigger and capital cities); (3) certain aspects of territorial dynamics (accessibility, city networking, functional regions, etc.); (4) certain aspects of technology and innovation (intellectual assets and capacity of companies to innovate), and; (5) certain aspects of the institutional framework (efficiency of institutions).
- On the other hand, there is another category of factors that may be addressed more directly by local authorities and policy-makers in the short or medium terms. Usually, they cannot guarantee a successful transition to a greener economy per-se, but they determine to a great extent the direction and speed of transition. These factors include different kinds of policies introducing targets, setting the right price of an economic good or forbidding a certain type of individual or company behaviour incompatible with green economy. Removing a certain type of policy barriers also belongs to this category. This group of factors also includes setting appropriate funding schemes for different key aspects of green economy such as: training of non-specialised human resources, innovation, etc. Funding is a matter of priorities and political consensus can be easily modified to the better or worse in the short term. Funding can also be optimised and made more efficient.

However, certain factors lie in a grey zone between the easily modifiable in the short term and those for which there is a significant time lag. For example, while it is relatively easy and inexpensive to regionally train operators for a certain type of uncomplicated green job, it takes educational planning and vision to educate high-level environmental engineers and environmental policy specialists and additionally create the right conditions to keep them in the territory. It is also relatively simple to organise awareness raising for companies on advantages of innovations, energy efficiency, zero CO_2/waste economy and other aspects of green economy. However, real change of behaviour of companies takes time and depends on a number of other factors such as market pressure; company culture; competitive environment, etc. This grey zone has also been elucidated within GREECO project, which have eventually led to the policy recommendations included in the analysis.

The methodological steps implemented in GREECO to provide an answer to this point have been the following ones:

1. Determine to what extent the non-policy factors characterised in previous steps can be modified by policy action (i.e. assessing which non-policy factors can be modified by policy action and which cannot).

2. For modifiable factors and those falling on the grey zone, identify the optimal policy responses needed to take advantage of positive factors impacting green growth.
3. Determine whether such policies are already in place and inform if they are working properly within sectors and case studies;
4. Propose new policy mixes or amendments on current ones within sectors or case study areas (i.e. policy recommendations).

2.3. Putting flesh on bones: from green economy factors to territorial indicators

The experience of the Europe 2020 Strategy and related EU policies has shown that it is difficult to choose indicators that are absolutely necessary for the monitoring and evaluation of a strategy and its associated programmes. Because strategies and programmes are multi-sectoral and multi-objective, there is a tendency to want to measure everything and to design systems of indicators that are so heavy that it is impossible to make them work. GREECO has tried to skip this pitfall proposing indicators that are smart, illustrative of complex, multi-dimensional, long-term processes and not only of restricted tendencies and patterns, and at the same time simple to communicate and understand.

At the same time, the proposed indicators in GREECO project ideally have a NUTS-2 territorial scale, and a good geographical (ESPON or EU-27 area) and temporal (2000-2010) coverage. Similarly, the chosen indicators have as far as possible illustrated the territorial dimensions involved in the development of green economies, in coherence with Task 2.2.1 Definition of the Territorial Dimension of the Green Economy. The latter has been implemented from two different perspectives:

- Firstly, the chosen indicators enable as far as possible the provision of a regionally differentiated picture (i.e. they are *spatially mutable*). This principle has implied selecting indicators that take account of the regional differentiation by means of their intrinsic spatial variability. For instance, powerful market-related factors such as the current and anticipated high prices of energy and raw materials, which is one amongst the most relevant factors of greeneing of the energy sector, does not typically show a strong regional variability across Europe, and accordingly loose much relevance from a territorial perspective.
- Secondly, in GREECO covering the territorial dimension also implied selecting indicators capable of capturing the spatially-explicit processes or features associated to the development of green economies, particularly for some sectors and project tasks (e.g. land take versus GDP growth, cluster economies, natural assets, etc.)

With all these criteria in mind, basing on the evidence collected within their respective assessments, the authors of sector reports and case studies have proposed relevant proxy indicators capturing green economic potentials. These indicators, which are of course linked to specific territorial factors, have been delivered to the top-down analysis of regional potentials (Task 2.3) where they have been processed and combined in a sensible way to produce a synthetic index of green economic potential at NUTS-2 level.

Section 3 – Discussion

3.1. Overview of the driving forces and enabling conditions for a greener economy

As it has already been said before, GREECO understands the territorial potential for a greener economy as the *combination* of all those *factors* that encourage or prevent territories to successfully start or consolidate a transition to a green economy. Such factors (i.e. green economy drivers and enablers) are the policies, physical and non-physical assets, market conditions and other features that are thought to activate the concepts and improve current and future greening performance across Europe. Identifying and characterising such territorial factors is thus instrumental in assessing territorial potentials at the regional level.

Figure 6 A combination of main drivers and enablers in the green economy

In a nutshell, regional potentials for green economy development have been characterised in GREECO project as the presence or manifestation (or otherwise absence) within regions of the green growth factors identified by the literature review, case studies and sector assessments performed in the project.

Such key factors shaping the evolution of green economy are described in the following pages:

3.1.1. God governance: institutions, policies and regulations

Quality of government is frequently presented in literature as a key enabler favouring socio-economic development at the regional level (N Charron & Lapuente, 2011; Nicholas Charron et al., 2014; Rothstein, Charron, & Lapuente, 2013). Quality of government has also been mentioned by some studies as a significant factor contributing to environmental sustainability (Morse, 2006).

The territorial evidence produced in GREECO proves that the governance setting certainly is instrumental for the transition to the green economy from many perspectives. All governance levels are important and it is difficult to single out one as more important than the other. GREECO case studies showed that while EU and national policies and targets give the initial momentum and create the overall framework of operation, regions and municipalities are instrumental in translating this vision into regional and local realities.

The **policies** help to create favourable framework conditions, reduce the cost of investments and increase knowledge development. From a sectorial perspective, **EU policies** are highly important for some sectors, such as agriculture (CAP) and fisheries (CFP). For other sectors there are no common policies, but a combination of different EU Roadmaps, Thematic strategies and Directives that steers greener development.

National legislation and regulations are highly important, in turn, in steering the green development of the forestry and building sectors. In case of the building sector, national policy schemes in the form of local building regulations have played a crucial role. Similar regulations have been found to be key greening drivers for most sectors.

From the **regional perspective**, one possible strategy for regions is to align themselves with national, EU targets and ensure compliance. Among GREECO case studies, this is the case with less ambitious regions or late starters such as Malta and its RES targets. However, these targets might not be sufficient for ambitious regions such as Navarra, Zealand or Puglia which have already reached far in their RES development and therefore need more ambitious goals.

The significance of regions is bigger in larger, more decentralised countries such as Spain, Germany and Italy. Other countries like Sweden and Denmark have weaker regions with limited jurisdiction but are instead having strong municipalities and the primary driving forces of the transformation towards the green economy are thus the national government and the municipal administrations. Regional role is harder to nail in smaller countries without strong regional administrative traditions such as Hungary and Estonia. It has to be noted that because of the Cohesion policy, regions have gained in importance especially as far as planning is concerned. Nonetheless, in the example of the UK, regional structures have been dismantled or significantly reduced and demonstrates that the role of the regions also has political dimensions.

Another lesson emerged from GREECO case studies is that stability is also one of the characteristics of good governance. In particular, ensuring the **continuity of strategic choices** such as adopted targets, financial commitments for greening the economy or simply having an overall mindset which is propitious to greening the economy is important to ensure successful implementation of long-term policies. This is very much a challenge at the end of a political cycle. Navarra (Spain) is a positive example in this regard where a persistent commitment to green the regional economy has been translated into a widely consulted and agreed Regional Innovation Strategy – MODERNA.

Along these lines, all case studies have demonstrated unequivocally that the **strategic vision** of a region is a major driver for greening the regional economy. This is especially the case if the strategic vision has been achieved with the **participation of a wide group of regional**

stakeholders – public, private, non-governmental sector and academia. The approach guarantees a shared understanding both of the benefits and challenges of greening the whole economy or a specific sector. The Maltese Tourism Plan is an example of a shared sustainable vision for one particular sector.

Additionally, regions and municipalities have a powerful leverage through **spatial planning, permitting and enforcement of legislation** which is the case for Zealand. For example, integrated urban and transport planning making it easier to use bicycle-public transport combinations and park-and-ride commuting are examples of local planning efforts that are key to the transformation.

In parallel, case studies show that the **diversity of regional institutions**, the synergies between them and the quality of human resources are a strong factor for enabling the transition to the green economy. Puglia is a positive example in this respect with a remarkable landscape of institutions operating in the field of advanced technologies within energy, agriculture and nanotechnology, which have enabled the leading role of the region in this field. These institutions are not restricted to public organisation, but range from industry to research.

3.1.2. Key economic instruments: access to funding and financial support

Access to funding for governments and businesses in green sectors is crucial for achieving a green growth. Access to the economic capital is essential for R&D and application of new technologies, RES, development of infrastructure for recycling etc., considering that these developments require high initial capital investments, which normally have a long pay-back period (DG Environment, 2006). Consequently, in order for green businesses to emerge and expand, adequate levels of private investment need to be available (Miranda & Larcombe, 2012; UNEP, 2011b). It may also be necessary to increase the availability of public finance so that a range of policy tools can be used to leverage local assets. In particular, **financial support** via the EU and national policies and funding schemes is a prerequisite for fostering green transitions (DG Regio, 2011; EC, 2011b; EEA, 2011; OECD, 2011c).

A lack of financial support is seen among the limiting factors for greener growth in virtually all the case studies analysed in GREECO, whereas most regional actors contacted within case studies stressed the importance of financial mechanisms and emphasise the need for increased public support. This perception was also certified by Flash Eurobarometer 381 that reviews the current state of the green market and the resource efficiency actions amongst Europe's SMEs, as well those in neighbouring countries and in the US (EC, 2013b). According to this survey, the financial incentives for new products, services or production process development are **the most likely** to assist green market SMEs become more resource efficient, and launch or expand their green product or service offering.

According to the poll results of Question 16 of Flash Eurobarometer 381 (EC, 2013b), financial support (grants and subsidies) is the most important driver mentioned by EU SMEs to make their company more resource efficient (34%), in contrast to one quarter that would prefer instead to receive consultancy support on improving resource efficiency (25%). One in five SMEs (22%) would like to receive advice on funding possibilities for resource efficiency investments, which is also strongly related to funding support.

Figure 7 Relevance of different types of support for increasing resource efficiency within EU SMEs.

Source: Eurobarometer 381 (European Commission, 2013).

According to the analysis of results by company characteristics done by Flash Eurobarometer 381 (EC, 2013b), companies with 50-249 employees are more likely than small and micro enterprises to mention grants and subsidies (40% vs. 33%-35%). Analysing results by economic branch, it can be evidenced that manufacturing and industry SMEs are the most likely to mention grants or subsidies (40% and 37% vs. 32%-33%).

For the vast majority of EU countries (23 out of 28), grants or subsidies are considered to be the most helpful in improving recourse efficiency, particularly for SMEs in Croatia (58%), Slovenia (56%) and Greece (48%). On the opposite side, Portuguese (21%), Finnish and Dutch (both 23%) SMEs are least likely to mention this option, similarly with those in Norway (21%) and Liechtenstein (12%). According to Flash Eurobarometer 381 (EC, 2013b), getting advice on funding possibilities for resource efficiency investments is particularly relevant for SMEs in the Former Yugoslav Republic of Macedonia (39%), Malta (34%), Croatia, Latvia, Luxembourg and Ireland (all 29%).

Financial support is also the most relevant driver mentioned by EU SMEs to launch or expand their range of green products or services. According to the poll results of Question 27A of Flash Eurobarometer 381 (EC, 2013b), almost half (46%) of the EU SMEs that already sell green products or services and a 29% of those that do not offer them yet mention financial incentives for new product, services or production process development as the kind of support that would be most helpful to them to expand their green offering. Comparatively, this kind of incentives are much more likely to be mentioned than, for instance, assistance with identifying potential markets or customers (27%), technical support or consultancy for new product, services or production process development (22%) or consultancy for marketing or distribution (19%).

This same perception is confirmed by the EU SMEs that do not currently offer green products or services financial incentives for developing new products. Those companies are also the most mentioned kind of support (29%) to launch a range of green products or services, according to survey results of Question 27B of Flash Eurobarometer 381 (EC, 2013b). Financial support seems to be the most important factor for all SMEs, regardless of their size: 28% of micro enterprises mention this kind of support, compared to 33% of SMEs with 50-249 employees.

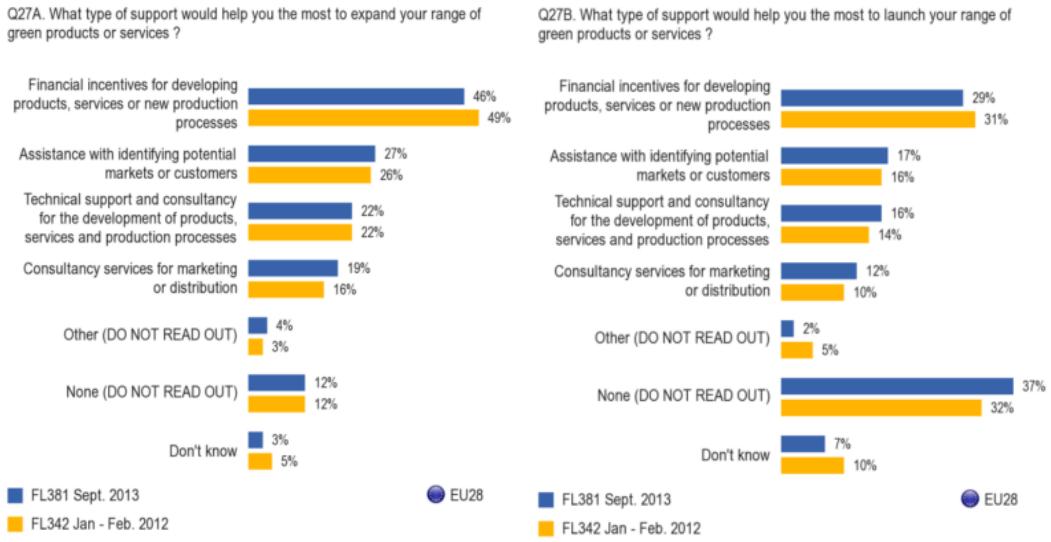


Figure 8 Relevance of different types of support for the production of green products and services by EU SMEs.

Source: Eurobarometer 381 (European Commission, 2013).

Among companies that already sell green products and services, medium-sized enterprises (50% vs. 45%-46%) and companies that do not sell to consumers (52% vs. 44%- 46%) are the most likely to mention financial incentives for product, service or production process development. Similarly, companies that currently receive public support for their green products or services (53% vs. 43% of those receiving private sector support), and companies that currently undertake at least a few resource efficiency actions are more likely to mention financial incentives (48%-46% vs. 30%) compared to SMEs who currently take no resource efficiency actions (EC, 2013b).

In turn, 29% to 36% of those companies that currently undertake resource efficiency actions mention financial incentives, compared to 17% SMEs who currently take no resource efficiency actions. Even more importantly, companies that receive support for their resource efficiency actions are also likely to use similar sources of support for the production of green products or services. For instance, the Flash Eurobarometer 381 (EC, 2013b) reports that 19% of SMEs that use external financial resources for efficiency actions also use external financial resources for production of their green products or services. This implies that policy support for SMEs geared towards the achievement of more resource efficiency with a life-cycle perspective can also have a great impact on the production of green products and services, unleashing what could be defined as an 'intra-firm multiplier effects'.

Within GREECO case studies and sector reports, financial support may take the form of a **feed-in tariffs** (e.g. renewables in Malta, Puglia, Navarra, etc.), **financing mechanisms** for R&D and technological cooperation in the region**, grant support** for innovative companies and projects, etc. Funding could either come from national sources or from **Structural and Cohesion policy**.

Green public procurement is another tool for driving the market for greener products and services and reducing the environmental impacts that can be implemented on local and regional levels. E.g. in Jämtland, green public procurement in the transport sector has been one main reason for the success of greening of such sector.

Moreover, since the prices hardly reflect the real value of natural resources, the policy support is essential for **adjusting the economic and fiscal framework** through, *inter alia*, comprehensive tax reforms, to provide incentives to become more resource efficient.

At the local level, economic instruments such as landfill **taxes and fees and penalties** to municipalities for not meeting the targets are significant drivers for stimulating the certain waste treatment options, whereas **pricing instruments** (e.g. water pricing) is an effective tool used by the Member States to promote resource efficiency in many value chains.

Regardless of its actual implementation, all cases studies and sector reports in GREECO project confirm that availability of financial resources and targeted financial support is the strongest driver for greening value chains, particularly in less developed regions.

3.1.3. Territorial assets and physical conditions

As shown by GREECO sector assessments included in Vol. 3 of the GREECO Final report, territorial characteristics and land use issues, the territorial preconditions and the availability of suitable land resources can be considered among the important enablers for a greener development of many sectors studied, especially those with the strongest territorial ties. Still, in-depth analyses within case studies have shown that whereas the importance of natural assets depends on the sector of the green economy, **the capacity to capitalise on the natural assets is strongly linked to other factors** such as the governance and strategic framework in a specific region. This is also implicit in Camagni's original definition of 'territorial capital' (Camagni, 2008).

Take for example the transition to a greener energy sector through a growth in renewable energy. Despite that this transition is closely related to the availability of sun and wind, other non-physical conditions are also needed. This combination of physical and non-physical assets may explain why a country/region like Malta that has the best possible conditions in this respect has not been able to develop the sector. Broadly speaking, the reasons for the weak development of Malta's RES sector lay on lack of political drive, appropriate legislation and financing but also on a lack of space and resistance of the populations towards the construction of wind turbines.

On the other hand, other areas like Burgenland and Navarra have fully profited from the abundance of wind and through a strong leadership, and thanks to the excellent legislation and institutional framework they have become leaders in RES generation. Naturally, the lack of strong conflicting territorial interests from other sectors such as tourism is also a pre-condition. An interesting case of how lack of natural assets puts a pressure for greening a sector is Malta's water sector. Here extreme water shortage has been the trigger for innovative measures for greening the sector through technologies for water savings, appropriate pricing, fighting the illegal boreholes.

For the abovementioned reasons, rich natural assets can only be considered enabling conditions for green economy development if are coupled with other essential factors. Moreover, lack of natural resources can even be a trigger for greening and innovation as the need for sustainable management of scarce natural assets is critical. Accordingly, the influence of such assets must be interpreted with care. Taken in isolation, physical assets cannot be considered key enablers or barriers for green growth. Empirical evidence collected within the project shows that it is the combination with other factors the one that eventually leverages such territorial potentials at the regional and local levels.

3.1.4. Access to technology

Development and increased uptake of **new technologies and eco-innovation** play an important role in fostering the transition to the green economy across all sectors analysed in GREECO. There is strong evidence of this influence in the academic literature (see for instance EEA, 2011, 2014b; EREP, 2014; Rene Kemp, 1994; René Kemp, 2011; UNEP, 2011).

By investing in new technologies firms achieve emission reductions and are becoming more environmentally friendly, but at the same time reduce their costs, attract new customers, reduce risk and vulnerability, and gain first mover advantages compared to their competitors. Eventually, all these elements increase expand potentials for a greener economy (Bleischwitz & Bahn-Walkowiak, 2009; Dangelico & Pujari, 2010; Esty & Winston, 2009; OECD, 2009, 2010, 2011a)

3.1.5. Expected market demand

Market is the ultimate driving force for increasing the demand within all green economy sectors. For example, higher energy prices favour the proliferation of green buildings, as the benefits associated with retrofitting and new building standards outperform the 'business as usual' situation. This is also true in case of developing the renewable energy and eco-innovation, as with increasing prices on conventional energy the RES and eco-innovation targeting resource efficiency in energy use become more competitive.

3.1.6. Human resources, knowledge and skills

Human resources development is a greener economy driver recursively found within GREECO sector assessments. In particular, the development of **human capital** is essential for fostering the technology transition and increasing innovation capacity.

In some case study areas, **scarcity of human resources** has been related to demographic challenges. These challenges can influence green economy development for instance through the lack of competent labour force following negative population trends. This is for instance the case in Jämtland region in Sweden. Lack of working force is expected in many parts of the county, both in terms of low and high qualified labour force in all sectors.

In Estonia, there are significant disparities between urban and rural areas and it is difficult to attract and keep the **qualified labour force** in the peripheral areas. There is simply a lack of committed and knowledgeable people, who would take an initiative and drive the change.

In turn, South Transdanubian institutions are suffering from the low availability of quality human resources in the region. In South Transdanubia in Hungary, two universities provide various courses in the region, which could potentially satisfy the local needs of professional labour force. However, a remarkable part of the graduates apply for jobs outside of the region after finishing their studies – mostly in the capital Budapest. This situation is leading to drainage of qualified labour force in the region creating obstacles for finding highly skilled workers necessary in a knowledge based, green economy transition.

3.1.7. Environmental awareness and voluntary actions

Higher **awareness level** contributes to fostering sustainable practices and choices of the companies and individuals. Awareness is important for greening the economic sectors through consumption choices. With an overall increase of awareness level the demand for more sustainable products and services also increases. Thus, awareness may trigger market change, technology penetration, adoption of new policies etc. (Amel, Manning, & Scott, 2009; Brécard, Hlaimi, & Lucas, 2009; Nash, 2009). In transport, this would be the preference for public transport or alternative transportation; in energy – the decision to renovate the building and improve insulation; in agriculture – the preference to purchase organic products, etc. In GREECO case studies there are a number of examples illustrating such mechanisms (see Vol 4).

With growing awareness levels of the population, expectations from the manufacturers and any other businesses when it comes to social, ethical and environmental responsibilities are growing. For this reason, **voluntary certification, agreements and such tools as Corporate Social Responsibility (CSR) and eco-labeling** play increasingly important role in greening of the sectors associated with production and provision of services (particularly forestry, building, manufacturing and tourism sectors). Additionally, voluntary environmental schemes have been among the most efficient tools for fostering eco-innovation. These instruments help the enterprises to unleash innovations, improve competitiveness and reputation, and deliver better financial returns (Banerjee & Solomon, 2003; Gulbrandsen, 2006).

Similarly, GREECO case studies show that relatively high level of environmental awareness has been translated into political expectations and eventually into strategies, policies, financing and actions at the local and regional levels. From the territorial perspective, awareness is achieved through long and persistent efforts on behalf of the regional and municipal administration which control a number of communication tools. Awareness is also strengthened through consistent **involvement of stakeholders into creating a future vision**. Additionally, awareness could also act as a pull factor for environmentally-friendly goods and services.

3.2. From green economy factors to indicators on territorial potentials

As far as the construction of a regional typology based on territorial green economic potentials is concerned, the approach followed in GREECO relies on the list of drivers and indicators identified within the project. Along these lines, and coherently with the theoretical approach presented in Section 1, the indicators presented below mirror the factors discussed in Section 3.1.

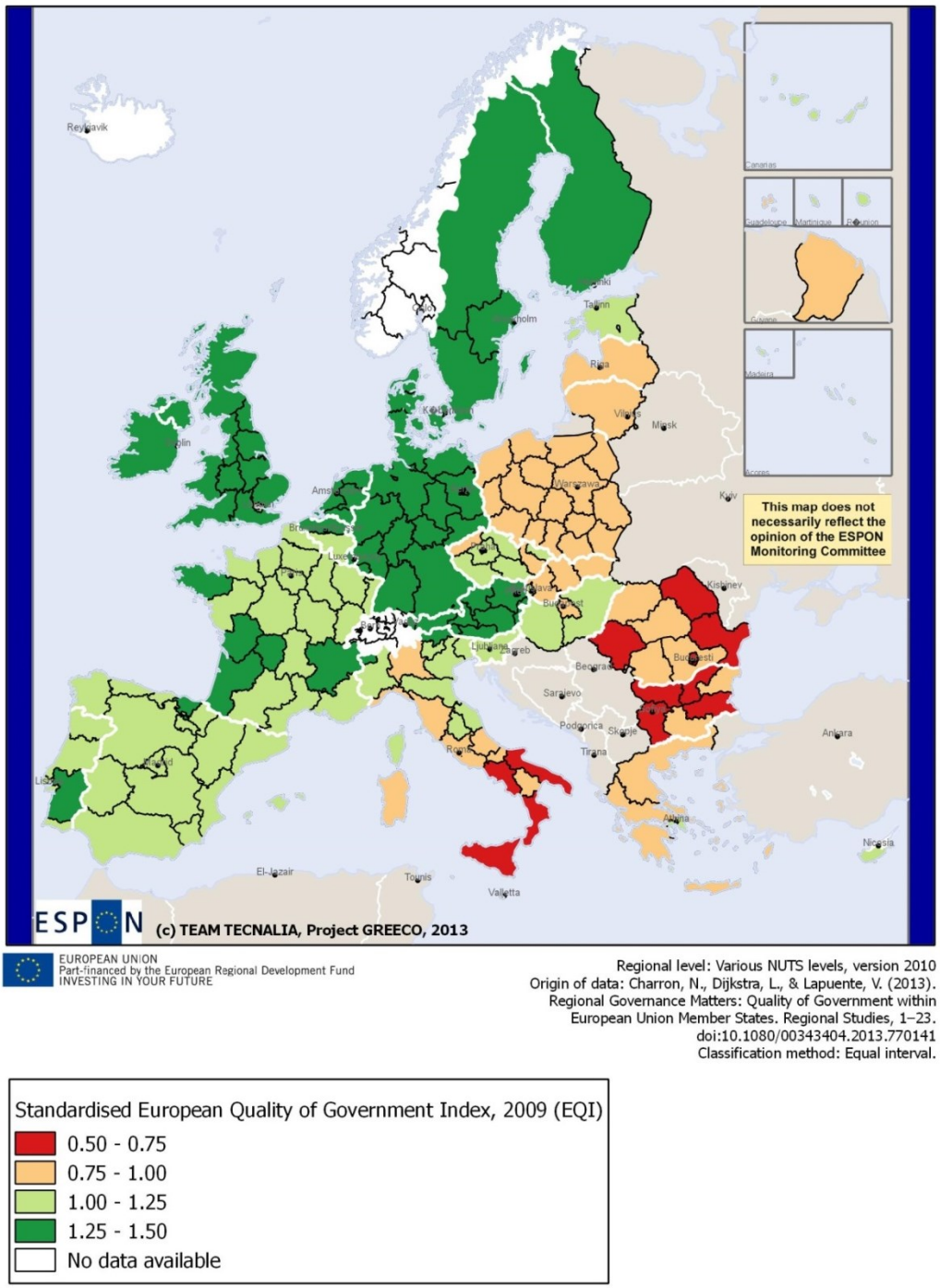
3.2.1. God governance: institutions, policies and regulations

From the governance perspective, it seems particularly challenging to differentiate those elements of good governance that are specific, or at least of special relevance, for the green

subset of the economy and sustainability, if any, from those that are rather unspecific and do not only apply to a greener growth model. Regretfully, accessing to comparable territorial information on governance and institutional settings in Europe is not an easy task, let alone gathering information specific for the green subset of the economy.

The best indicator of good governance at the regional level available in Europe is the "European Quality of Government Index" (EQI) produced by the Quality of Government Institute[4] at The University of Gothenburg (Nicholas Charron et al., 2014). This indicator, which was first was constructed for a report sponsored by the EU Commission for Regional Policy, provides a comparative overview of the quality of regional governance for 172 NUTS-1 and NUTS-2 regions within 18 of the 27 countries of the EU. The indicator itself has been inspired by the World Bank Government Indicator (Kaufmann, Kraay, & Mastruzzi, 2008).

[4] http://www.qog.pol.gu.se/data/datadownloads/qogeuregionaldata/



Map 1 European Quality of Government Index (2009)

The EQI was produced relying on a large survey of roughly 34,000 respondents in Europe which was distributed back in December of 2009. The regional data combines 16 survey questions about quality of government in each region in relation to the following dimensions of good governance: (1) public education, (2) public health care and (3) law enforcement, and criteria: (1) quality, (2) impartiality and (3) corruption. Given its methodological soundness and relevance, even if not directly related to environmental policies and the green economy as such, the EQI is a good indicator of government quality.

Map 1 presents the distribution of the EQI across Europe for the year 2009. The map shows very defined spatial patterns. Regions ranking higher in terms of quality of government are those located in the Pentagon (with the exception of Italian regions), plus the Nordic

countries, British Isles, Austria, and some French, Spanish, Portuguese and a couple of Italian regions neighbouring with Austria. Lower values are found in New Member States and the Italian Peninsula, particularly within regions located in the Italian Mezzogiorno, Romania and Bulgaria.

3.2.2. Key economic instruments: access to funding and financial support

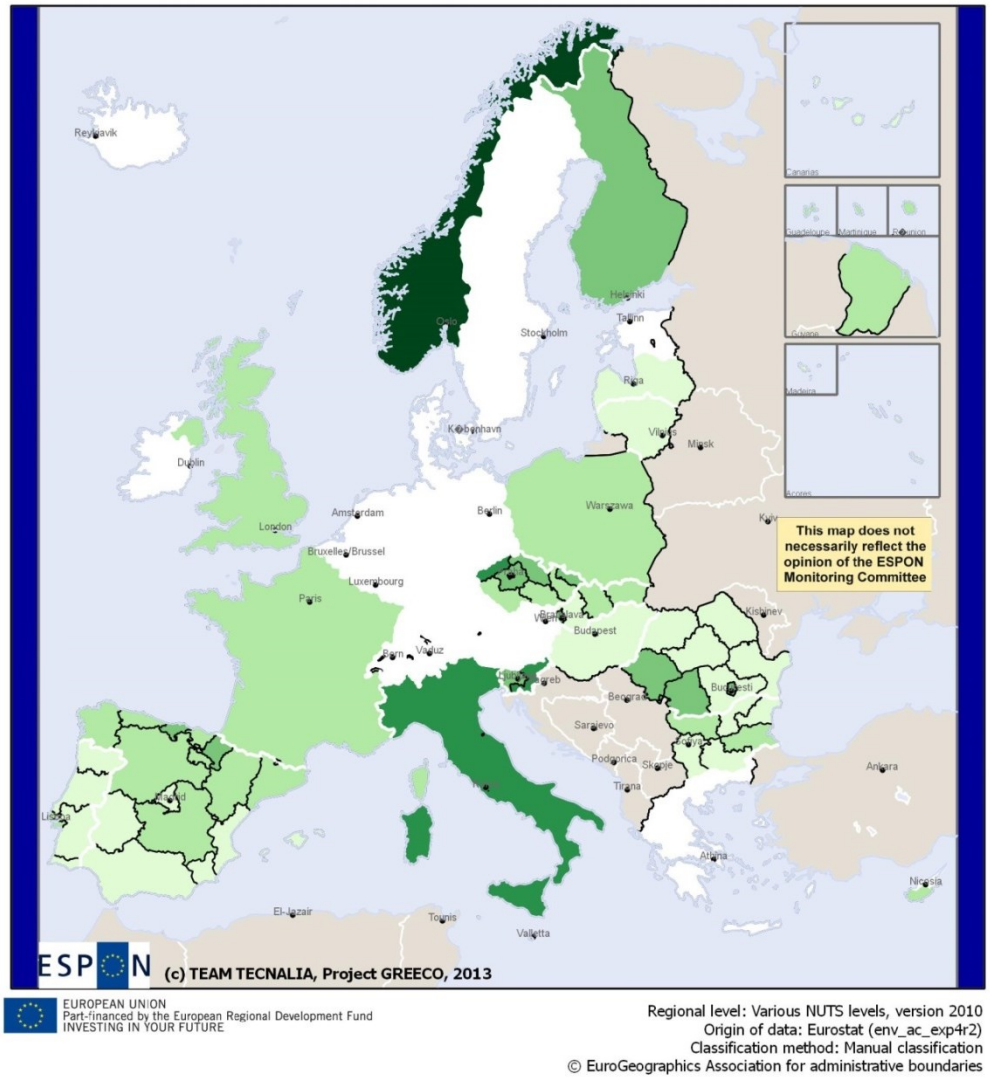
Among the very limited range of regional indicators on financial support systems and funding mechanisms available, there are a couple that could be mentioned as proxy indicators indirectly informing on the financial support tools. Such indicators are Environmental Public Expenditure and Green Public Procurement Expenditure.

Environmental Protection Expenditure (EPE) refers to activities that are directly aimed at environmental protection through "the prevention, reduction and elimination of pollution or any other degradation of the environment". These activities are defined according to the Classification of Environmental Protection Activities (CEPA 2000), which distinguishes nine environmental domains, namely 1) protection of ambient air and climate; 2) wastewater management; 3) waste management; 4) protection and remediation of soil, 5) groundwater and surface water; 6) noise and vibration abatement; 7) protection of biodiversity and landscape; 8) protection against radiation, and; 9) research and development and other environmental protection activities. This indicator covers two economic sectors (public administration and industry), plus the so-called specialised producers of environmental services[5] (public and private enterprises specialised in environmental services such as waste collection).

To a certain extent, the indicator may render the idea of the actual willingness, financial capacity and actual need to invest on environmental management and remediation by all the economic agents involved in productive activities within a given context. Nonetheless, EPE is not a financial support mechanism itself. It cannot be related either with a direct increase in resource efficiency or a policy-driven transformational aim at the regional and local scales. It should be considered in particular that environmental expenditure does not necessarily deal to a net increase in resource efficiency, as the largest share of EPE flows to management and restoration activities. EPE does not inform either on the efficiency of the investment made in terms of environmental benefit achieved per euro invested. Fluctuations in EPE at the regional level are also very sharp on an annual basis.

The following map shows the distribution of EPE in Euro per capita at various NUTS levels for the year 2010. It can be easily perceived how EPE highly differs across regions and countries. At the national level, per capita investments in EPE are almost 10 times larger within countries devoting more resources to environmental protection (Norway, € 251.02), than those investing less in per capita terms (Lithuania, € 28.52). At the regional level differences are even higher, with values ranging from € 175.06 per capita in East Slovenia (SI01) to € 5.25 per capita in Bulgaria's Severen Tsentralen planning region (BG32). Unfortunately, the great number of data gaps prevents explicit spatial patterns to arise, although it could be said that comparatively speaking regions located in New Meber States and Southern Europe tend to invest less resources per capita in EPE than their counterparts in Northern and Central Europe.

[5] http://epp.eurostat.ec.europa.eu/cache/ITY_SDDS/EN/env_ac_exp4r2_esms.htm



Map 2 Environmental Protection Expenditure in euro per capita at various NUTS levels (2010)

Green Public Procurement (GPP) initiatives are one of the most relevant instruments available to promote greening of business and markets in areas where market signals are not fully effective (OECD, 2011a), and it is recurrently mentioned as one of the most powerful drivers supporting green transformations (ILO, 2012).

Besides, GPP informs on public demand for green products and services within the public sector, and can arguably shed light on the emphasis that regional authorities place on greening supply chains by pouring money on green products and services, which according to the OECD (2013) contributes to create the conditions for the establishment of long-term private-public partnerships.

However, as shown in Figure 9 only a small proportion of SMEs (12%) participate in green public procurement tenders at the EU level. It is even more important to emphasise that, according to Flash Eurobarometer 381 of (EC, 2013b), SMEs that take at least some resource efficiency actions are more likely to have bid for such a tender than those that take no actions (13%-19% vs. 7%). From the latter it can be inferred that GPP policies do have the ability to stimulate companies to implement internal resource efficiency measures, whereas companies that are more concerned on environmental issues tend to participate more on GPP bids.

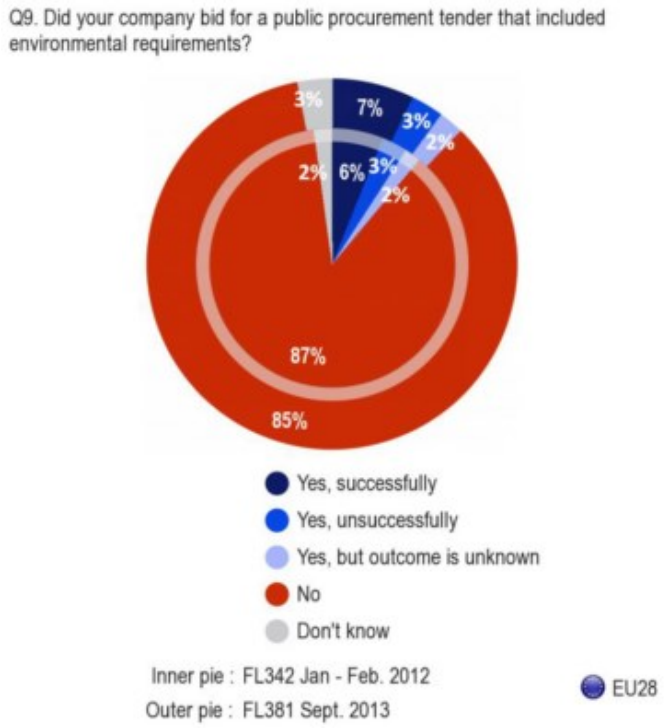
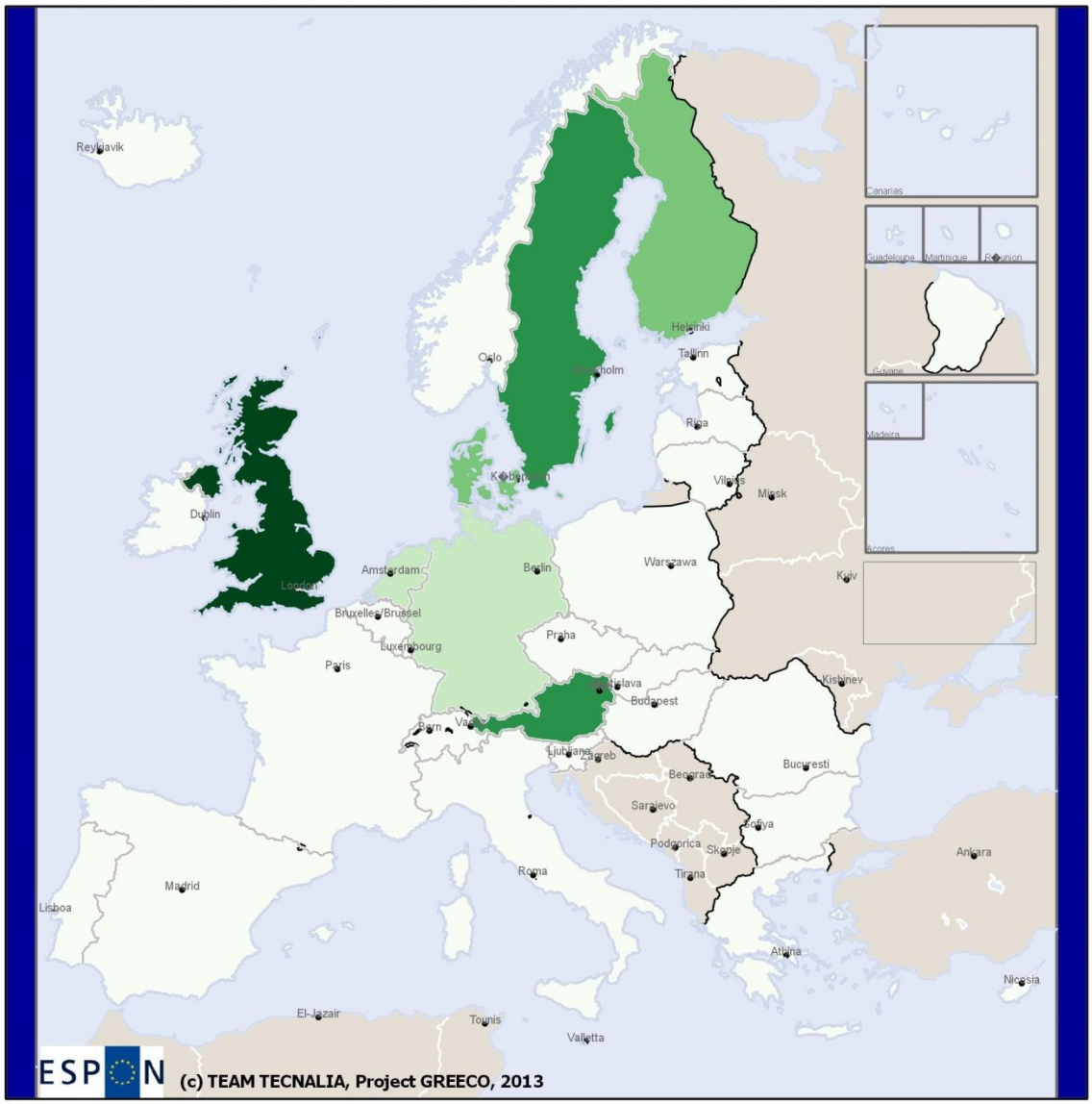


Figure 9 Share of EU SMEs that participate in GPP, by degree of success
Source: Eurobarometer 381 (European Commission, 2013).

Map 3 below shows the GPP data for 2007 available at the Eco-Innovation Observatory from a 2009 report (PWC Sustainability, 2009). Despite that data coverage is very low, the map shows that some countries, in particular Sweden (50%), Austria (52%) and the UK (75%), already canalise the larger share of their total public procurement towards green products and services. Other countries were at that stage far from achieving that same goal: Finland (43%), Denmark (42%), Germany (30%) and The Netherlands (26%) all contributed with less than half of their procurement activities to reduce environmental impact of products and services throughout their life-cycle. But GPP is not an indicator of financial support to companies and businesses either. Besides, considering that GPP data is only available for a small subset of EU countries, it has not been possible to include it as one of the components of the Green Economy Theoretical Potentials Index introduced below.



Map 3 Percentage of Green Public Procurement as a share of total Public Procurement (2007)

Besides the proxy indicators mentioned above, probably the only dataset available at the European level with comparable figures informing on the financial support that companies and businesses obtain to increase resource efficiency and/or develop new green products and services is provided by the Flash Eurobarometers 342 and 381 commissioned by DG Enterprise and Industry (EC, 2012c, 2013b). Such surveys aimed at characterising green markets, green jobs and resource efficiency from a SMEs perspective.

Despite that most part of the EU SMEs that took part in 2013 survey (EC, 2013b) declared to use only their own internal financial resources when trying to be more resource efficient (60% of all respondents), or selling green products or services (58% of all respondents), around one in five SMEs declared to take actions to be more resource efficient as a result of fiscal or financial incentives or other public support (19%), or due to the competitive advantage or business opportunities such actions provide (18%).

Q25 Which type of external support does your company get for the production of its green products or services? (MULTIPLE ANSWERS POSSIBLE)

	Advice or other non-financial assistance from private consulting and audit companies	Advice or other non-financial assistance from business associations	Private funding (from a bank, investment company or venture capital fund)	Advice or other non-financial assistance from public administration	Public funding (grants, guarantees or loans)	Funding from friends or relatives
EU28	36%	31%	18%	18%	14%	6%
Company size						
1-9	34%	31%	16%	16%	13%	8%
10-49	39%	26%	21%	22%	9%	4%
50-249	44%	37%	22%	25%	32%	3%
Sectors grouped (NACE)						
Manufacturing (C)	28%	31%	15%	16%	15%	5%
Retail (G)	36%	32%	15%	13%	10%	6%
Services (I/J/K/H/L/M)	44%	28%	23%	26%	18%	10%
Industry (B/D/E/F)	30%	34%	18%	17%	14%	2%

Figure 10 Type of external support received by EU SMEs for the production of green products and services

Source: Eurobarometer 381 (European Commission, 2013).

According to Flash Eurobarometer 381 (EC, 2013b), among those EU SMEs receiving external support to increase resource productivity, 28% receive private funding, while 19% receive public funding and 7% funding from friends or relatives. Medium-sized enterprises are more likely than small and micro enterprises to rely on external support from public funding (27% vs. 18%-19%), whereas SMEs in the manufacturing sector are more likely than those in other sectors to rely on financial support from the public sector (28% vs. 16%-19%). It is also interesting to acknowledge that SMEs whose turnover has decreased in the last two years are less likely to be relying on public sector support (27%) than those whose turnover has stayed the same (38%) or increased (41%).

The Flash Eurobarometer 381 (EC, 2013b) also shows that most EU SMEs that sell green products or services rely on their own financial resources (58%) and/or technical expertise (55%) for production, although small enterprises are the least likely to rely on their own financial resources (55% vs. 58%-59%). On the opposite side, industry SMEs are the most likely to rely on their own financial resources (63% vs. 55%-57%). Thus, just over one in five (22%) SMEs that sell green products or services rely on external support to produce green products or services.

Within this context, the maps presented below show the shares of companies that responded affirmatively to questions 13 and 25 of the Flash Eurobarometer 381,

respectively. Question 13 inquired on the type of external support that SMEs received to increase resource efficiency within their production system, among those that reported to receive some on a previous question. In turn, question 25 inquired on type of external support that companies get for the production of its green products or services, among those that reported to offer green products or services on a previous question. In both cases, possible answers included the following types of support (multiple answers were possible):

- Public funding (grants, guarantees or loans)
- Private funding (from a bank, investment company or venture capital fund)
- Funding from friends or relatives
- Advice or other non-financial assistance from public administration
- Advice or other non-financial assistance from private consulting and audit companies
- Advice or other non-financial assistance from business associations
- Other type of support

The following table shows the share of SMEs that reported to receive any kind of external financial support for increased resource efficiency (question 13) or the production of green products or services (question 25). For the sake of fast visual interpretation, value cells have been coloured according to a green to red scale. Higher values have greenish colours and lower values have reddish colours.

NUTS	Public support for increased resource efficiency (Question 13)	Private support for increased resource efficiency (Question 13)	Public support for production of green products or services (Question 25)	Private support for production of green products or services (Question 25)
AT	29	22	7	14
BE	17	41	21	20
BG	32	21	6	24
CY	3	20	0	30
CZ	39	46	21	37
DE	30	23	21	31
DK	6	10	3	11
EE	69	18	91	28
ES	17	17	20	33
FI	26	39	12	21
FR	17	16	13	14
GR	44	49	51	15
HR	46	5	40	18
HU	8	16	4	8
IE	8	10	14	2
IS	2	12	0	12
IT	5	14	0	1
LI	18	9	22	33
LT	41	32	48	90
LU	4	23	5	0

LV	43	46	8	8
MT	36	43	14	17
NL	30	24	15	2
NO	15	23	28	18
PL	24	21	26	22
PT	31	54	13	16
RO	15	23	8	24
SE	19	20	14	25
SI	47	24	34	26
SK	44	38	24	11
UK	10	19	8	7
EU	19	21	14	18
AL	0	56	22	78
MK	0	44	30	0
ME	26	45	0	44
TR	57	23	59	59
IL	24	44	4	4
RS	31	29	16	0
US	20	21	6	16

Table 2 Proportion of SMEs that reported to receive external financial support in countries participating in ESPON 2013 Programme (above) and other countries (below) according to Flash Eurobarometer 381 (2013)

Source: Eurobarometer 381 (European Commission, 2013).

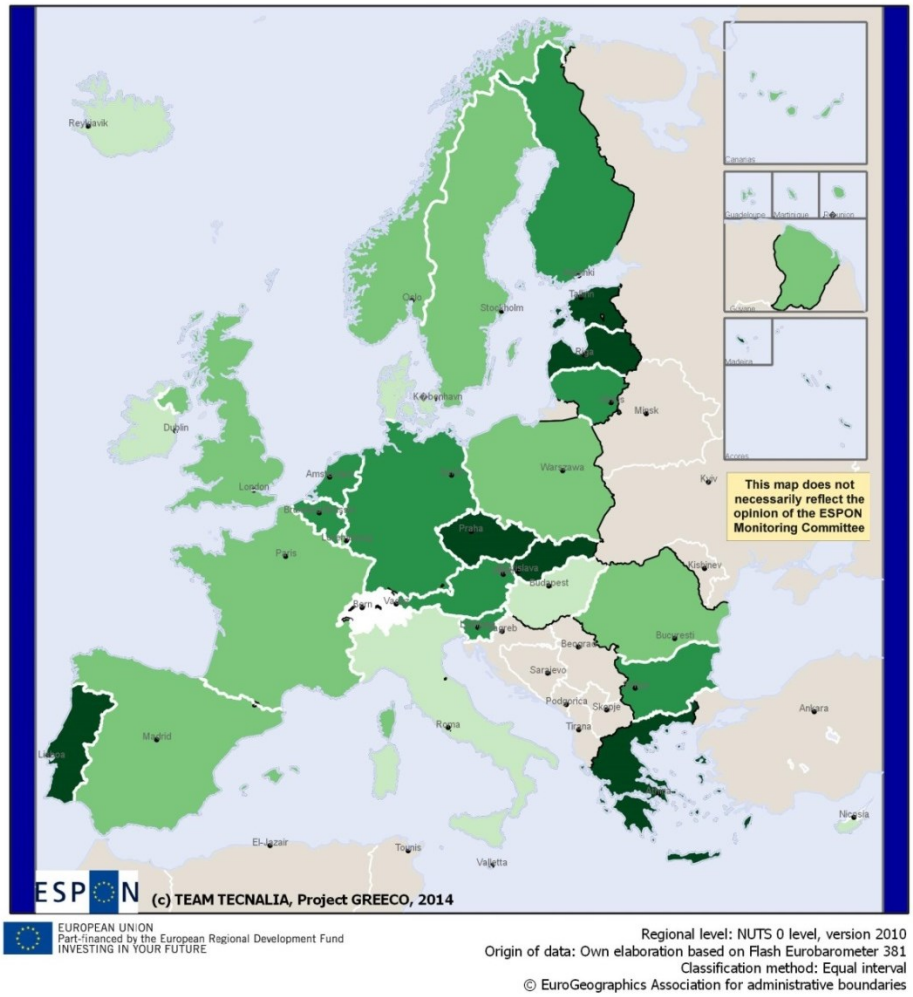
Map 4 below informs on the accumulated financial external support (either public and / or private) that SMEs declared to receive for increased resource efficiency, according to the answers provided to Question 13 of Flash Eurobarometer 381 (EC, 2013b). The map shows how the counties where SMEs receive lower external financial support for increased resource efficiency are Island, Denmark, Irland and Italy. Less than 20% of SMEs in all these countries declare to receive any kind of public and/or private support for increased resource productivity. On the opposite side lay SMEs from Greece (93%), Latvia (89%), Estonia (87%), Portugal and Czech Republic (both with 85% of combined public and/or private support for increased resource productivity).

It is important to acknowledge that financial external support cannot be directly connected to higher (or even increased) resource efficiency through a simplistic cause-effect relationship. It has to be considered that other types of incentives and obligations may also influence and eventually led to increased resource efficiency and performance. This means, on the one hand, that the map should be red with care as those countries where SMEs receive more support for resource efficiency could well not be those were SMEs are more resource efficient, and vice versa. On the other hand, the spatial patterns that arise in the map are difficult to interpret in absence of other analytical elements.

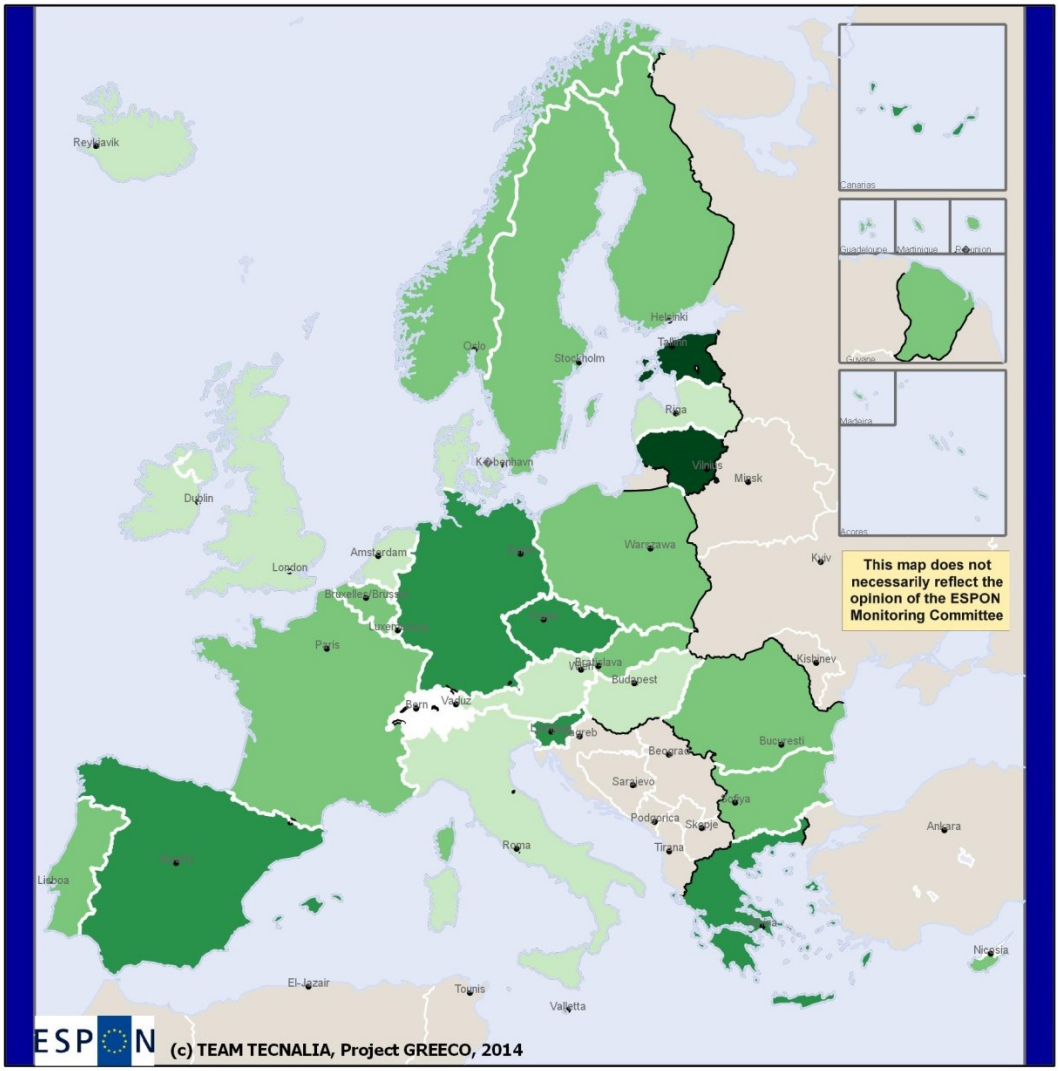
Map 5 below shows the accumulated financial external support (either public and / or private) that SMEs declared to receive to produce green products or services, according to the answers provided to Question 25 of Flash Eurobarometer 381 (EC, 2013b). From the map, it is implicit that the most market-oriented financial support that SMEs offering green products and services are receiving is mainly located in the Baltic countries. For instance,

90% of Latvian SMEs declared to receive private external support for the production of green products and services, whereas 91% of Estonian SMEs receive public support to produce green products and services. The countries where SMEs receive less support for the production of green products and services are Italy (0% public and 1% private), Luxembourg (5% public and 0% private), Ireland (4% public and 4% private), Island (0% public and 12% private) and Hungary (4% public and 8% private).

As on previous occasion, taken in isolation, these figures do not inform on the comprehensive support that SMEs in all the surveyed countries receive to expand their range of green products and services. Similarly, the causal relations of these elements cannot be inferred analysing the spatial patterns that emerge from the spatial distribution showed on Map 5. These figures are more informative if combined with other explanatory features driving greener growth, as discussed in Section 3.3.1 below.



Map 4 Combined public/private financial support to SMEs (2013) for increased resource efficiency



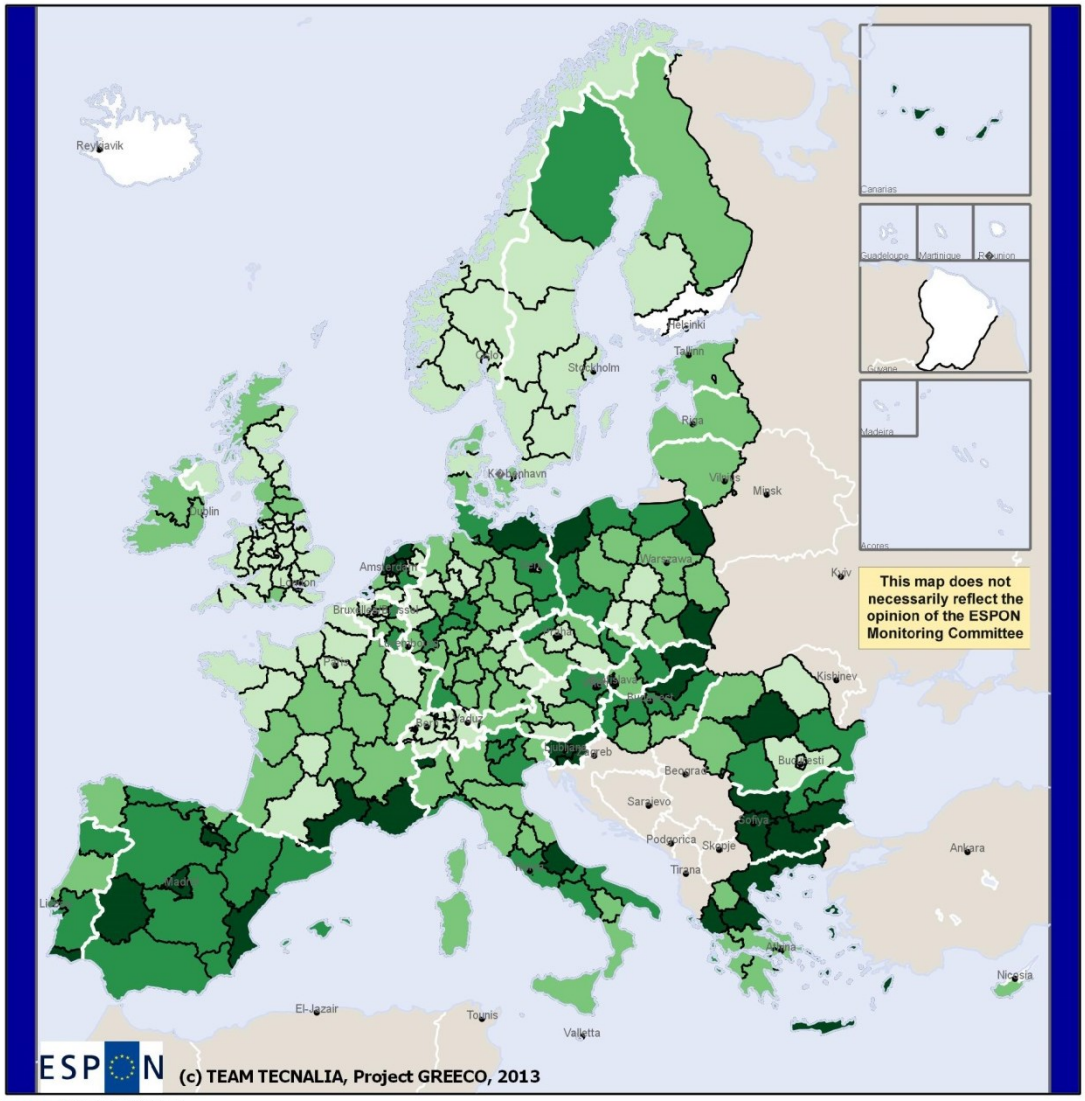
Map 5 Combined public/private financial support to SMEs (2013) for the production of green products and services

3.2.3. Territorial assets and physical conditions

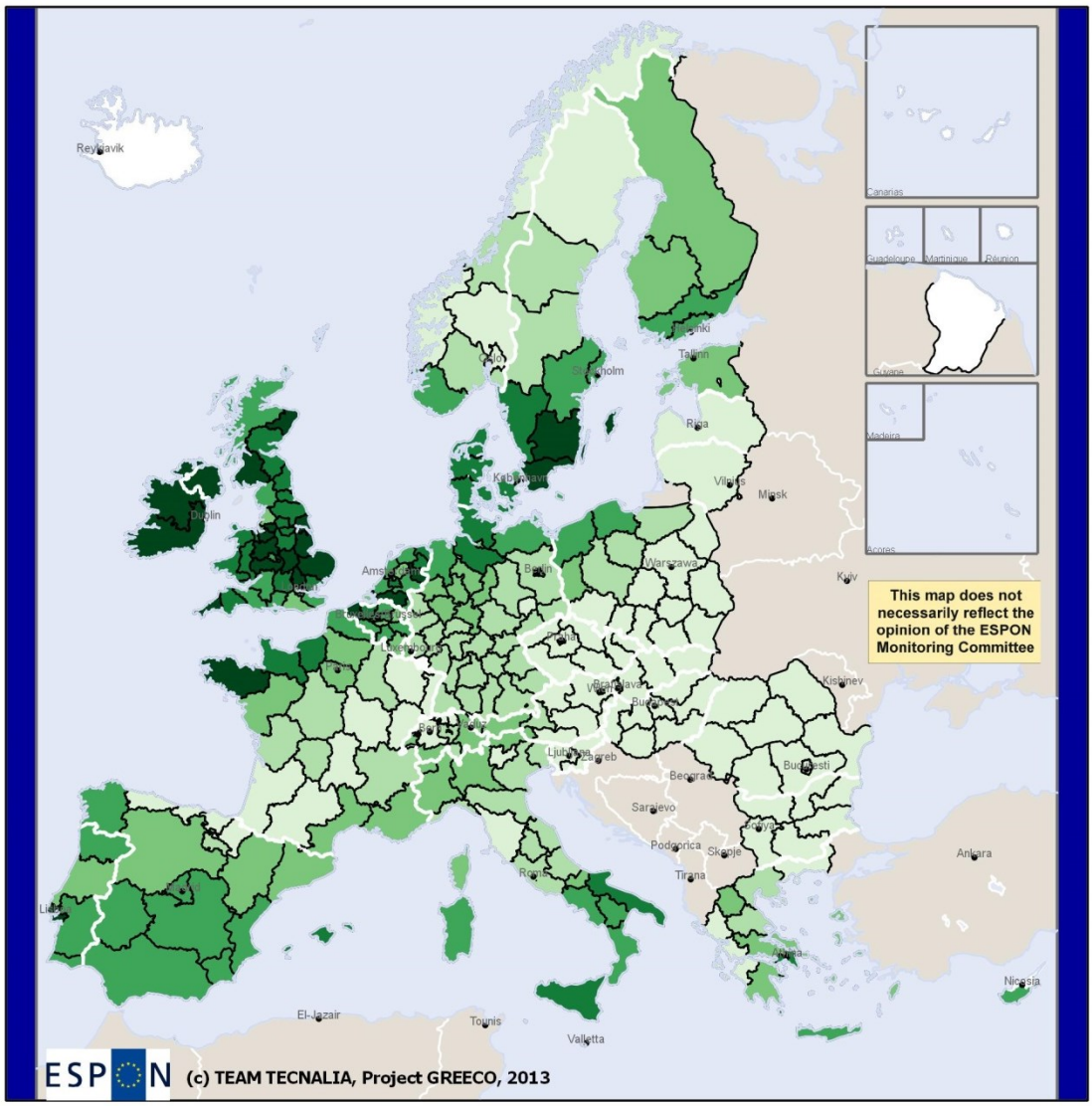
According to GREECO case studies and sectoral insights, the two key territorial assets that should be unequivocally considered a core feature of the green economy, on the one hand, and contribute to create new opportunities for green growth – and thus increase green economic potentials in those regions where such factors are present –, on the other, are the **overall environmental quality** (Atkinson, 2013; OECD, 2014; UNEP, 2012a) and the **renewable energy potentials** of regions (Business Insights, 2012; IEA, 2013), respectively.

The Share of Natura 2000 area by NUTS-2 region has been chosen as an indicator of the overall quality and amount of valuable and healthy ecosystems at the regional level. This indicator, showed on Map 6, has been obtained from INBALUD project (Geoville, 2012) basing on 2009 data provided by the EEA. Figures have been checked for accuracy within a number of EU regions. Results show that the accuracy INBALUD data is considerably higher than similar indicators made available by other data providers.

Contrary to overall environmental quality, which is usually perceived as non-economic asset, other services provided by nature have a direct and well recognised economic impact. Among those it could be mentioned such ecosystem services supporting agriculture, fisheries and forestry. Similarly, energy production from renewable sources has a very relevant, obvious and direct link to territorial assets. We still know very little about the green economy, but one thing we know about it is that it will certainly be powered by renewable energy sources. Accordingly, the accumulated regional renewable potentials shown on Map 7 have been chosen as a proxy indicator of the direct economic benefit obtained from ecosystems services within the most paradigmatic green economy sector.



Map 6 Share of Natura 2000 area by NUTS-2 region (2009)



EUROPEAN UNION
Part-financed by the European Regional Development Fund
INVESTING IN YOUR FUTURE

Regional level: NUTS 2, version 2010
Source: GREECO project
Classification method: Manual breaks
© EuroGeographics Association for administrative boundaries

Accumulated renewable energy source potentials (TOE/yr/sqkm)

- < 25
- 25 -50
- 50 - 100
- 100 - 150
- 150 - 200
- > 200
- No data available

This map shows the accumulated potentials of RES production at NUTS 2 level. The map has been created based on the calculations performed in GREECO project for the following energy sources: (1) Technical biomass potentials of agriculture residues; (2) Technical biomass potentials of forest residues; (3) Technical biomass potentials of manure residues; (4) Potential PV ressource rent at 8 c/kWh; (5) Non-forest area wind energy potential at 8 c/kWh. Photovoltaic and wind potentials have been converted to TOE using the following conversion ratio: 1 GWh = 85.9845227859 TOE. For additional information on the calculation methodology for each data source, please check Vol. 2 of GREECO Final Report.

Map 7 Onshore wind, PV and biomass energy potentials (TOE per km^2 per year) at NUTS-2 level

Map 7 has been produced relying on a number of estimates on technical and economic energy potentials for biomass production from forest, agriculture and manure residues,

alongside wind and photovoltaic potentials. The methodology used to generate these figures can be found within the Scientific Report of GREECO project.

Whereas biomass potentials have been delivered taking mainly into account technical considerations (see Vol. 2.3 – "Bioenergy potentials" included in GREECO Final Report for the details), wind and photovoltaic potentials also include economic considerations related to generalised installation and operation costs (see Vol 2.2 – "Database report" included in GREECO Final Report for the details). However, it is important to note that the latter economic constraints do not take the location-specific costs of installation, grid connection and transport into account and that this is particular important for remote and sparsely populated regions where such costs can be higher. It is also important to acknowledge that the map does not take into account the extent to which existing potentials might have been already exploited within the regions.

Potentials are expressed as Tonnes of Oil Equivalent (TOE). Given the order of magnitude of wind potentials, several times larger than other energy sources, these condition the spatial distribution of the combined renewable energy potentials more than any other energy source.

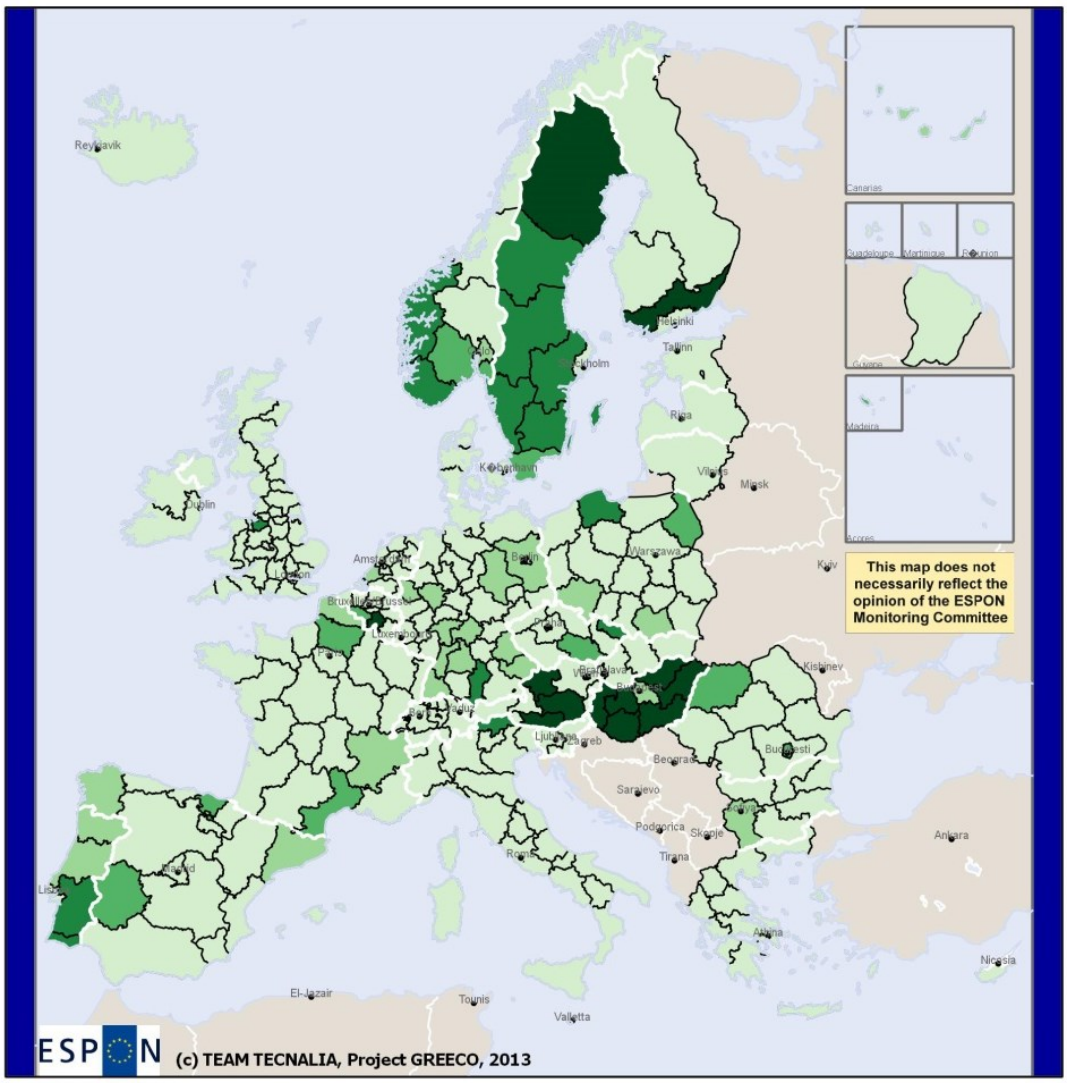
3.2.4. Access to technology

One of the green economy dimensions found to have a greater impact on future green growth potentials is access to technology. This dimension is covered in GREECO by two strands of indicators. The first strand is based on green patent data made available by the OECD, either from the Regions and Cities Database[6], or from the Science, Technology and Patents database[7], both including regional information on green patents, although with minor differences on contents and geographical levels. However, this indicator does not reflect some dimensions of innovation that are crucial for territorial development. In particular, business networking and public-private partnership activities linked to green activities are not fully unveiled by the OCDE figures.

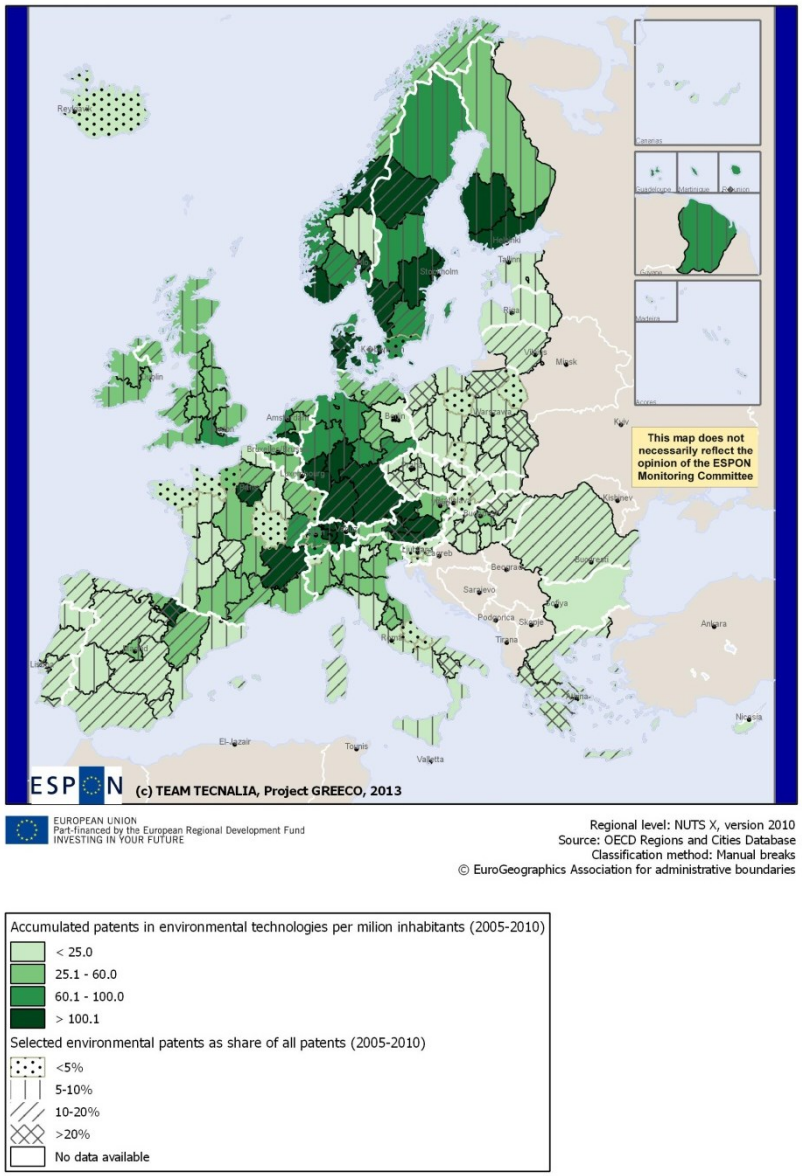
This issue was addressed in GREECO through a new indicator on greentech clustering. The indicator was derived from data provided by the European Cluster Observatory. The database included a list of more than 170 cluster organisations, consulting organisations, national agencies, professional organisations, regional agencies, science parks and universities that are involved in green research and development within any of the following sectors: Environmental Technology, Bioenergy, Hydrogen and Fuel Cells, Recycling, Solar Energy, Wind Energy, Eco-Construction, Renewable Energy, Sustainability, Water and Green Technology. Clusters were linked to the specific NUTS-2 region of operation and weighted according to their specialisation on green technologies and total population of each region. The final indicator is presented on Map 8 as the number of green clusters per million inhabitants.

[6] http://www.oecd.org/gov/regional-policy/regionalstatisticsandindicators.htm

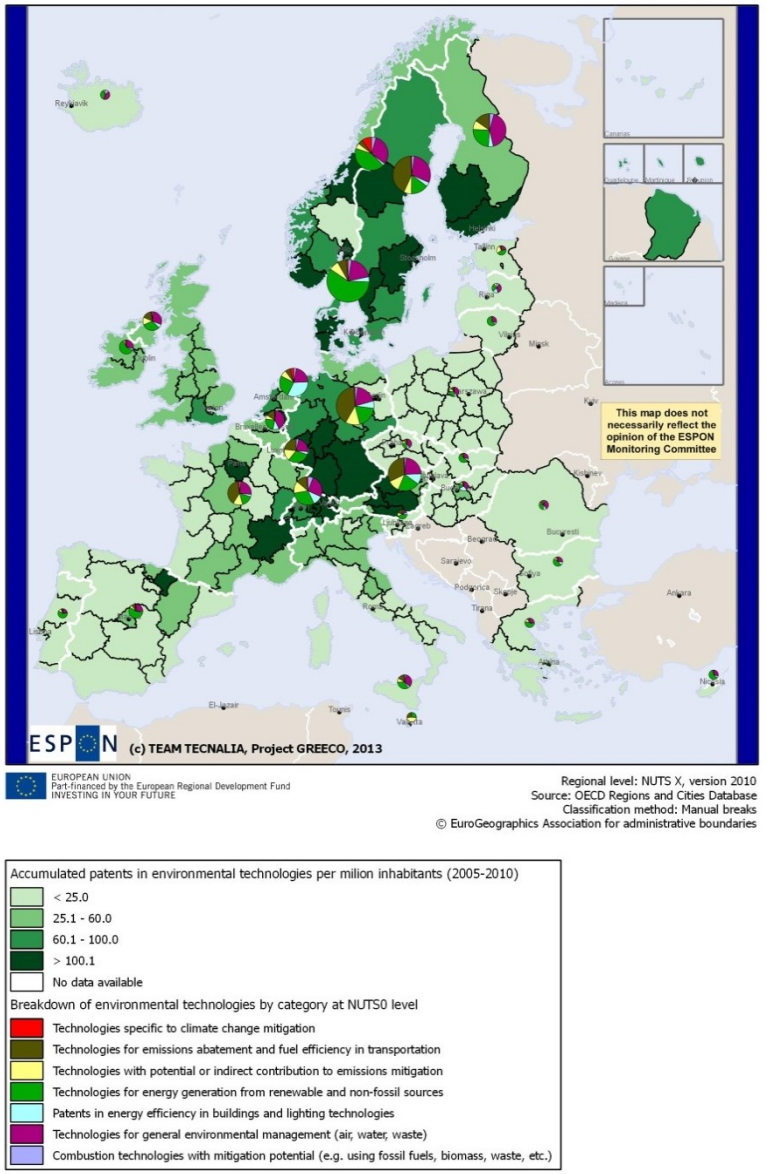
[7] http://www.oecd.org/sti/inno/oecdpatentdatabases.htm



Map 8 Number of Green clusters per million inhabitants (2013)



Map 9 Accumulated patents in selected environmental technologies and their share as a percentage of total patents (2005-2010).



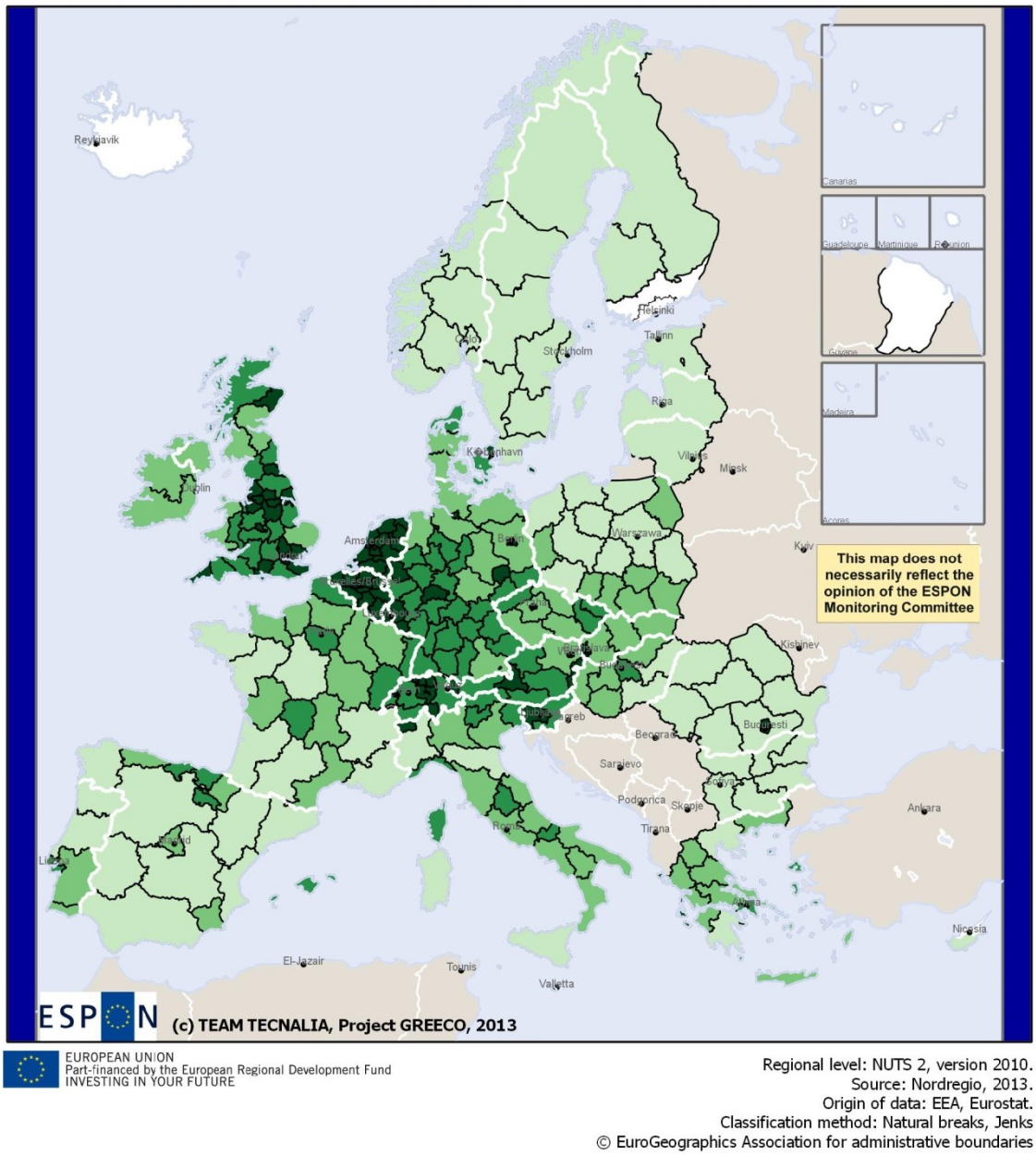
Map 10 Accumulated patents in selected environmental technologies per million inhabitants at various territorial levels (2005-2010)

3.2.5. Expected market demand

A key green economy driver is the potential market demand for green products and services (EEA, 2014b; OECD, 2011b). Still, available market surveys on green products and services are much focused on concrete products and services and are also rather unspecific from the geographical perspective. At the same time, in an open and unified market such as the EU it cannot be argued that a direct cause-effect relationship between a growing demand for concrete products and services within a given territory and a greener profile of local production systems holds. Similarly, it cannot be forecasted either future demand for such products and services at the local and regional levels.

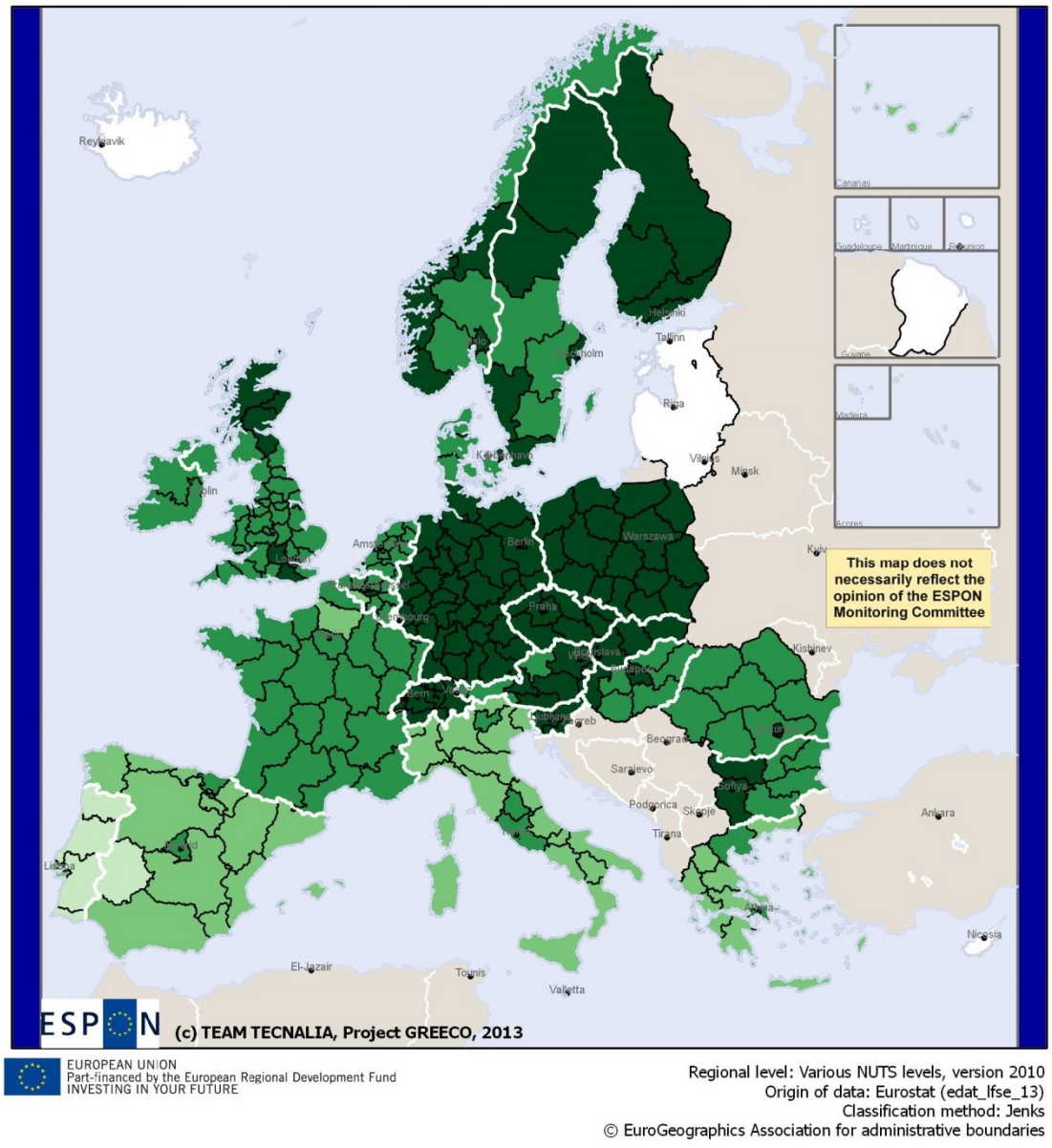
Nonetheless, some sectors will necessarily have to initiate a transition to different development pathways as a result of the implementation of strong EU, national, regional and local regulations, strategies and targets. Some of these sectors, such as the building sector, are strongly linked to territorially-bound assets. Additionally, this particular sector shows a much localised market from the geographical perspective. Most of the supply related to building and construction indeed is located very close to where demand for these types of services is actually generated.

For these reasons, an estimate on the annual CO_2 emissions savings potential for the building sector in 2050 has been proposed in GREECO as proxy indicator for the market dimension of green economic development. Regional values of this specific indicator are based on allocating current national estimates of per capita emissions rates to forecasted population development for 2050, then applying a linear 89.5% reduction in order to achieve the EU's policy target for the sector. Results are shown in Map 11.



Map 11 Estimated annual CO2 emissions savings potential for the building sector in 2050

3.2.6. Human resources, knowledge and skills



Map 12 Percentage of population aged 25-64 and 20-24 with upper secondary or tertiary education attainment, by NUTS-2 regions (2011)

A skilled workforce is a crucial resource for all economic activities. Those included in the green economy are no exception. Needed skills comprise those that are specific for the

environmental goods and services sectors, but also those transversal skills needed to support transitions in terms of increased energy and material efficiency, adaptation to climate change, etc. (ILO, 2011; Martinez-Fernandez, Hinojosa, & Miranda, 2010). Accordingly, from the labour perspective transitioning to the green economy will be much more about changing the way work is performed rather than replacing existing jobs (CEDEFOP & ILO, 2010). Thus, the indicator chosen in GREECO to reflect this dimension on the regional typology is the Percentage of persons aged 25-64 and 20-24 with upper secondary or tertiary education attainment, by NUTS-2 regions.

3.2.7. Environmental awareness and voluntary actions

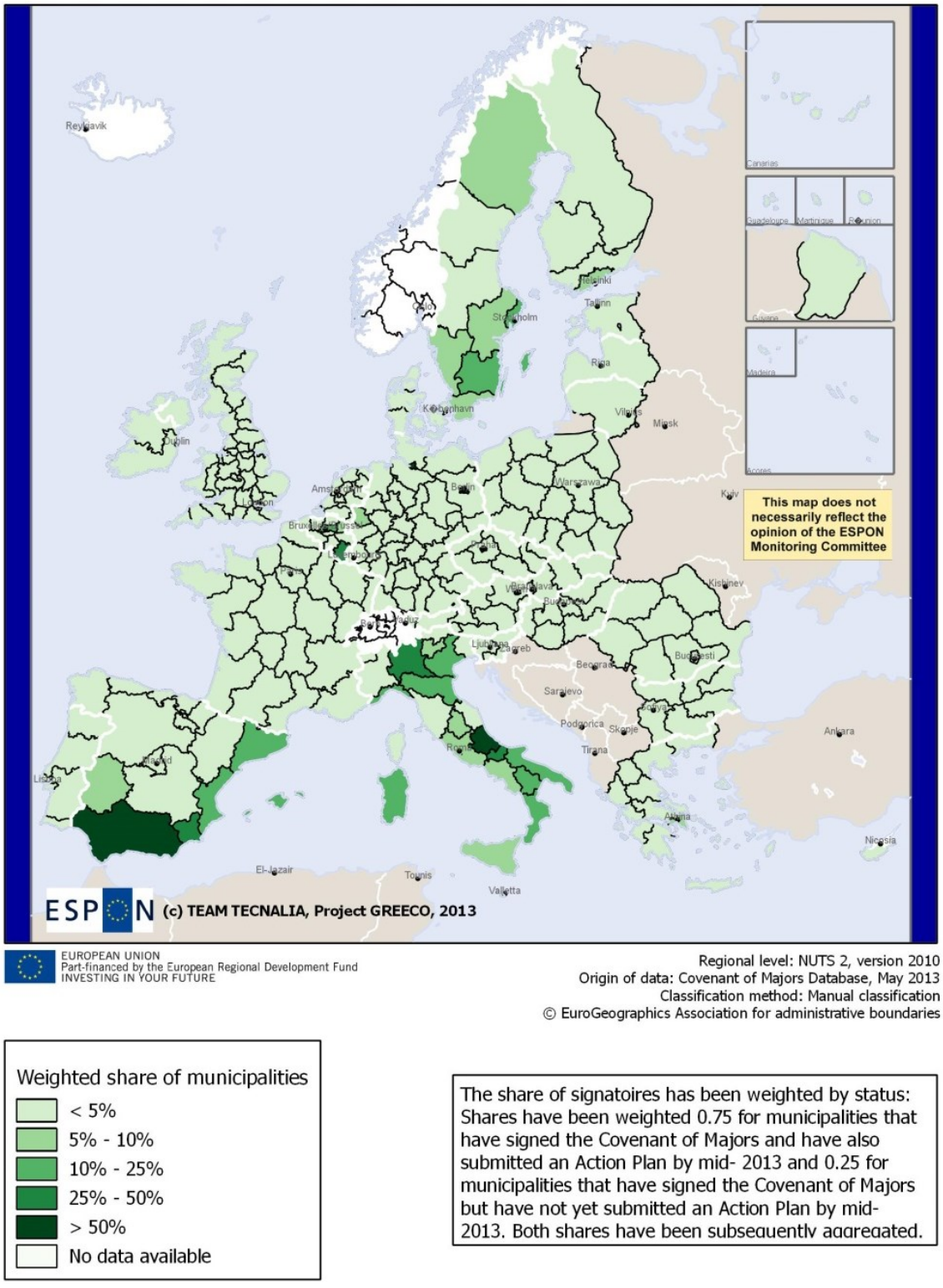
A good sign of regional and local commitment to move towards greener scenarios is the role played by public stakeholders within international initiatives oriented towards the establishment of more ambitious environmental targets. Besides awareness, this indicator is also thought to provide good insights into the degree to which regional and local authorities participate in information sharing, communication of best practices and logistical and technical support.

To our current knowledge, surveys on environmental awareness of population at the regional level are not available for the EU as a whole. Moreover, common registries of voluntary actions adopted by regional and local authorities are not usually kept either at the European level. Still, there are some voluntary actions pushed forward by a number of international bodies for which good registries are kept. In particular, the Covenant of Majors network, which is the largest voluntary action initiative hosted by the EU in relation to energy efficiency and use of renewable energy sources at the regional and local levels, holds a large database of signatories. This initiative is voluntarily joined by local and regional authorities committing to increasing energy efficiency and use of renewable energy sources on their territories, with the specific aim to meet and exceed the European Union 20% CO_2 reduction objective by 2020.

Beyond energy savings, the initiative seeks to create “skilled and stable jobs, not subject to delocalisation; healthier environment and quality of life; enhanced economic competitiveness and greater energy independence”[8].

The signatories database was kindly made available to GREECO project by the Covenant of Majors. This database was processed in order to generate a new indicator relevant for environmental awareness and voluntary actions, namely the weighted share of municipalities that have signed the Covenant of Majors and have also submitted an Action Plan at NUTS-2 level.

[8] http://www.eumayors.eu/about/covenant-of-mayors_en.html. Last accessed 17 November 2013.



Map 13 Weighted share of municipalities that have signed the Covenant of Majors and have also submitted an Action Plan by mid- 2013

Map 13 illustrates the different degree of involvement of local governments across Europe in the Covenant of Majors movement –Share of local administrations that are signatories to the Covenant of Majors -, as well as the effective commitment of signatories in developing a set of

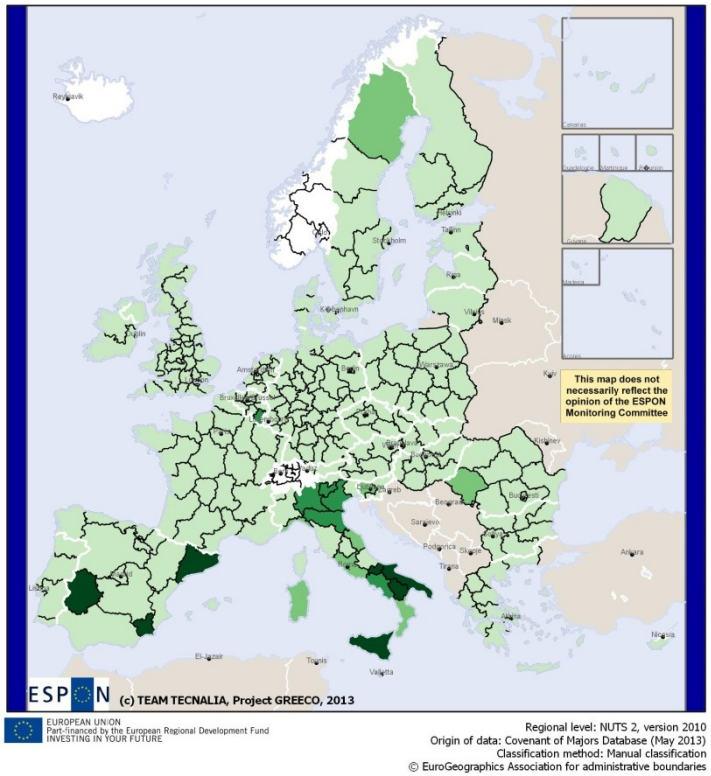
strategies towards the achievement of the specific objectives of the initiative initiative –Share of local administrations that have already submitted an Action Plan -.

One interesting feature connected to this initiative launched by the European Commission in 2008, is that according to the Covenant of Majors webpage[9] so far no local administration has reached Step 3 in the implementation sequence. Reaching this step implies the submission of implementation reports by signatories in order to check the compliance of the interim results with the objectives set in the Action Plans in terms of measures implemented and CO_2 emission reductions. This means that local and regional authorities have not yet reported the extent to which the actions foreseen in their Action Plans are actually being implemented.

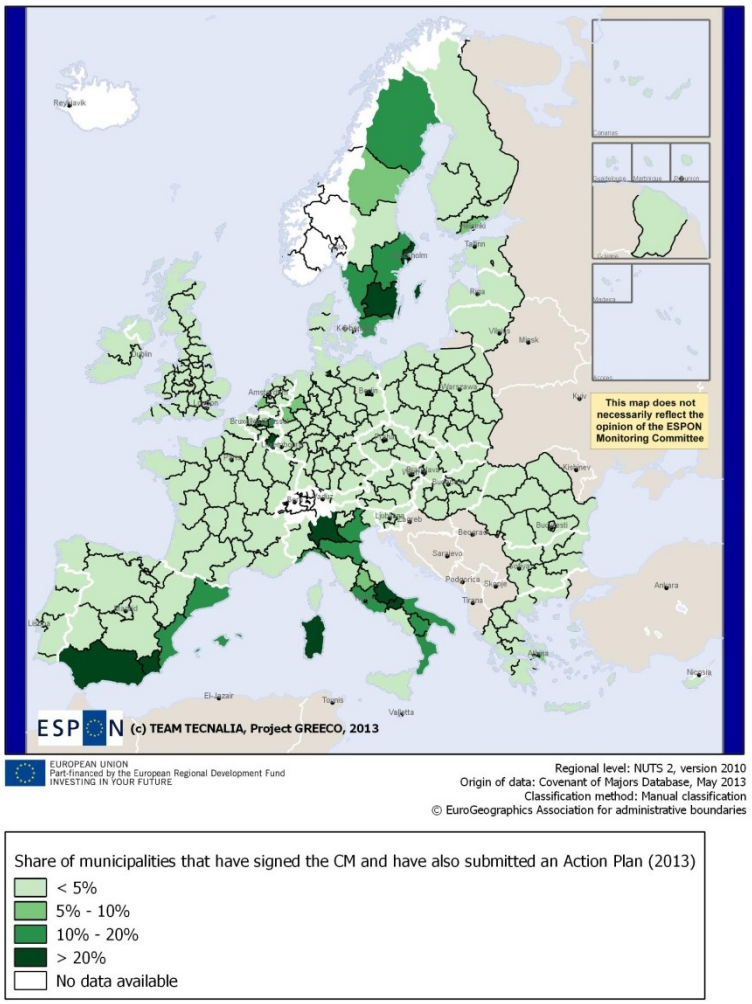
The map show as participation of regions is mainly concentrated around the Mediterranean and Baltic seas, alongside the Benelux, both with a relevant share of municipalities that have joined to the Covenant of Majors. This holds for all kinds of signatories, but particularly for those that have already submitted their Action Plans. Those that have signed but have not yet submitted their plans are mainly located in the Mediterranean region, particularly in Southern Italy and Spain. This may well suggest a lack of capacity to actually design and implement action plans.

The share of municipalities within each NUTS-2 region that are signatories of the Covenant of Majors at NUTS-2 level, is shown in the following maps:

[9] http://www.eumayors.eu/about/signatories_en.html?q=Search+for+a+Signatory...&country_search=&population=&date_of_adhesion=&status=3. Last accessed 17 November 2013.



Map 14 Share of municipalities that have signed the Covenant of Majors but have not yet submitted an Action Plan by mid- 2013



Map 15 Share of municipalities that have signed the Covenant of Majors and have also submitted an Action Plan by mid- 2013

3.3. Developing a tentative typology of territorial potentials for a greener economy

3.3.1. Integration of factors and indicators: basic approach

All the empirical evidence introduced on previous paragraphs was combined to generate the Green Economy Theoretical Potentials Index (IGETP), showed on Map 16 below. The IGETP was generated as an arithmetic sum of the weighted normalised averages of all the 7 factors considered in the analysis (a Weighted Linear Combination). The resulting sum of all factors was subsequently normalised from 0.5 to 1.5 for representation purposes. Some of these factors relied on one single indicator, whereas others included two (Territorial assets and physical conditions) or even three (Access to technology) indexes combined.

Green economy factors	Indicator	Source	Weights for aggregation to	
			Core factor index	Comprehensive IGETP
Good governance: institutions, policies and regulations	European Quality of Government Index (2009)	Quality of Government Institute at The University of Gothenburg (Nicholas Charron et al., 2014).	1	0.14285714
Key economic instruments: access to funding and financial support	Public/private support to SMEs for increased resource efficiency and/or the production of green products and services (2013)	Flash Eurobarometer 381 SMEs, resource efficiency and green markets (EC, 2013b).	1	0.14285714
Territorial assets and physical conditions	Onshore wind, PV and biomass energy potentials (TOE per square kilometre per year) at NUTS-2 level	New indicator developed in GREECO project	0.5	0.14285714
	Percentage of Natura 2000 area by NUTS-2 region (2009)	INBALUD project based on EEA data (Geoville, 2012)	0.5	
Access to technology	Accumulated patents in selected environmental technologies per million inhabitants at NUTS-2 level (2005-2010).	OECD Regions and cities database.	0.5	0.14285714
	Share of patents in selected environmental technologies over total	OECD Regions and cities database.	0.25	

	number of patents (2005-2010).			
	Number of green clusters per million inhabitants (2013)	New indicator developed in GREECO project.	0.25	
Expected market demand	Estimated annual CO2 emissions savings potential for the building sector in 2050 (Mt per square km per thousand inhabitants)	New indicator developed in GREECO project.	1	0.14285714
Human resources, knowledge and skills	Percentage of persons aged 25-64 and 20-24 with upper secondary or tertiary education attainment, by NUTS-2 regions (2011).	Eurostat Regional Database (edat_lfse_13)	1	0.14285714
Environmental awareness and voluntary actions	Weighted share of municipalities that have signed the Covenant of Majors and have also submitted an Action Plan by mid- 2013.	New indicator developed in GREECO project.	1	0.14285714

Table 3 Indicators for territorial potentials of the green economy

As shown on Table 3, all factors have been assigned identical weights, regardless of their relevance on different economic sectors. However, this option could be discussed, taking also into account the possible trade-offs and links among different drivers as well as the asymmetric implications that such elements have on the different green economy spheres (i.e. environment, economy, society and territory, plus the econosphere), depending on a number of contextual features. Likewise, the decision on how to assign weights not only relates to objective factors derived from territorial evidence, but also to the way such evidence is interpreted from the field within regional and local practice. This also conditions their actual relevance for policy development itself.

Thus, contextual features, on-going strategies, political priorities, cultural beliefs and even personal choices are essential for a balanced weighting of factors. For this reason, it a good practice to gather as much perspectives as possible in order to assure the maximum overall relevance of pondering decisions. This has been attempted in GREECO project through consultation with the Monitoring Committee of ESPON representatives. However, the exercise did not led to concluding outputs due to the small size of the collected sample. As a result, the typology presented on Map 16 assigns equal weights to all the green economy factors. Ultimately, this approach rests on the idea that it is the combination of all the different perspectives and explanatory factors involved in green economy transitions rather than the fine-tuning of the integration methodology itself the one that may better support decision-making processes at all territorial levels.

Data issues

In order to assure the overall quality of the analysis, the indicators were analysed and pre-processed to deal with data issues as far as possible. These could be grouped in the following categories:

- A total lack of information for relevant factors, mainly as a result of a lack of information at the regional level, but also at other geographical scales.
- Information was only partially available, either because data coverage was incomplete from geographical and/or temporal perspectives, because data was provided in an old NUTS version, or because data was territorially incoherent, meaning that figures were available with almost complete ESPON coverage but at different territorial levels for different countries.
- Factors for which indirect or proxy indicators were only available due to (1) the lack of specific data for certain green growth drivers; (2) the intrinsic difficulty in measuring certain green growth factors, and; (3) the non-specificity of certain factors for the green subset of the economy.

No data available

Whereas some of the data issues mentioned above could be overcome, others prevented us to include in the analysis relevant pieces of evidence that would have been considered if data were available. The main dimension that, albeit being clearly relevant for the development of greener activities, could not be considered in the construction of the regional typology of green economic potentials is environmental advocacy of population, for which not even a proxy indicator could be found. Thus, environmental awareness, which has been identified in some sector reports and case studies of GREECO project as a powerful driver for some green growth activities, could not be included in the classification.

Using synthetic indicators

For instance, consumer demand for green products and services do not simply seem to be available for most countries. A proxy on the potential market size of green building and construction has been used instead. This indicator, which is specific for the green subset of the economy, was developed by Nordregio within the construction sector report (see Vol. 3 of this report). The indicator has the capacity to synthesise in one single score more than one relevant dimensions of the process of green economic transformation, namely territorially-bound assets, such as housing stock, the spatial patterns of current development model –though residential patterns- and the expected market size –though population projections-, as well as the policy perspective –though carbon-budgets linked to mitigation policies at the EU level-. The main disadvantage of synthetic indicators is that the details and specificities of each of its individual components are lost through aggregation.

Data disaggregation

Estimating indicators at the regional level is the most relevant data-related issue that has been tackled during the project implementation phase. Data gaps are particularly acute among the indicators related to key economic instruments. Most datasets in this category were either available for a small portion of EU regions and / or at broader geographical scales. For

instance, GPP was only available from a PWC report based on 2007 figures (PWC Sustainability, 2009) for a limited number of countries. The EPE figures available from the Eurostat[10] have a broader spatial coverage. Still, these figures are delivered at various non-homogeneous geographical scales. Similarly, in late 2013 the Flash Eurobaromenter 381 (EC, 2013b) delivered a great amount of relevant information for most ESPON countries (with the exception of Switzerland) at NUTS-0 level, which had to be extrapolated to the NUTS-2 level for combination with other indices.

In other words, data scarcity at the regional level made necessary to estimate data at NUTS-2 level by means of the most proximate upper territorial level, either it being NUTS-1, NUTS-0 or even EU and ESPON space averages. A similar approach allowed regionalising the accumulated patent data for the period 2005-2010, which is available for various territorial levels at the OECD Regions and cities dataset[11]. Estimates were also necessary to fill data gaps for the European Quality of Government Index made available by the University of Gothenburg at various NUTS levels (Nicholas Charron et al., 2014). To a lesser extent, data on human resources development provided by Eurostat[12] also had to be estimated relying on broader averages for a limited number of regions.

Upgrading NUTS version

Another recurrent data issue was related to the lack of data for NUTS-2010 version. This made necessary to upgrade versions assuming that minor border lines of some regions did not have a major impact on overall figures. Thus, in such cases where upgrading to NUTS-2010 implied a combination of two or more previously existing NUTS-2006 regions, the resulting value was assumed to be the plain arithmetic sum of contributing NUTS-2006 regions[13]. In turn, regions that were split in two or more regions during the NUTS-2006 to NUTS-2010 transition were classified as "no data" regions.

This method has been implemented on the following variables that were only available at NUTS-2006 level:

- European Quality of Government Index (2009)
- Percentage of Natura 2000 area by NUTS-2 region (2009)
- Accumulated patents in selected environmental technologies per million inhabitants at NUTS-2 level (2005-2010)
- Share of patents in selected environmental technologies over total number of patents (2005-2010)
- Estimated annual CO2 emissions savings potential for the building sector in 2050 (Mt per square km per thousand inhabitants)

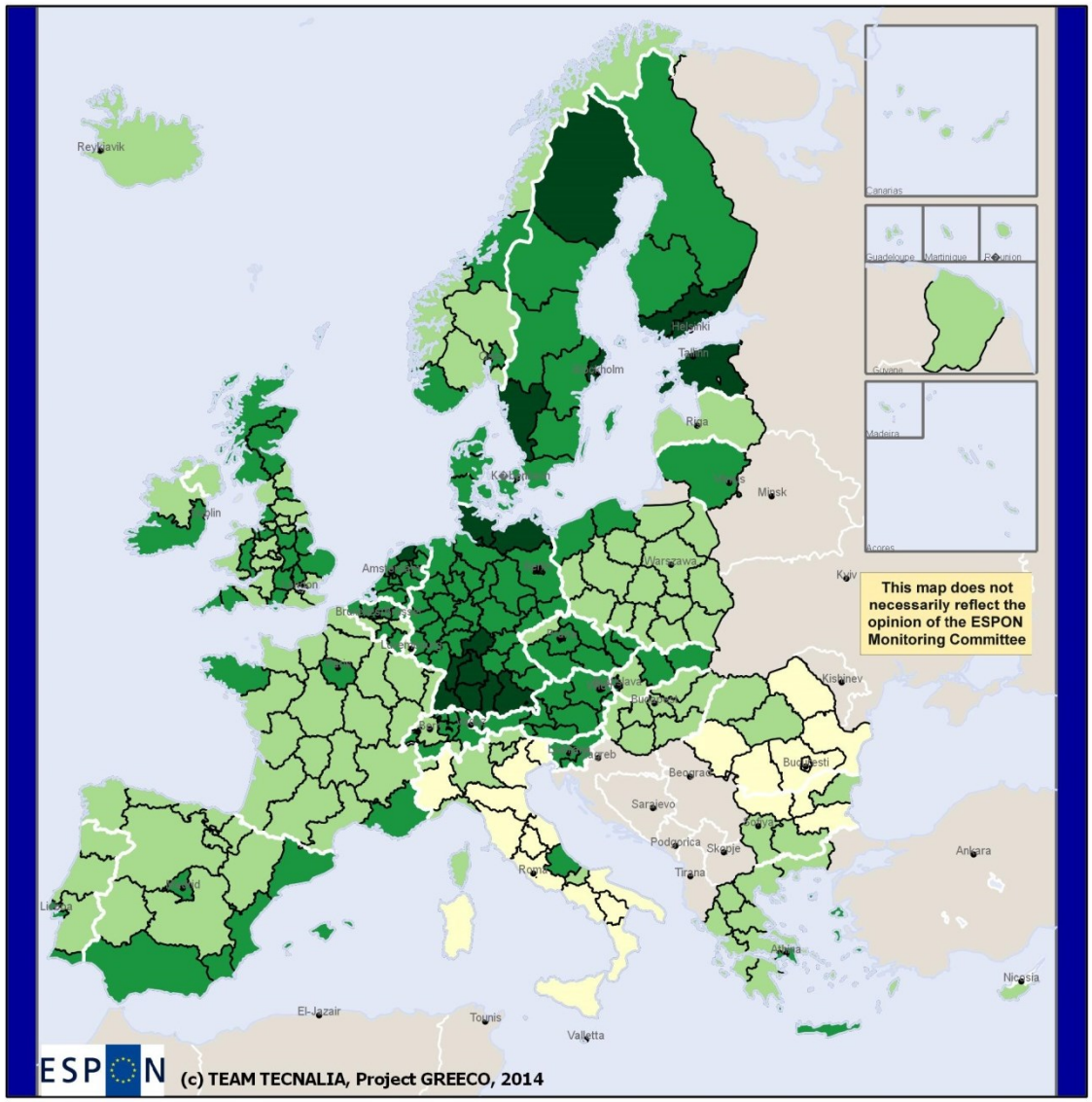
[10] env_ac_exp4r2: http://epp.eurostat.ec.europa.eu/cache/ITY_SDDS/en/env_ac_exp4r2_esms.htm

[11] http://stats.oecd.org/Index.aspx?DatasetCode=PATS_REGION#

[12] EUROSTAT regional database: Persons aged 25-64 and 20-24 with upper secondary or tertiary education attainment, by sex and NUTS 2 regions (2011) - % [edat_lfse_13]

[13] Of course, this was only attempted for accumulative indicators. It was not applied to ratios, indexes, typologies, etc.

3.3.2. A typology of regional potentials for a greener economy



Map 16 A tentative typology of territorial potentials for a greener economy at NUTS-2 level (2013)

Map 16 shows a quite uneven territorial distribution of theoretical green economy development potentials across Europe. Potentials seem to be higher in the Pentagon, particularly Germany's Southernmost and North-eastern regions, Nordic countries, in particular within the most urbanised Swedish and Finish regions, plus the remote and sparsely populated Upper Norrland (Övre Norrland) region in Sweden, and the Baltic countries, in particular Estonia.

Besides these areas, medium to high IGETP scores can also be found in some specific NUTS-2 regions located in the British Isles, New Member States and around the Mediterranean Basin. However, most regions located within the latter two macro-regions show medium to low and low theoretical green economy development potentials. In particular, IGETP scores are particularly low in most Italian and Romanian regions. The remaining areas show medium to low IGETP scores.

It should be considered that the spatial variation of the IGETP is of course tightly related to the spatial variability of the different components combined in such index. Given that the IGETP has been estimated as a weighted average of the indicators illustrating the seven green economy factors included in the analysis (i.e. good governance and institutions; key economic instruments and financial support; territorial assets and physical conditions; access to technology; expected market demand; human resources knowledge and technology, and; environmental awareness and voluntary actions), the numerous possible combinations of such scores depict a highly variable output.

For this reason, the interpretation of the results should be done differently for those regions showing particularly high or low scores, on the one hand, and those regions showing intermediate IGETP scores, on the other hand:

- Areas where IGETP scores are particularly high or low include regions where virtually all the indices combined in the IGETP show structurally high or low values, respectively. These are regions where overall green economy potentials, either high or low, are unequivocal, provided that the factors that have been identified in GREECO project are those that matter. In these areas, interpretation of results is easier and policy-oriented decisions can be taken assuming that all the most important green economy factors perform in a structurally similar way.
- Areas where IGETP scores are intermediate include regions where different combinations of green economy factors are possible (high with lows or intermediate values of the different factors considered). In these areas, interpretation of results is much more difficult and it cannot lead to relevant policy recommendations unless the different components combined in the IGETP are analysed separately.

Thus, linking to a recurrent critique to synthetic indicators, it has to be acknowledged that the IGETP hides factor-specific information that could be relevant for descriptive and normative purposes. For this reason, it is important to observe how the different factors that are included in the normalised IGETP contribute to overall score and distribute according to the development level of regions.

As shown on Figure 11 below, in most cases variability of green economy factors according to the "level of regional development"[14] is low. This implies that internal variability within specific categories of regions is, in general terms, higher than in-between groups. All groups of regions

[14] As in DG Regio's classification of regions for Structural Funds within the framework of the Reformed Cohesion Policy for the period 2014-2020: http://ec.europa.eu/regional_policy/what/future/index_en.cfm

seem to follow similar distribution patters, with the exception of non-EU regions (Island, Norway and Switzerland) and less developed regions. Still, even for these specific categories of regions, relative differences with other groups of regions appear to be small for most factors. Differences are higher for the governance-related factors (including good governance and institutions; key economic instruments and financial support, and; environmental awareness and voluntary actions), than for the so-called structural factors (including territorial assets and physical conditions; access to technology; expected market demand, and; human resources knowledge and technology).

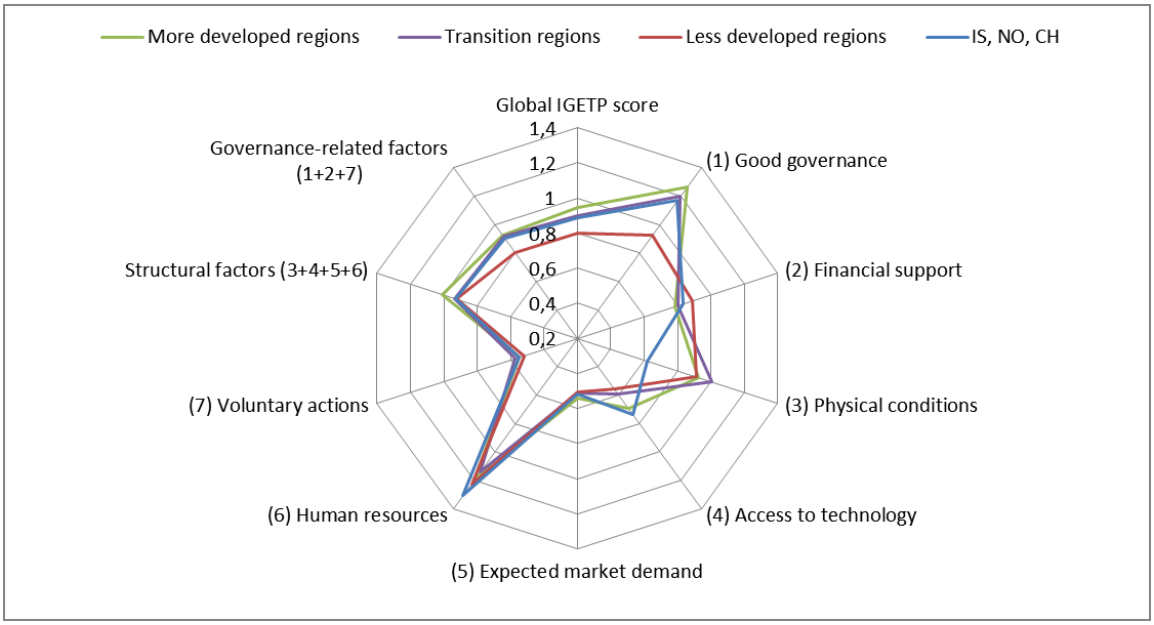


Figure 11 Contribution of green economy factors to the global IGETP score by level of regional development

All the above implies that, from a development perspective, green economy drivers are not concentrated within any specific category of regions. Regions seem to be, if not equally, at least similarly endowed to start or consolidate transitions to a greener economy, regardless of their present level of development.

However, the sensitivity analysis performed on IGETP scores showed that small variations in the number of variables included and the weights used could lead to quite different results. This implies that the IGETP might rely on a too narrow number of indices to qualify as something more than a highly exploratory and preliminary research output. Thus, in order to avoid the various potential pitfalls linked to synthetic indicators in general and the IGETP in particular, the typology showed on Map 16 should be utilised in combination with the different components included in the IGETP (mapped on Section 3.2 of this report).

Generalising this recommendation, it could be claimed that the use of benchmarks of indicators is arguably preferable to synthetic indexes that combine several intrinsically diverse dimensions. On the one hand, panels of indicators enable a better policy interpretation of research outputs and allow for a more accurate design of policies compared to synthetic indexes. On the other hand, the interpretation of results based on panels of indicators allows benchmarking of regions that are comparable in the dimensions where benchmarking is done. Along these lines, the formulation of a framework of indicators capable of assessing progress

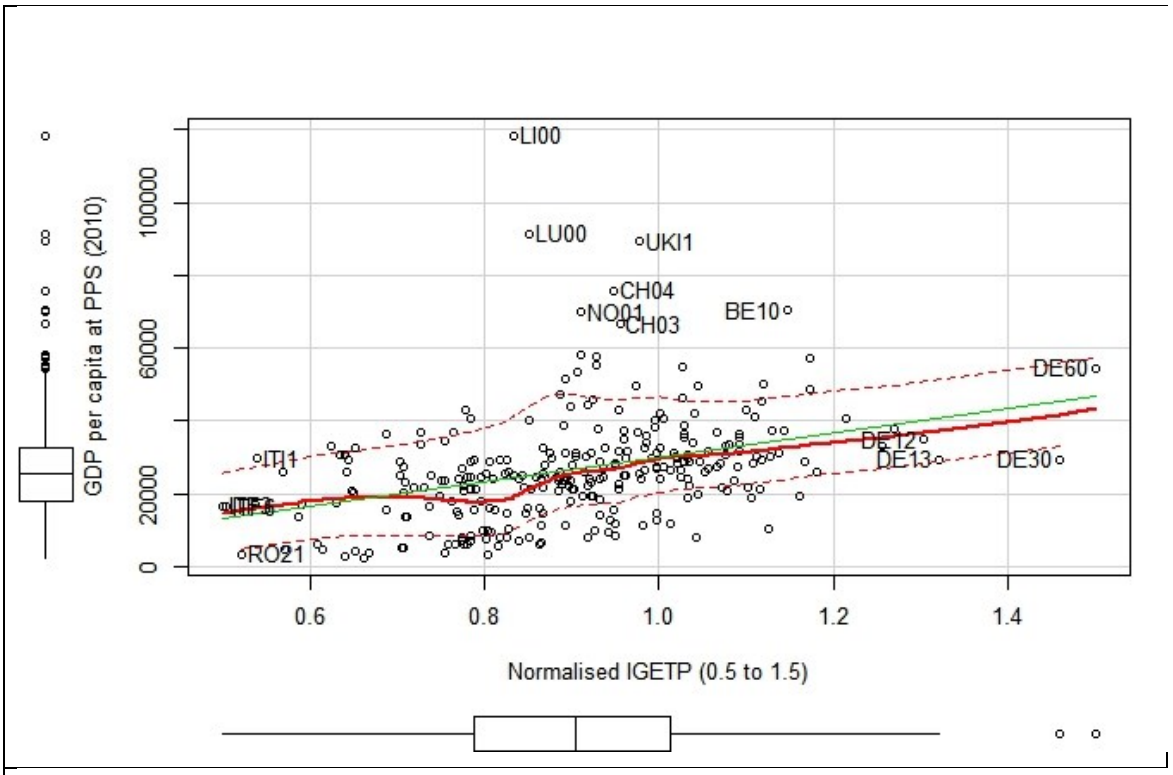
towards a green economy, such as the one provided in GREECO project, might be very helpful. It would allow the formulation of ends and means in specific targets and instruments.

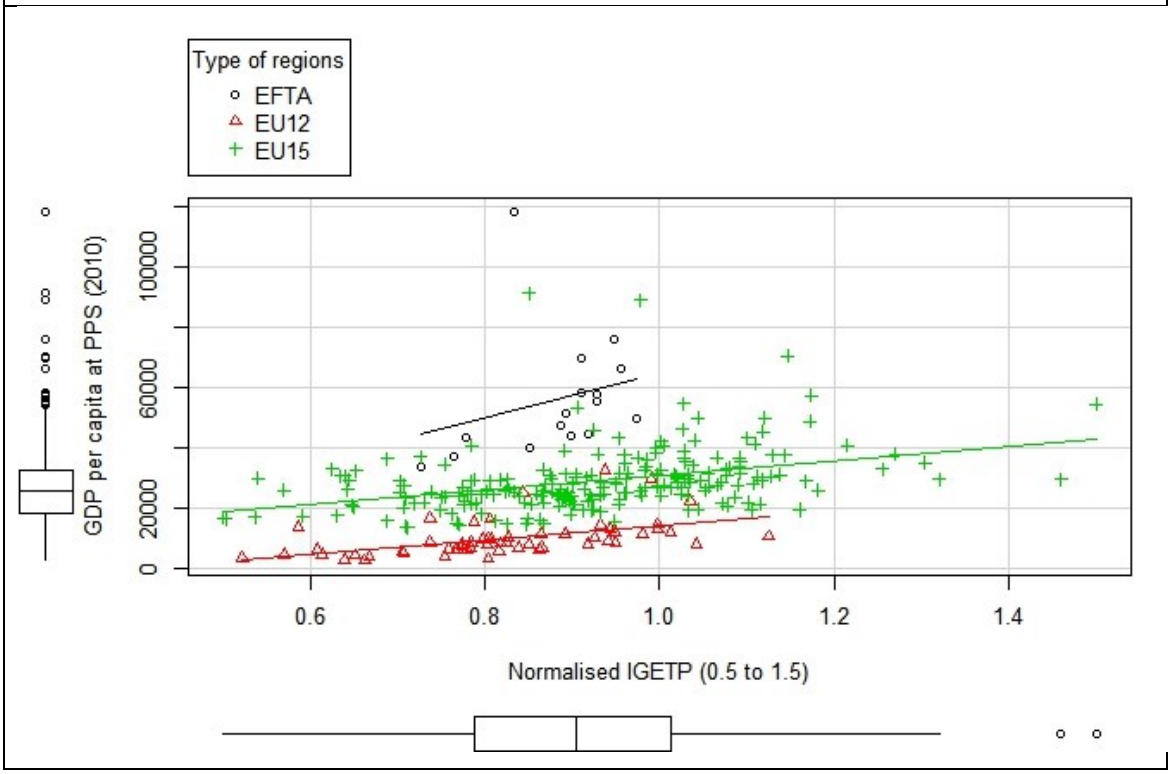
3.4. Relating regional potentials with other socio-economic variables

Relating IGETP scores and its components with other socio-economic variables and additional regional classifications can be useful to identify territorial patterns connected to green economy potentials.

Although from a purely statistical point of view none of the socio-economic variables analysed below has a statistically valid linear relation to IGETP (Adjusted R-squares values are in all cases under 0.15), a linear model renders the possibility to explore differential behaviours of dependent and explanatory variables across the distribution:

In general terms, the relation between IGETP and deflated **GDP per capita** (expressed in terms of Purchasing Power Standard – PPS – *deflated* by the GDP deflator with respect to the price level of 2005) seems to be positive (see upper graph on Figure 12 below). Simply put, this relationship implies that an increase in one point in IGETP score (which is the maximum total variability of the index) *is worth* € 33 618 measured in GDP per capita, according to the proposed model. All types of regions seem to correlate positively with the IGETP from a GDP per capita perspective, with the only exception of transition regions, where there does not seem to be a specific relationship in either direction (see lower graph on Figure 12 below). This confirms that regions ranking on intermediate positions in terms of IGETP are the most difficult to characterise from a green economy perspective.


LI00
LU00
UKI1
CH04
NO01
CH03
BE10
DE60
DE12
DE13
DE30
ITI1
RO21
GDP per capita at PPS (2010)
0
20000
60000
100000
0.6
0.8
1.0
1.2
1.4
Normalised IGETP (0.5 to 1.5)


Type of regions
EFTA
EU12
EU15
GDP per capita at PPS (2010)
0
20000
60000
100000
0.6
0.8
1.0
1.2
1.4
Normalised IGETP (0.5 to 1.5)

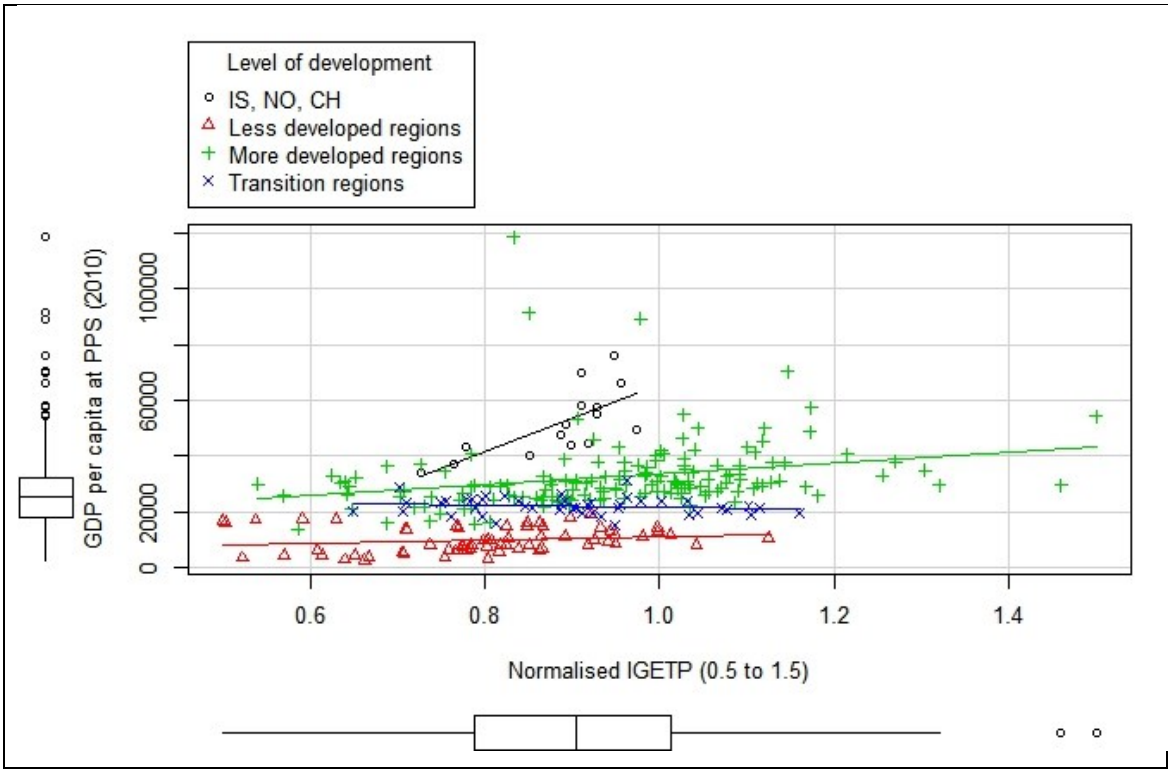
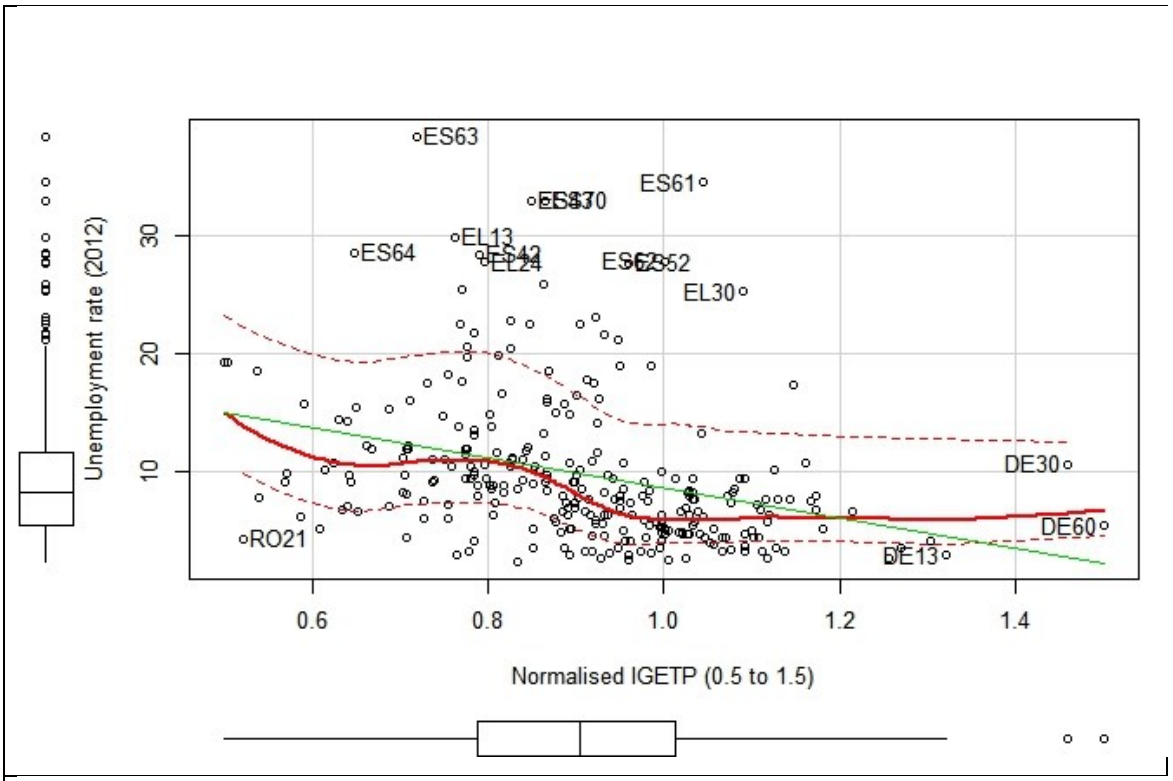


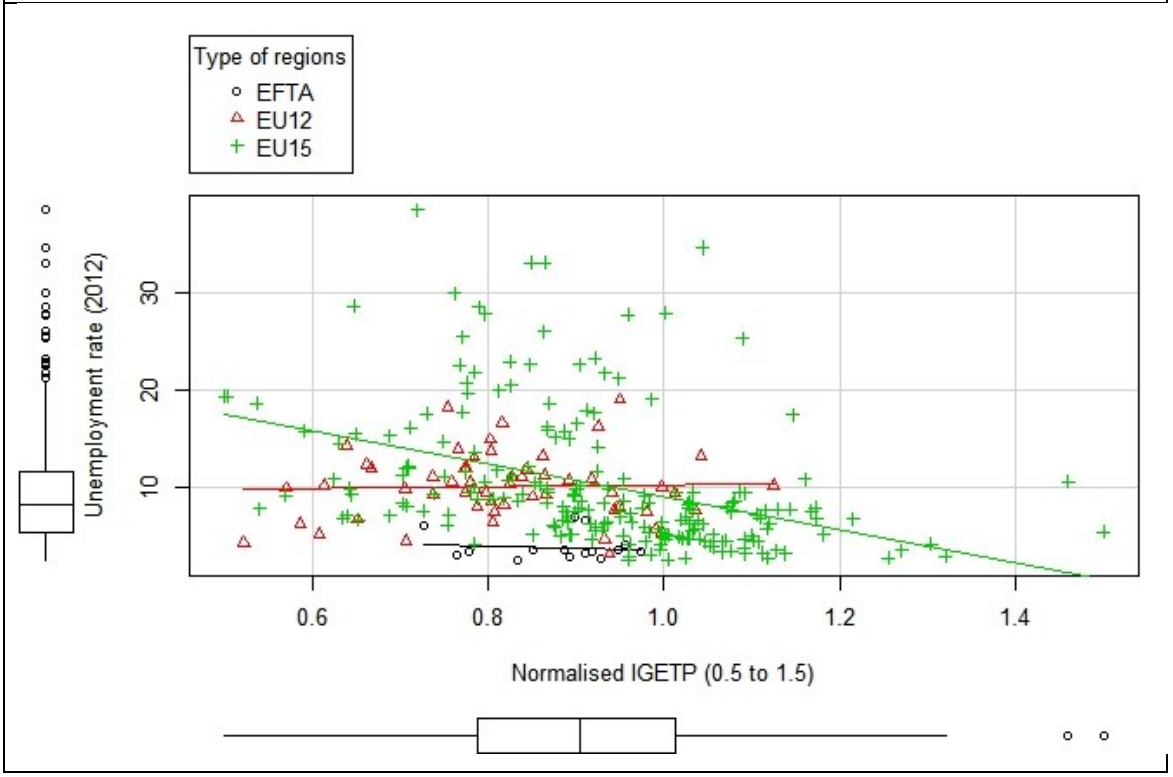
Figure 12 Scatterplots showing the relation between IGETP and GDP per capita at NUTS-2 level (2010) for different types of regions: ESPON space (above), regional categories (middle) and level of development (below)

Figure 13 below shows the relation between regional **unemployment rates** and IGETP scores. In this case the global correlation is negative (see upper graph on Figure 13). This implies that the higher the estimated IGETP is, the smaller unemployment rates are found at the regional level. This seems obvious, as the IGETP combines several variables, albeit not all of them, that have a strong negative correlation with unemployment rates, in particular the availability of well-trained human resources and access to technology.

Looking at regional categories, New Member States (EU-12) have a clearly differentiated behaviour in comparison to the remaining regions (see middle graph on Figure 13). If taken in isolation, unemployment rates and normalised IGETP scores of regions located within EU-12 countries do not show any specific correlation pattern, whereas the remaining regions have a pretty strong negative one. Furthermore, this lack of correlation is also present in most of the factors considered in the IGETP, including good governance and institutions, access to technology, as well as key economic instruments and financial support. In turn, regression analysis show similar moderately negative correlation between normalised IGETP scores and unemployment rates by regional level of development (see lower graph on Figure 13).

Even if its statistical relevance is limited, this differentiated behaviour is symptomatic of a higher level of complexity of the mechanisms activated by green economy factors within New Member States in comparison to other areas. This calls for a more detailed assessment in such regions.


ES63
ES61
EL13
ES64
EL30
DE30
DE60
RO21
DE13
Unemployment rate (2012)
Normalised IGETP (0.5 to 1.5)
10
20
30
0.6
0.8
1.0
1.2
1.4


Type of regions
EFTA
EU12
EU15
Unemployment rate (2012)
Normalised IGETP (0.5 to 1.5)
10
20
30
0.6
0.8
1.0
1.2
1.4

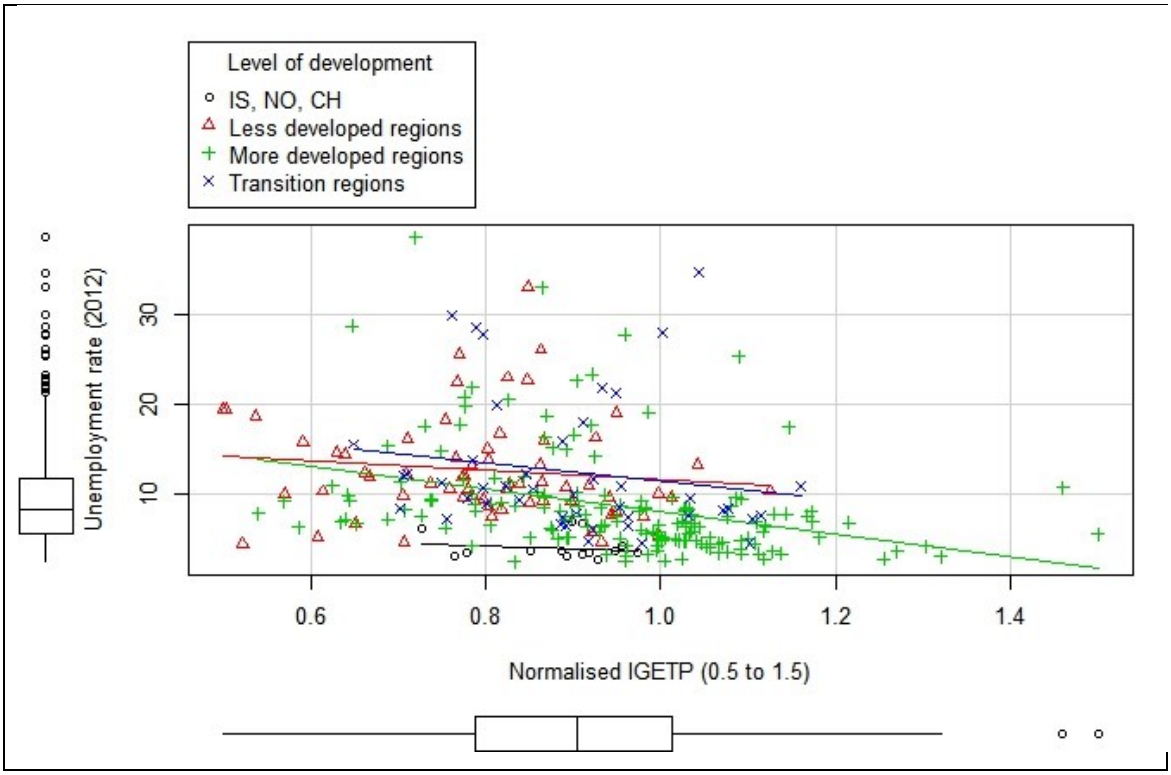
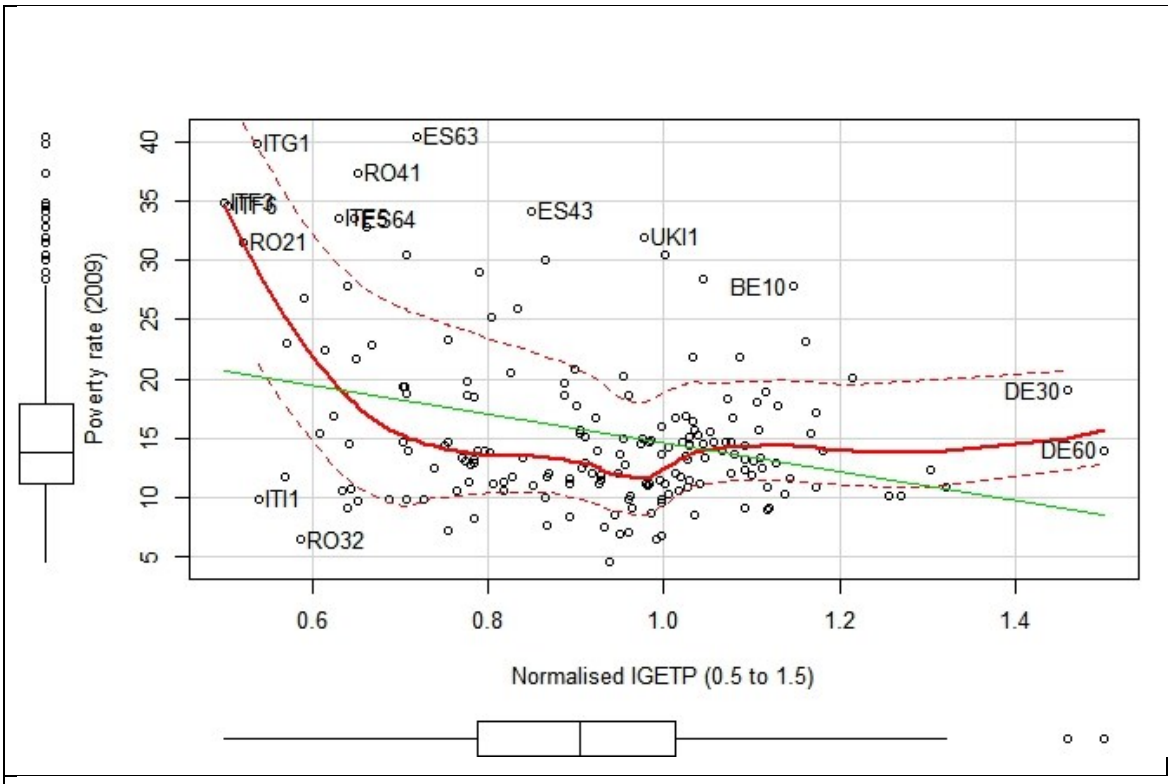
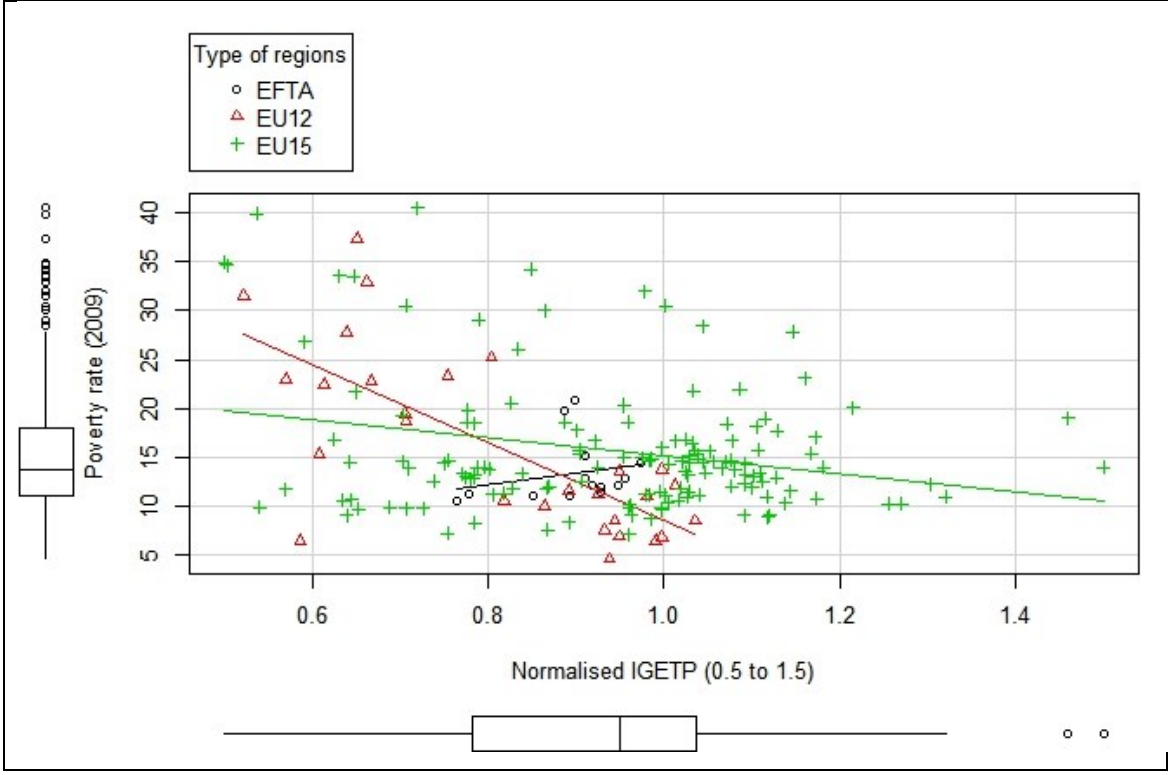


Figure 13 Scatterplots showing the relation between IGETP and unemployment rates (2012) for different types of regions: ESPON space (above), regional categories (middle) and level of development (below)

A comparable situation can be observed within Figure 14, which relates regional IGETP scores with **poverty rates** in ESPON countries. As it could be expected considering the green economy factors included in the IGETP, the global correlation between IGETP scores and poverty rates is negative (see upper graph on Figure 14). Still, variability among different groups of regions is great, with New Member States (EU-12) and less developed regions showing stronger negative correlation rates that the remaining regions. For the latter group of regions the relationship is much weaker and uncertain (see middle and lower graphs on Figure 14, respectively).

It is very difficult to draw conclusions basing on these figures but, broadly speaking, it could be claimed that concentrating resources in improving those factors linked to green economy potentials could indirectly help the most vulnerable regions to reduce their poverty rates. Several pieces of territorial evidence collected in this project seem to suggest that investing in greening the economy can create favourable conditions for the implementation of a number of win-win policy strategies that in the worst case could contribute to improve environmental conditions alone and, in the best and most probable case, could improve quality of life, economic wealth and wellbeing in many, not only mutually compatible, but also synergic respects.


ITG1
ES63
RO41
ES64
ES43
UKI1
RO21
BE10
DE30
DE60
ITI1
RO32
Poverty rate (2009)
Normalised IGETP (0.5 to 1.5)
5
10
15
20
25
30
35
40
0.6
0.8
1.0
1.2
1.4


Type of regions
EFTA
EU12
EU15
Poverty rate (2009)
Normalised IGETP (0.5 to 1.5)
5
10
15
20
25
30
35
40
0.6
0.8
1.0
1.2
1.4

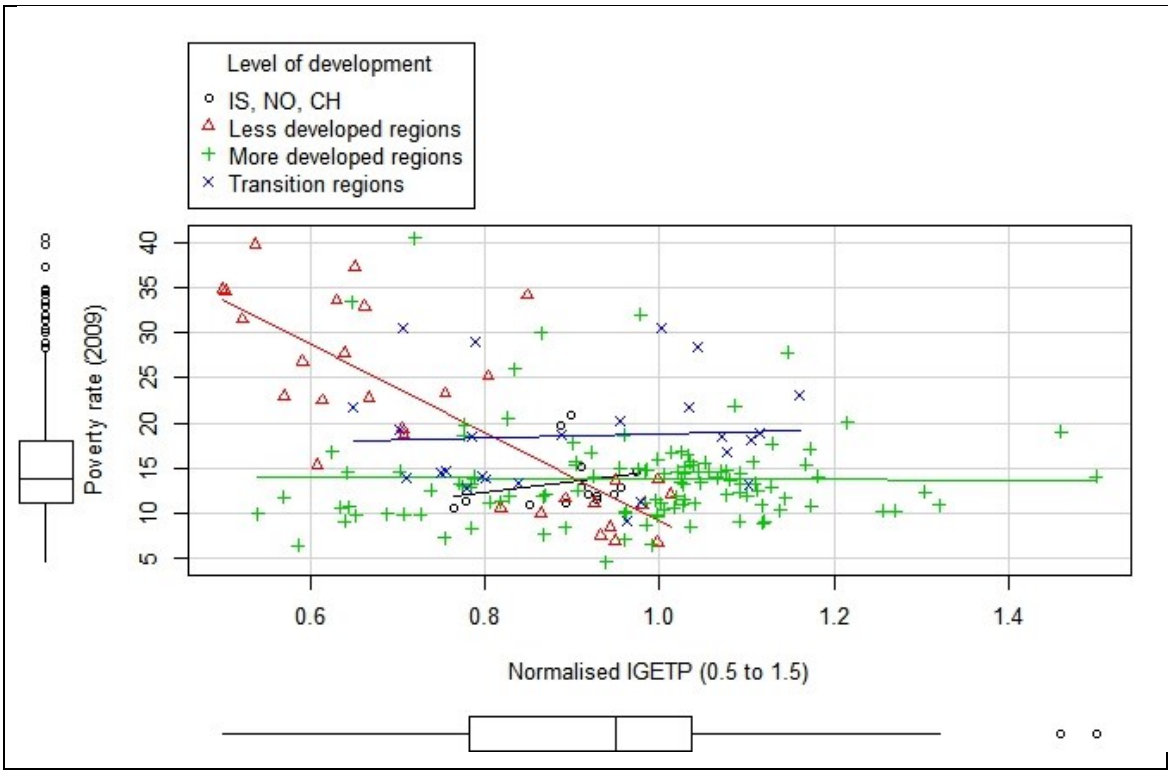


Figure 14 Scatterplots showing the relation between IGETP and poverty rates (2009) for different types of regions: ESPON space (above), territorial regional categories (middle) and level of development (below)

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Annex I: Overview of potential factors found in literature

Factor	Page	Fragment
UNEP, 2011, Towards a Green Economy: Pathways to Sustainable Development and Poverty Eradication, www.unep.org/greeneconomy		
Consumer awareness and demand changes	94, 431	*In recent years, we have seen a relative explosion in the number of programmes that seek to help consumers make informed decisions in terms of sustainability about their consumption of fish products. Although such programmes are not without criticism, it is clear that consumer awareness of marine fishery issues, if properly designed and implemented, would be an important driver of greening world fisheries as such awareness programmes expand into more and more places around the world.*
The need to protect environment and resources	169	*New, incentive-based approaches to conserving forests have emerged over the last 10 to 15 years.2 The most high-profile of such initiatives are payments for environmental services (PES), which pay forest landowners for providing watershed protection, carbon storage, recreation, biodiversity etc.*
Unsustainable waste generation	294	*The waste sector is facing four sets of challenges: 1) increasing growth in the quantity and complexity of waste streams associated with rising incomes and economic growth; 2) increasing risk of damage to human health and ecosystems; 3) the economic unattractiveness of the 3Rs; and 4) the sector's contribution to climate change*
Information instruments	397	*Information instruments may induce further changes in behaviour through raising awareness of alternative modes or methods of travel. Public-awareness campaigns, mobility management, labelling of new cars, and driver education are representative examples. (In the case of transport for example)*
Technology transfer and access	402	*In order to meet the sustainable transport development challenge for future, it is important to continue to develop new technologies.*
…tourism strategic areas	441	Table A2-1

Stock and flows of natural resources	503	*The key drivers of a greener economy, as represented in the global model developed for the analysis carried out in the GER, are stocks and flows of natural resources in addition to the stocks and flows of capital and labour which are important in any long term economic model. Stocks are accumulations of inflows and outflows (as forests are the accumulation of reforestation and deforestation).*
Policies and institutional capacity	549-564	*a)Promoting investment and spending in areas that stimulate a green economy* *- Public expenditure measures* *- Ensuring rational public expenditures* *b) Addressing environmental externalities and market failures* *- Environmentally related taxes* *- Tradable permit schemes* *- Ensuring effective use of environmentally related taxes* *c) Limiting government spending in areas that deplete natural capital* *- Environmentally harmful subsidies* *- Reforming harmful subsidies* *d) Establishing sound regulatory frameworks* *- Standards* *- Property laws and access rights* *- Negotiated and voluntary agreements and other information-based tools* *e) Strengthening international governance* *- Multilateral environmental agreements* *- International trade law* *- International investment in framework* *Strong institutional capacity provides the basic functions for the effective design, implementation and operation of any policy intended to enable a green economy: consistent, science-based measurement, analysis and decision-making; inclusive consultation and strategic planning; monitoring the performance of policies and economic actors; adaptation of policies where necessary; enforcement of laws; transparency and accessibility regarding information of interest to citizens; and existence of systems that ensure the accountability of decision-makers.*

Green Economy. Why a Green Economy Matters for the Least Developed Countries. A joint publication of United Nations Environment Programme (UNEP), United Nations Conference on Trade and Development (UNCTAD), and Office of the High Representative for the Least Developed Countries, Landlocked Developing Countries and Small Island Developing States (UN-OHRLLS) for the LDC-IV Conference in May 2011.		
Tradition on sustainable practices	3	*While other countries face sizeable economic and social costs of 'decarbonization', alongside costs linked with retiring inefficient fossil fuel-based technologies, LDCs can jump start the green economy transition by maintaining and expanding the sustainable practices that already exist. For example, practices such as low-carbon, labour intensive agriculture and community-based forestry which have existed for decades in these countries, will be central elements to the greening of these sectors.*
Trade	11	*Trade can be a powerful connector between sustainable consumption and production to drive a transition to a green economy, even in the context of LDCs.*
Less developed countries early stage of industrializati on	12	*LDCs' early stage of industrialization offers avenues for leapfrogging and adopting technologies which offer greater energy and resource efficiency*
Adapting for a Green Economy: Companies, communities and climate change. A Caring for Climate report by the United Nations Global Compact, United Nations Environment Programme (UNEP), Oxfam, and World Resources Institute (WRI)		
Climate change	22	*Effective adaptation to climate change will require the development and deployment of a wide range of new and innovative products, strategies and services to help vulnerable people in developing countries manage climate risks and impacts. Many of these are also part of a green economy.*

Greening the economy: mainstreaming the environment into economic development. Economic Commission for Europe Seventh "Environment for Europe" Ministerial Conference. Astana, 21–23 September 2011		
Wood and agricultural crop biomass	11	*Wood and agricultural crop biomass have a role to play in facilitating the transition to a green economy. While mitigating climate change through the replacement of nonrenewable energy sources, they generate new income sources and can lead to the development of domestic as well as export markets.*
Traditional energy costs	13	*Common reasons for avoiding energy subsidy reform should be carefully scrutinized against the background of alternative policies with lower environmental and fiscal costs.*
Greener transport policies. Tax instruments	17	*Greener transport policies to internalize negative externalities of road transport include taxation. Tax instruments applied successfully in many countries include the taxation of vehicles (according to engine power, emission levels, engine type), taxation of fuels (typically well over 50% of total price) and taxation of road use (congestion charging, road tolls). Other effective and widely used policy instruments are vehicle regulations and periodical technical inspections. Emission of local pollutants has been reduced efficiently through emission limits*
Alternative engine technologies	18	*Alternative engine technologies, such as electric and plug-in hybrid vehicles, can be effective for improving environmental sustainability, but only if the generation of electricity and the production of hydrogen are sustainable and appropriate fuel quality and type (e.g., biofuels and natural gas) are available*
Organic agriculture	19	*Organic agriculture preserves soil organic matter and biodiversity, thus rendering a multitude of ecosystem services. (…)developing sustainable cultivation systems and a variety of high-quality products*
Education	20	*Education is a key element for developing human potential for greening the economy relevant to the transition towards the green economy. Education should embrace the values of sustainable development and enable individuals to understand their role in building the green economy, as well as how to consume, produce and act sustainably.*
Research & Development & Innovation	22	*In the pan-European region, innovation is already a key driver of increased energy; carbon, water and material efficiency; and the improved performance of goods and services*
Towards Green Growth. OECD Ministerial Council Meeting on 25-26 May 2011. www.oecd.org/greengrowth		

Dual role of natural capital	25	*Natural capital contributes to production by providing crucial inputs, some of which are renewable and others which are not. It also influences individual and social welfare in various ways, through the effect that the environment has on health, through amenity value and through provision of ecosystem services.*
Investment in natural capital	25	*Acknowledging that investment in natural capital is an area in which public policy intervention is most needed because market incentives are weak or non-existent. This is largely because the contribution of natural capital to production is often not priced and the contribution of natural capital to individual welfare is not appropriately valued. The lack of proper valuation and market incentives or signals can affect behaviour and truncate the foresight of households and firms in ways that set the economy on trajectories that are unsustainable (or conversely that miss growth opportunities) or that are not necessarily maximising well-being. (...)*
Technology transfer and diffusion	62	*Ensuring a wide diffusion of green technologies will be as important as their invention, in particular in addressing global environmental issues. The speed of deployment of, for example, existing low-carbon technologies will partly determine the global costs of climate-change mitigation and adaptation.*
Investing in infrastructure	65	*Shifting to a greener growth trajectory requires special attention to network infrastructure such as energy, transport, water and communications networks. There is considerable potential for infrastructure investment to contribute to economic growth and prosperity because it enables trade specialisation, competition, access to new resources, the diffusion of technology and new organisational practices (OECD, 2009c). Well planned infrastructure development can reduce water and air pollution and curb unsustainable land use change further enhancing development.*
Institutional and governance capacity	74	*Institutional and governance capacity to implement wide-ranging policy reform is an essential condition for greening growth.*
Labour market and skills development policies	91	*Labour market and skills development policies can make an important contribution to greener growth. By minimising skill bottlenecks and preventing a rise in structural unemployment, these policies can make the transition to green growth quicker and more beneficial. By helping workers to move from contracting to expanding sectors, they can also assure a fairer sharing of adjustment costs arising from economic changes accompanying the greening of growth.*

International co-operation	104	*Global challenges require co-operation on a global scale in order to deliver public goods (climate change mitigation, biodiversity) or protect the global commons (the environment, fisheries). International co-operation is necessary because: a) no single country can successfully address the problems alone; b) the costs and benefits of action may accrue to different countries, and individual countries may not be willing to bear the costs of addressing global challenges if they cannot appropriate the benefits; and c) uncoordinated efforts of many countries to address global challenges are likely to be more costly and less successful than co-ordinated, co-operative efforts.*
Towards Green Growth. Monitoring progress. OECD indicators. OECD 2011		
Innovation and technology	11	*These are drivers of multi factor productivity change through new products, entrepreneurship and business models, and new consumption patterns.*
Green entrepreneurship	27	*Examining the dynamics of firm creation and entrepreneurship in relation to environmental goods, services and technologies goes one step further: green entrepreneurship is both a source of innovation and a source of opportunities for economic growth.*
International trade	29	*International trade is a source of economic opportunities in general. In conjunction with green growth, there has also been a stream of work on the importance of trade in environmental goods and services (Kennet and Steenblik 2005). The liberalisation of trade in environmental goods and services can help green growth. For importing countries, fewer and lower barriers to trade in environmental goods and services translate into greater access to the most efficient, diverse and least expensive goods and services on the global market. For exporters, liberalisation can create new market opportunities and spur development of globally competitive industries dedicated to environmental improvements, for instance via technology development or diffusion.*
Prices and taxes	30	*A rising share of environmental taxes in overall revenues is at least a signal for rising political importance attached to environmental issues by policy-makers.*
Regulations and management approaches	30	*Over economic instruments used to get prices right, regulatory instruments should not be forgotten as a tool to reduce negative effects on the environment. (…)* *For example, it might be possible to assess whether or not there is an obligation to equip new cars with catalytic converters or to screen environmental legislation for obligations to carry out environmental impact assessments. And what may be a tough standard in country may be lenient in another one if there are large differences in the environmental asset base and its quality.*

Training and skills development	30/48	*Education, training and skills development are closely linked to the capacity to innovate. Public policy plays a role by institutionalising environmentally-related lines of education in particular in higher education. Vocational Education and Training is equally important in raising awareness about environmental issues, in fostering innovation on the workplace and in facilitating the transition and development of firms and the workforce into a low-carbon economy (OECD 2010b). (...)* *Building human capital through education and training programmes is particularly important. Young people who complete secondary education will likely face fewer difficulties to find work and move to environmentally oriented sectors.*
OECD Green Growth Studies. Energy. OECD and IEA. 2011		
Policies for green growth in the energy sector	12-13	*A range of mutually reinforcing measures is required to address market failures and barriers, and create the enabling policy conditions for large scale private-sector investment. This includes:* *• Rationalising and phasing-out inefficient fossil fuel subsidies that encourage wasteful consumption, while adequately addressing the needs of low-income households through effectively targeted social policies.* *• Setting a price signal to value externalities and provide robust signals for longer-term structural changes.* *• Establishing sound market and regulatory frameworks that remove barriers to green investments and facilitate the move away from existing systems and patterns of fossil fuel energy use.* *• Radically improving energy efficiency will reduce the need for investment in energy infrastructure, cut fuel costs, increase competitiveness, lessen exposure to fuel price volatility, increase energy affordability for low-income households and cut local and global pollutants improving consumer welfare.* *• Fostering innovation by creating the enabling environment and regulatory frameworks to foster breakthroughs and overcome the inertia incumbent in today's energy systems, whether* *institutional or economic. Investment in relevant research and temporary support for the development and commercialisation of green technologies will be needed in certain cases. Intellectual property protection is important to the industry as reflected in the growing numbers of clean technology patent applications. In addition, governments need to implement effective policies for green energy innovation that target the cost competitiveness gap while also fairly reflecting the maturity and competitiveness of individual technologies and markets.*

Innovation to achieve environmental and economic objectives	17	*Innovation is fundamental to the objectives of green growth in that it can help to decouple environmental damage from economic growth, and is also at the core of economic objectives such as productivity growth and job creation. It offers the opportunity to meet environmental challenges at a reasonable cost. Innovation is particularly important in the energy industry, as we search for forms of energy that impose fewer environmental costs and ways of improving efficiency in use as prices rise.*
Synergies between environmental and productivity growth objectives	18	*Improved resource productivity and energy efficiency, through innovation or deployment of energy technology or processes, supports decoupling between economic growth, environmental damage and resource degradation.*
Opportunities for new markets and industries	18	*Shifting toward green growth in the energy sector will require new technologies, fuel sources, processes and services that can spur new markets and new industries. There are also increasing demands from consumers and investors for environmentally-friendly products, services and production processes in the energy sector. Firms that are proactive in the face of these changes will be well-positioned to both contribute to and benefit from them.*
Policies for green growth in specific energy sectors	54	*Substantially greening the transport sector will require policies to promote both the widespread adoption of best available technology, and the longer-term development and deployment of a range of new technologies. It will also require strong policies to ensure the rapid uptake of these innovations and to encourage sensible changes in travel patterns (IEA, 2009e).*
Sustainable Manufacturing and Eco-innovation: Towards a Green Economy. OECD, 2009		
Table on indicator groups and topics covered	12	

(Eco)-Innovation	2	*Innovation has long been seen as central to economic performance and social welfare; it is increasingly recognised as a significant driver of economic growth. More recently, industry leaders and policy makers have also looked at innovation as the key to making radical improvements in corporate environmental practices and performance.*
Regulations and standards	7	*Flexible and well-designed standards and regulations, however, could help to diffuse advanced environmental technologies and eco-products by creating demand.*
Public procurement and demand support	7	*Some governments have started to highlight procurement as a way to spur innovation. Governments may also directly support consumers with subsidies, tax incentives or other benefits to encourage the uptake of eco-products and services.*
Technology transfer	7	*Technology transfer is a way for technology-importing countries to increase resource efficiency in a relatively short time while providing exporting countries with market and innovation opportunities.*
A New Growth Path for Europe. Generating Prosperity and Jobs in the Low-Carbon Economy Synthesis Report. Carlo C. Jaeger, Leonidas Paroussos, Diana Mangalagiu, Roland Kupers, Antoine Mandel, Joan David Tàbara. Potsdam, 2011		
Variety of fronts – including incentives for additional investment, growth-oriented fiscal policy, public procurement, and, of course, climate policy	6	*With this strategy, Europe can define its role in the global economy by focussing on high-quality products where stable unit costs do not depend on low wages but on continuous learning-by-doing. European industry can then maintain and enhance its competitiveness by developing the lowcarbon materials and technologies that will shape the future.*

A virtuous circle of additional investment, learning-by-doing and expectation formation	17	*The basic mechanism creating the opportunity for a new growth path in Europe is the mobilization of a virtuous circle of additional investment, learning-by-doing and expectation formation.*
Greening the Economy. A strategy for growth, jobs and success. ALDERSGATE GROUP, 2011		
Dynamic sectors	6	*The most effective way to stimulate green investment is on a sectoral basis due to the large number of specific barriers and solutions that each sector faces.*
Public spending and strong incentives and regulatory levers	12	*Driven by significant public spending, and strong incentives and regulatory levers, China has transformed itself over the past two decades to a major manufacturer of a number of low carbon technologies. By speeding up the cultivation and development of emerging strategic industries (including energy saving and environmental protection), it aims to restructure China's economy and reshape its industry, improving R&D in science and technology, and establishing a resource efficient and environmentally friendly society*
Dynamic policy framework	14	*The UK needs an intelligent and dynamic policy framework that corrects market failures. Otherwise green investments will flow to more attractive markets or develop at too slow a pace.The most effective policies will provide as much certainty as possible by being:* *» Credible. Legal, enforceable, fully deliverable and supported by an overarching vision.* *» Consistent. Providing confidence that a policy direction will be maintained, implementing progressive, and avoiding retrospective, changes.* *» Bankable. Risk and reward levels are attractive over clear investment timeframes, with no shocks to damage early investors.*
Tax Regime	22	*For many manufacturers, the tax regime is a much more significant driver for long-term investment than environmental regulation or the projected carbon price.*

New skills	23	*A crucial component of the transition a green economy is the development of new skills in rapidly growing environmental markets (mainly building on existing skill sets) and sustainable literacy skills in all sectors and businesses (such as project management and communication skills). Greater collaboration between government, industry and learning providers to deliver a cohesive approach to skills and education is needed and funding should be responsive to industry needs.*
Localism	25	*The solutions to environmental challenges must be delivered at the local level. Regional and local level actors will need to perform a number of vital functions in the successful shift to a more sustainable economy and meet the aspirations of the 'Big Society'. In terms of skills and resources, smaller, less complex environmental projects tend to have simpler supply chains providing the added benefit of effective utilisation, the development of UK skills and providing greater opportunities to smaller businesses and new market entrants.*
Sizing the Clean Economy: A national and regional green jobs assessment. THE BROOKINGS INSTITUTION, METROPOLITAN POLICY PROGRAM, 2011		
Global demand for environmental sustainability	9	*The clean economy matters, first of all, because its emergence reflects a growing demand for environmental sustainability given growing concerns about the already massive scale of global and national environmental deterioration….*
A sharpening need for resource security	10	*The clean economy also matters for reasons of resource security: It reflects new demands that this nation and others reduce their vulnerability to resource supply shocks and related conflict*
A world-wide aspiration toward economic transformation	10	*There remains a third increasingly ascendant factor behind the clean economy's significance: the prospect of industrial transformation. The clean economy matters, in short, because it interacts with nearly every aspect of the rest of the economy and is emerging as a site of rapid technological and process innovation world-wide.*
Metropolitan areas	24	*Most of the country's clean economy jobs and recent growth concentrate within the largest metropolitan areas.*

Industry clusters	30	*Strong industry clusters boost metros' growth performance in the clean economy. A final finding pertains to the role in economies of industry clustering— geographic concentrations of interconnected firms often accompanied by supporting or coordinating organizations.*
Make a market: catalyze vibrant domestic demand	34-35	*Vibrant domestic market is critical because strong demand—or the expectation of strong demand—in a large and growing domestic market signals opportunity, attracts investment, and induces incremental innovation. (…) The strategy: Improve market access and demand*
Ensure adequate finance: address the commercialization gap	37	*The nation's current patchwork of responses to clean economy finance needs—especially in the energy field remains sub-optimal and requires attention. (…) The strategy: Address key finance gaps*
Drive innovation: accelerate technology development	39-41	*Only through such a sustained technology push will society offset the serious market problems that prevent private firms from investing adequately to generate the next waves of products, processes, and business models, whether in cheap renewable energy, green materials, environmental remediation, or super-efficient water purification. (...) The strategy: Keep working to improve the clean economy innovation system*
Focus on regions: build the clear economy cluster by cluster	41-42	*Regions and the regional industry clusters they contain play a critical role in growth because they foster innovation, entrepreneurship, and job creation while promoting economic efficiency. (…) The strategy: Build the clean economy "bottom up," region by region*

Activités, emplois et métiers liés à la croissance verte: Périmètres et résultats. Commissariat général au développement durable. Service de l'observation et des statistiques. Juin 2011.

La combinaison de 6 chocs exogènes et endogènes	19	*– l'augmentation du prix des ressources rares et la volatilité du cours des énergies non renouvelables liée à l'incertitude ;* *– le changement climatique et la taxation des émissions de carbone ;* *– la mise en place de nouvelles réglementations et de normes dédiées à l'internalisation des contraintes environnementales non climatiques ;* *– l'évolution des préférences collectives et l'émergence possible d'un mode de consommation durable ;* *– le niveau et la structure des dépenses publiques environnementales ;* *– les innovations technologiques portées par les efforts de recherche en matière de réduction des émissions de CO2 et de la pollution.*
The European Agricultural Fund for Rural Development Examples of 'Green Growth' projects. Managing editor: Rob Peters, Head of Unit, EC Directorate General for Agriculture and Rural Development. Manuscript text finalised during July 2011.		
Efficient use of resources	4	*Greater emphasis on the efficient use of EU resources is seen as a key tool for tackling climate change and encouraging green economic growth.*
Local initiatives	4	*A group of rural businesses from Luxembourg appreciate the potential profits that can be gained from 'going green' and they have joined forces, with support from the EAFRD, to form an innovation cluster of resource-efficient technologies.*
Agri-environment payments	6	*In this way the EAFRD is used to secure ecological benefits for society, such as safeguarding the preservation of wildlife habitats and EU biodiversity. The schemes can also act as development tools for farm businesses that can use their environmental assets to diversity into new economic activities, like wildlife tourism. This underscores the relevance of agri-environment action as a Green Growth tool.*
Water management: intelligent irrigation	10	*Water management is a key challenge for rural areas and wise water use is known to make direct contributions to rural development issues connected with business competitiveness, environmental conservation, economic diversification and quality of life. (...) However, irrigation can be the cause of counter-productive environmental problems. Namely, depletion of underground water supplies in aquifers, increased risks of soil salinity and erosion. Automated approaches to irrigation offer opportunities to overcome some of these problems*

Organic production	12	*Organic farming exemplifies the type of Green Growth approaches to sustainable agriculture that can be supported by the EAFRD. Organic production methods place high emphases on environmental protection and animal welfare considerations.*
Biomass production	16	*Biomass is one of the widespread fuels used by EU renewable energy sectors and the growing popularity of biomass is attributed to a number of factors. It remains especially competitive as a heating fuel compared to fossil-based alternatives like coal, oil or gas. It is also often more readily available than these fossilfuels and, unlike solar or wind energy, biomass energy has the advantage that it can be produced continuously, because most of feedstock can be conveniently stored. This offers useful benefits for supplying seasonal energy demands.*
Wildlife species and rural tourism	18	*RDP resources can be used to promote Green Growth in a manner that helps conserve wildlife and support rural economies.*
Converting farm waste into biogas fuel	20	*This technology accelerates decomposition of the manure and produces combustible gas which can then be burnt either for heating purposes or fed through a turbine to generate electricity*
The Clean Energy Economy. Repowering Jobs, Businesses and Investments across America. The Pew Charitable Trusts, June 2009.		
Incentives (as Recyclebank)	18	*RecycleBank, which operates in 18 states and 100 cities and towns, encourages recycling while helping consumers and local governments save money. The company collects recyclable materials in bins equipped with computer chips that record the amount recycled and send the information to the RecycleBank's Web site, where it is converted into points for the bin owner's account. The customer can log into the account and convert points to coupons for stores such as Target and brands such as Kraft.*

Growing demand for energy services, the stress on water supplies, the need to reduce greenhouse gas emissions, and a limited supply of traditional fossil fuels	25-26	*"The long-term drivers for cleantech are still intact," the group reported in April 2009. These include the growing demand for energy services, the stress on water supplies, the need to reduce greenhouse gas emissions, and a limited supply of traditional fossil fuels, according to the report.*
Venture Capital????	25/34	*Venture capital investments in businesses that are drivers of the clean energy economy (…)* *Venture capital investments help drive states' clean energy economies, allowing companies to grow, hire new employees and scale up the production and distribution of goods and services*
Local advantages	29	*Each state has different competitive advantages when it comes to growing jobs and businesses in the clean energy economy, attracting private venture capital investments and incubating research and development. Some states have abundant natural resources such as wind and sunshine, while others are home to dozens of research universities.*
Renewable Portfolio Standards (and similar policies)	39/41	*These renewable energy targets are expected to drive growth in already fast-growing areas of the clean energy economy. (…)* *Business leaders and policy makers we interviewed cited state policies such as renewable portfolio standards as important factors in driving investments, attracting companies and growing new industries and jobs because they help create market demand for clean energy technologies, products and services.*
U.S. Conference of Mayors-green jobs report		

Metropolitan areas	8	*The table to the right reveals the metropolitan areas with the highest numbers of Green Jobs. It is not surprising that the highest ranking areas are some of the largest metropolitan economies in the country, especially considering that over half of the country's Green Jobs are in the engineering, legal, research, and consulting category.*
Wind/Solar/Hydro/Geothermal/Biomass power potential	9-12	*The four highest ranked states (North Dakota, Texas, Kansas, and South Dakota) are estimated to have a total potential of 4,500 billion kWh, enough to power the entire country. (…)* *There is tremendous potential for solar power across the country. Implementation options vary from large centralized generation fields to smaller scale units for neighborhoods or individual homes. The most intense and reliable solar energy is in the southwest, but most areas receive enough sunlight for solar power to be economically viable. As with other technologies, potential job growth is available to any city that is able to attract manufacturing firms in the industry. (...)* *Despite the already large contribution of hydropower to the national electricity infrastructure, there is significant room for it to expand. In a 2006 study, the U.S. Department of Energy identified feasible available potential hydropower projects that would double net generation by this highly efficient and clean source. (...)* *Geothermal energy is another energy source that is poised to grow and create jobs as our alternative energy infrastructure is further developed. (...)* *Biomass is another group of technologies where additional investment and jobs will help to develop the nation's alternative energy infrastructure.*
Physical advantages	16	*Some areas of the country have an advantage for a specific resource type due to more intense sunlight, wind, flowing water, or access to geothermal heat.*
Infrastructure	15-16	*That last resource is defined as hydropower generation capacity added since January 1, 2001, via increased efficiency at existing infrastructure or by investing in new infrastructure. (...)* *Green Jobs are created by additions to the infrastructure and by the operation of that infrastructure.*
Measuring the Green Economy. U.S Department of Commerce and Economics and Statistics Administration. April 2010		
Increasing demand	26	*However, there are several reasons to believe that the green economy may have grown since 2007 and may be poised for future growth. First, consumers, both here and abroad, may be increasing demand for green products and services. Second, energy prices remain at high levels, creating gretaer financial incentives for firms to develop more energy-efficient products and services.*

High energy prices		
COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS. A Roadmap for moving to a competitive low carbon economy in 2050. Brussels, 8.3.2011 COM(2011) 112 final		
Cheaper renewable energy	7	*A wide range of existing technologies will need to be widely deployed, including more advanced technologies, such as photovoltaics, that will continue to become cheaper and thus more competitive over time.*
Energy taxation	8	*Tools, such as energy taxation and technological support may also be appropriate to ensure that the power sector plays its full part.*
Investment in smart grids	8	*Investment in smart grids is a key enabler for a low carbon electricity system, notably facilitating demand-side efficiency, larger shares of renewables and distributed generation and enabling electrification of transport.*
Technological innovation	8	*Technological innovation can help the transition to a more efficient and sustainable European transport system by acting on 3 main factors: vehicle efficiency through new engines, materials and design; cleaner energy use through new fuels and propulsion systems; better use of networks and safer and more secure operation through information and communication systems.*
Measures to reduce Greenhouse Gas (GHG) emissions	8	*Emissions from road, rail and inland waterways could in fact be brought back to below 1990 levels in 2030, in combination with measures such as pricing schemes to tackle congestion and air pollution, infrastructure charging, intelligent city planning and improving public transport, whilst securing affordable mobility. Improved efficiency and better demand-side management, fostered through CO2 standards and smart taxation systems, should also advance the development of hybrid engine technologies and facilitate the gradual transition towards large-scale penetration of cleaner vehicles in all transport modes, including plug-in hybrids and electric vehicles (powered by batteries or fuel cells) at a later stage.*
Innovative public financing instruments	12	*Public finance through innovative financing instruments, such as revolving funds, preferential interest rates, guarantee schemes, risk-sharing facilities and blending mechanisms can mobilise and steer the required private finance, including for SMEs and consumers. In this way, limited public finance can leverage a multitude of private sector investments.*

Globalising climate change policies	14	*The EU should use this opportunity to strengthen its cooperation with its international partners, including to work towards a gradual development of global carbon markets to support efforts of developed and developing countries to implement low-emission development strategies, and ensure that all climate financing contributes to "climate proof" development opportunities.*

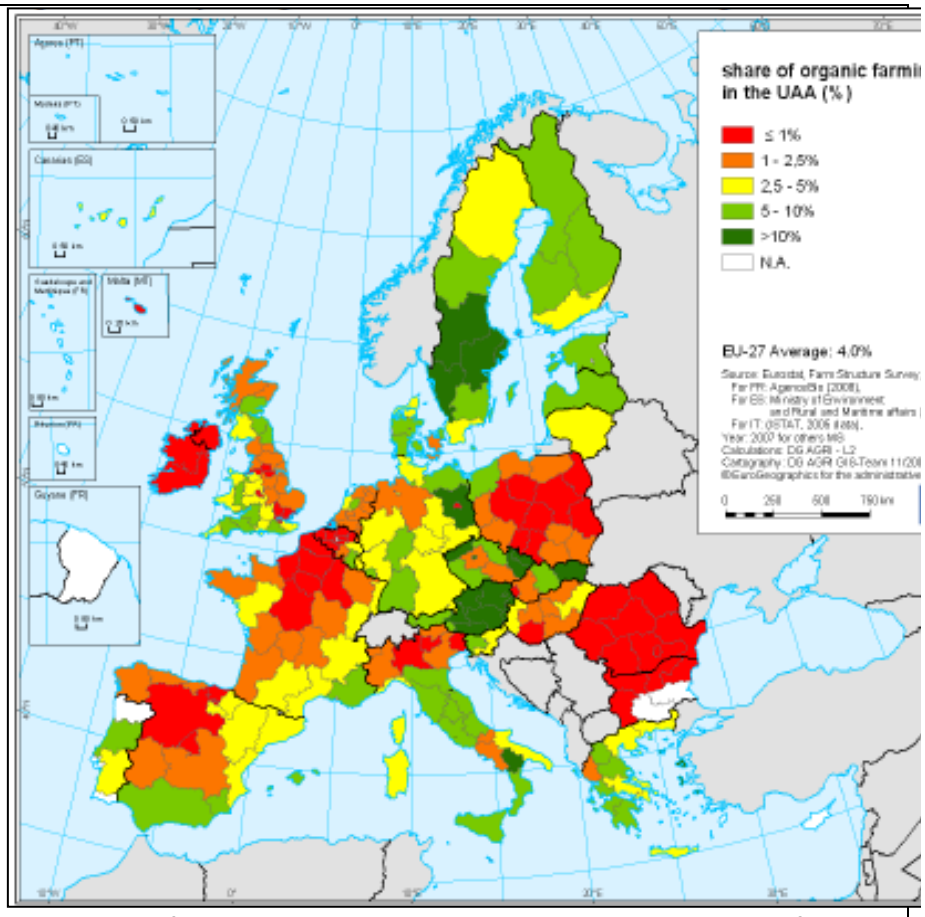
Annex II: Overview of factors found in GREECO sectors

Annex II.1. Bioeconomy

Annex II.1.1. Agriculture sector

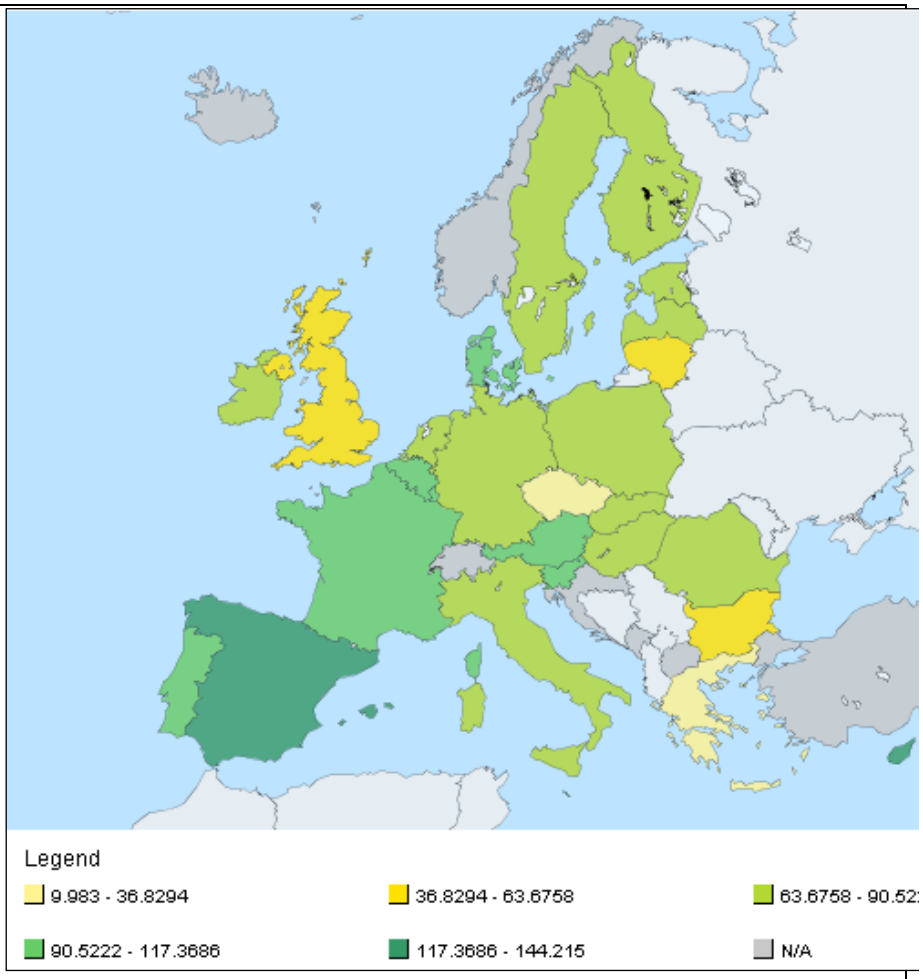
Consumer awareness and demand changes

Description	Consumption of organic products and less consumption of meat and dairy products. More specifically "what" we consume and "how" it is produced. Also how much is wasted. Obviously, many of the benefits of organic farming relates to the aspects brought forward as the main components of greening the entire agricultural sector. Specifically, according to the Commission communication COM (2004:415) the main benefits of organic farming relate to: •Pesticides •Plant nutrients •Soil protection •Biodiversity and nature protection •Animal welfare Facts and figures from the EU show that an increasing part of agricultural area is now devoted to organic production, with an estimated 7.6 mio ha in 2008, i.e. 4.3% of EU-27 utilised agricultural area (UAA). In the period 2000-2008, the average annual rate of growth was 6.7% in the EU-15 and 20.0% in the EU-12. The area under organic agriculture is close to or higher than 9% of the total UAA in five Member States: the Czech Republic, Estonia, Latvia, Austria (15.5%) and Sweden. In 2008, it is estimated that there were about 197 000 holdings involved in organic agriculture in the EU-27, i.e. 1.4% of all EU-27 holdings. Consumer food demand grows at a fast pace in the largest EU markets, yet the organic sector does not represent more than 2% of total food expenses in the EU-15 in 2007.



Map: Share of organic area in total UAA in 2007. Source: Eurostat farm structure survey.

It is evident from looking at the relationship between GDP and protein consumption that we consume more protein the richer we get. Obviously there are some cultural and ethical differences to such patterns but the overall picture is such. As the prosperity of the EU has increased the trend is towards consuming more dairy, pig meat and poultry. The consumption of other protein products per capita is rather stable since the 1960s. Over all the intake of protein in the EU is well above the recommendations made by the world health organisation, in fact it is almost the double. Hence a cut-back on meat would be beneficial not only for the environment and resource base – but also for human wellbeing. The fact that over-consumption of meat and other protein product causes severe problems for the environment is due to multiple reasons. It involves both feed production (inputs such as land, water and other resources), manure nitrogen leakage, land use for grazing, greenhouse gas emissions from animals, etc. The most severe impact for GHG emissions are from beef and veal, dairy cows and pigs sectors. Poultry and egg production have less of an impact. The picture is the same when it comes to feed use per sector. But here dairy cows are using more inputs compared to beef and pigs (looking at overall sectors and not per kg of produce). The picture for land consumption is the same. The land used for dairy production in EU is actually almost the same as that used for crops for human consumption.



Map: Consumption of meat per capita, in kg per year. Source: Eurostat database (latest available year for each country)

When it comes to waste the most important losses appear in the production of beef. From a 500 kg cow there is only 180 kg reaching the consumer. For a 2 kg chicken the loss is 1 kg. The problems of food waste in developed countries are primarily in private homes, retail stores, transport and food services. The EU food manufacturing sector and households alone waste about 90 million tonnes of food annually or 180 kg per person, not taking into account losses in agriculture and fisheries. This has a huge impact on the amount of resources used in this sector; resources which are in fact wasted (or to some extent transferred through the energy intensive food production and consumption process - to energy production; if waste is used for heat or fuel production).

Specificity for the green economy	Organic production is specific to the green "sub-set" of the sector. In many definitions this is in fact the most straight forward definition of how to classify labour in agriculture as being part of the green economy. Many believe that organic farming is one type of farm practice that can help in greening the agricultural sector. This is not a straight forward analysis though since some evidence question the possibility to produce enough food globally (using organic fertilisers and non-chemical ways to prevent pests) and the total effect on the environment given more use of machinery in relation to the size of the harvest. This depends heavily on

	the fuel for machinery and equipment as well as natural circumstances and crops grown. Anyway, organic farming (in Europe) relies on a number of objectives and principles, as well as common practices designed to minimise the human impact on the environment, while ensuring the agricultural system operates as naturally as possible.
Provable impact on the green economy spheres	Specifically, according to the Commission communication COM (2004:415) the main benefits of organic farming relate to: •Pesticides: research indicates that organic farming has, on average, a greater effect on the improvement of the landscape, wildlife conservation and faunal and floral diversity than non-organic farming systems. Restricting the use of pesticides, as is the case in organic farming, also improves water quality and fewer pesticide residues are found in food products. •Plant nutrients: organic farming usually results in lower nitrate-leaching rates than those achieved on average in integrated or non-organic agriculture, as shown by studies on autumn nitrogen residues in the soil of almost all relevant crops. •Soil protection: management practices broadly used by organic farmers, such as growing catch crops to reduce nitrate leaching, wider and more varied crop rotations, and mixed grazing to reduce mono-specific overgrazing, all help to protect the soil. Although the organic matter content of soil is highly site-specific, it is usually higher on organic compared to non-organic farms. •Biodiversity and nature protection: organic farming contributes to the preservation of species and natural habitats by means of its reduced inputs, its high share of grassland within holdings and its greater use of indigenous breeds and plant varieties. •Animal welfare: organic farming may have a positive impact on animal welfare since the standards for organic farming include several requirements in this area that go further than the statutory provisions.
Trade-offs: mixed +/- impacts on green economic spheres?	
Externalities: impact on other sectors / case studies	Unknown
Interactions with other factors	This factor interacts with many of the other factors brought forward for the agricultural sector. For instance “Policies and institutional capacity at the regional level” is important in shaping the awareness of consumers (as well as producers). Even the fact that there is government policy towards greening of agriculture (agri-environmental support schemers, schemes for organic production and marketing, etc.) can/might lead to a shift in the awareness and attitudes of consumers. Also the prevalence and activity of “local networks and local initiatives” supporting a transition of both the

	supply and demand side of the agricultural economy is important since it helps to bring these products to local markets (farmers market initiatives, transition days, etc,) and it adds to the awareness of all consumers. It can also impact on the availability of local meat products where animals are fed using grazing rather than imported feed products; this has for instance been a large product for the WWF internationally. "Urban and rural interactions" can obviously be an important interaction between these factors since the change in consumer behaviour will have to take place in urban areas – based on their understanding of something that is (most of the time) taking place in rural areas.
Causal level of operation (proximate/direct versus underlying/indirect factors)	This could perhaps be thought of as an indirect force (?) The feed-back is through the choices of consumers – via markets – to the production choices of farmers.
Spatial level of operation (internal versus external factors)	This is a spatial factor since it is also much related to level of economic progress and the cultural and historical differences between places. The level of economic development is linked to some respect to awareness and the possibility to devote time and money to consuming eco-friendly products. But the consumption of meat is adversely related to the same – more income means more meat as shown at the national level.
Type of market force involved	The change in awareness is primarily a demand side factor that can be worked on in different regions to form a factor for change. The organic production is a supply side factor as well because it is as much about finding ways to keep up production while being less input intensive and new ways for fertilizing and pest control. These are really direct aspects of greening of agriculture and require supply side innovation both in technology and know-how.
Policy recommendations: making the link between policy and non-policy factors	On the "consumption side" the EU is working with awareness programs, web-portals and certification schemes. There are many regulations/com on the supply and market sides: Regulation of the European Parliament and of the Council on organic production and labelling of organic products – Review of EU political and legal framework for organic production in particular Council Regulation (EC) N° 834/2007 and European Action Plan for organic farming of 2004 Communication from the Commission to the Council and the European Parliament of 10 June 2004 - "European Action Plan for Organic Food and Farming" [COM(2004) 415] Council Regulation (EC) No 834/2007 of 28 June 2007 on organic production and labelling of organic products and repealing Regulation (EEC) No 2092/91
Possible indicators	It is difficult to think of the indicators to measure the factors of potential. There are indicators for current performance. This could for instance be measured as the share of organic products in the consumption of food

	products. The composition of food consumption where the consumption of meat products on a to large scale will have a negative feed-back effect to producers and the greening of the sector. The waste could be measured as the proportion of food that is discarded at home, in the supply-demand chain, or in food away from home establishments.

Labour and skills development and the availability of capacity in a region for the restructuring of the agricultural sector

Description	Labour and skills development - and the availability of capacity in a region for the restructuring of the agricultural sector – are important factors for a transition to a green farming sector that builds on an understanding of how production impacts society and nature. Innovation does not have to be from within a region – but the application of innovation and the adaption of it to local circumstances have to be. Such factors are important for adopting new technology, new know-how and for producing within the boundaries in each territorial context. For instance, for the Mediterranean region it dictates the ability to develop (or adopt existing technologies) for water management and intelligent irrigation. In agriculture as in other sectors, active labour market policies including skills training are essential for helping workers make structural transitions. The adaptive capacity of labour markets in agriculture may be more limited than in other sectors owing to the narrower focus of farming and also location-specific factors. Safety nets for farmers and farm workers should be in place. Public initiatives to train rural workers in green skills such as retro-fitting farm buildings, landscape and habitat preservation, and renewable energy production are needed. Farmers will generally benefit from vocational training and gaining basic business skills in human resource management, networking and market development. Agriculture could also learn from looking at the fishery sector. In the fisheries sector, government efforts to facilitate adjustment have tended to focus on short-term efforts to finance alternative employment for redundant workers. These are generally introduced as an adjunct to capacity adjustment programmes given that vessel reduction is usually the main focus of policy reform. A longer-term issue is to ensure that governments develop broader and coherent set of policy signals for fishing communities so that adjustment occurs smoothly and largely autonomously in the future. Such policies are an essential complement to ensuring that the adaptability and resilience of fishing communities are strengthened over time. The management arrangements for fisheries will also play a major role in ensuring the resilience of the fishing sector as it is essential that fisheries management policy and labour market policies are mutually supportive.
Specificity for the green economy	This factor is definitely not specific for the green subset of the sector. Development of the sector more broadly (efficiency, structural change, becoming more professional as managers, improving value added) requires the same set of regional factors.
Provable impact on the green economy	No evidence has been found in the work on the sector report on how the factor has impacted the transition to green agriculture at the

spheres	regional level thus far.
Trade-offs: mixed +/- impacts on green economic spheres?	
Externalities: impact on other sectors / case studies	There could be. The development of skills and enterprises in the farm sector will probably have an impact on at least the tourism sector and the energy sector. Farmers that have knowledge about the restructuring of the sector are (I should say perhaps because there is no reference to this in the sector report) perhaps more prone to pick up diversification activities to broaden their firm and develop such activities as agri-tourism and bioenergy production.
Interactions with other factors	"Urban and rural interactions" are probably important in the development of the labour force and skills in agriculture. There is a need for a link between knowledge institutions and extension services and these are usually situated in more urban settings. But this is just a basic information interaction and perhaps not what is envisaged in the interaction of urban and rural areas from a geographical perspective. "Local networks and local initiatives" supporting a transition of both the supply and demand side of the agricultural economy can play a role in developing the4 labour market and skills. Local networks can be farmers themselves – but it can also be local action groups that want to have an impact on the sector.
Causal level of operation (proximate/direct versus underlying/indirect factors)	This is probably best defined as a direct factor since it will have a direct impact on the decisions made on the farm.
Spatial level of operation (**internal versus external factors)**	Spatial level of operation (does the factor operate internally within territories (e.g. population growth in a given area), or is it rather a manifestation of an externally-driven force (e.g. climate change or globalization)?)
Type of market force involved	This is a supply side factor which impact the production side of the sector and how production is structured both in the short and long run. In the short run programs and interventions can impact on the management practices of the sector and the choices made by farmers in the day to day production of food and fibre. In the long run the impact can be on buildings, farm types, supply chains, and many other structural aspect of the sector.
Policy recommendations: making the link between policy and non-policy	There are clear links to a policy factor here. In the CAP pillar II there are explicit schemes for developing the labour force and skills of farmers and farm workers. Measures aimed at promoting knowledge and improving human potential through: •vocational training and information actions,

factors	•schemes promoting the establishment of young farmers (people under 40 years of age setting up for the first time as the head of a holding) and the structural adaptation of their holdings, •early retirement for farmers deciding to cease activities with the aim of transferring their holding to other farmers, and agricultural workers who decide to definitively cease all agricultural activities. In general, beneficiaries must be at least 55 years old, but below the regular age of retirement in the Member State concerned, •the use of advisory services by farmers and forest holders and the establishment of advisory services, farm relief and farm management support services. The use of these services should help assess and improve the performance of their holdings;
Possible indicators	There are some indicators from Eurostat on the Agricultural training of farm managers, but it is only at the national level. Uptake/participation in the programs of the CAP should be possible to pick up at the national level as well – at least how much money are spent in each country (and perhaps region) on the development of the labour force. It could be interesting to use results/typology from the ESPON KIT project to say something about the backdrop of adaptive capacity when it comes to region. It could say something about the ability of the region to pick up technology, innovative practices, marketing mechanisms, market structure, etc. (but I don't know it the "hard core" innovation definitions in such a project would apply nicely to agricultural practise?)

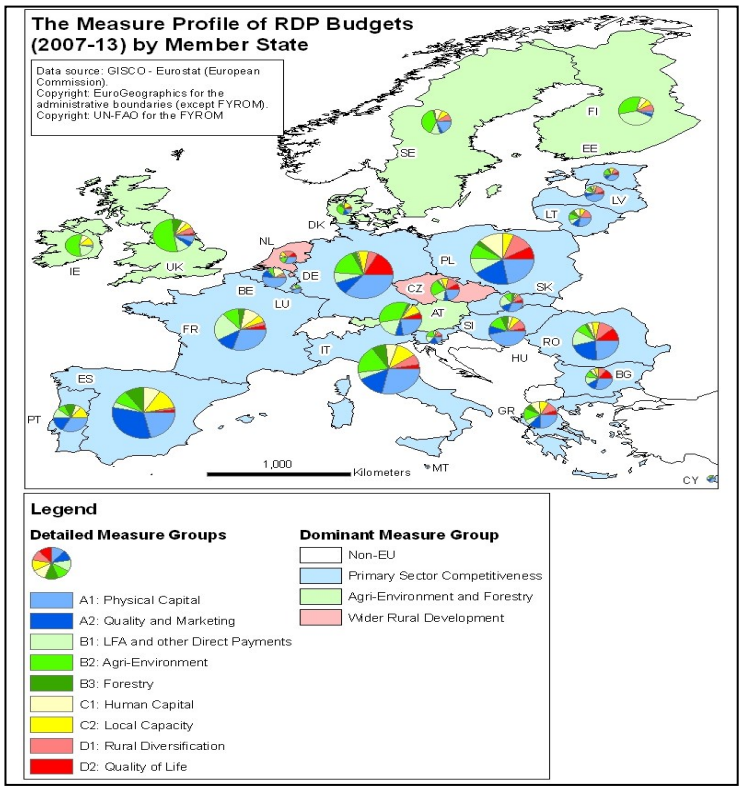
Local networks and local initiatives supporting a transition of both the supply and demand side of the agricultural economy

Description	This factor has not been brought forward so much in the sector report but it seems as an important factor at the regional level. It can be understood both as networks of farmers, networks between farmers and regional authorities, networks of other local action groups, or combinations of any of these. The merits of such networks in relation to the greening of agriculture can be either in supply side aspects (adoption of new practices or technique, participation in EU or national schemes, developing new products or markets, etc.) or it can be towards the demand side (to inform consumers, or if the network is consumers - they can put pressure on the supply side). From a policy perspective the power of setting up regional networks to deal with all of these issues have been manifested through for instance LEADER in the CAP pillar II. The aid allocated under the LEADER axis relates to: • the implementation of local development strategies through public-private partnerships called “local action groups”. The strategies applied to clearly designated rural territories must achieve the objectives of at least one of the three preceding axes; • the local action groups also have the option to implement inter-territorial or transnational cooperation projects. The method was first introduced in 1991 as a tool to implement rural development in an alternative and more flexible way. The aim was to encourage innovative solutions to old and new rural problems. The method is based on stimulating solutions or projects that can then be transferred to other regions, the model value and the dissemination of information is thus paramount. In 1991 LEADER was not a part of the Common Agricultural Policy (CAP), but the method and the funding was integrated into the CAP's second pillar for the period 2007 -2013. Within the GREECO project we should consider some of the fundamentals of the LEADER approach as a possibility for understanding governance structures for pursuing a local (or place based) development of green growth. LEADER is widely considered a success in pursuing a place based rural development within the rural development programs. LEADER aims to promote the effective implementation of the Rural Development Programme by the added value of local support, influence and cooperation. Through a local mobilisation of endogenous (intrinsic / site specific / idiosyncratic) development potential the goal is to implement rural development policies based on a holistic view of the countryside. The aim of LEADER is thus to contribute to overall rural program goals and (sustainability). You could say that the "intervention logic" is "territorial" rather than to have a sector specific approach. There are specific geographic areas

	and LEADER is going across traditional administrative boundaries and is based on local resources, conditions, local "capital", available in each region. It is also important with a "model value" and "transferability" of practice and experience. I.e. transfer of operational projects (with an understanding of the conditions that led to the results) but also the transfer of work and training. This can be related to the green growth process as well where it is important with a transfer of ideas and solutions, as well as policy solutions. Intervention in LEADER works through both the projects that are actually carried out (actual expenditure) and through relationships, learning and community involvement. It has become widely acknowledged that results in terms of outcomes goes beyond the traditional indicators when it comes to this kind of interventions. Obviously there should be results and effects associated with the projects and programs quantitatively measurable objectives. But it is also acknowledged that it is difficult to measure the impact that activities and practices initiates learning and knowledge, interaction and relationships, local organisation and embedding of project activities in their local environment. If we consider the keywords within the LEADER implementation idea we see that they are also close at hand for a discussion about regional/territorial green growth processes: Local partnerships, bottom-up approach, multisectoral collaboration, decentralised decision making and financing, transnational cooperation, exchange of ideas and practices, Networking, Good Governance, Social Capital, Learning regions, Endogenous development potential.
Specificity for the green economy	This factor is definitely not specific for the green subset of the sector. The occurrence of regional networks are as important for developing the farming more generally as well.
Provable impact on the green economy spheres	Since the CAP is such an important policy, and the LEADER is one program within it, it would be wise to look at the impact of such schemes in this respect. All countries have to do such evaluations but looking at all of them is a to grand task (however the commission synthesises all evaluations and there will be results available for this program period after it ends in 2013). Nordregio have looked at the evaluation (half time) for the Nordic countries. According to all the Nordic evaluations important positive impacts have been achieved in terms of increased cooperation and networking, the encouragement of entrepreneurship and development of small firms. The supports to building competence and skills are generally seen as a success and tourism and the production of bio-energy have also been boosted by the programme in some regions (notably Finland). According to the Danish evaluation Leader has contributed to mobilizing human and financial resources that presumably otherwise wouldn't have been active, value added has increased in the agricultural sector and the productivity in agriculture and food has also increased. In Finland the significant role that the Leader method has had in activating local inhabitants and enterprises, and producing positive impacts on the demographics of the countryside, is emphasised. The Leader method is considered the most efficient tool in reinforcing the development potential of each rural area.

Trade-offs: mixed +/- impacts on green economic spheres?	
Externalities: impact on other sectors / case studies	
Interactions with other factors	This factor probably interacts in a positive way with "consumer awareness and demand changes", "labour and skills development and the availability of capacity in a region for the restructuring of the agricultural sector" as well as improving the "institutional capacity at the regional level".
Causal level of operation (proximate/direct versus underlying/indirect factors)	This probably best defined as an indirect factor since the impact will have to be later on in the actual decisions of farmers – or in the mind of consumers.
Spatial level of operation (**internal versus external factors)**	Internal; this is really about the endogenous development potential of a region and the way such potential is defines, acted upon and integrated in different processes.
Type of market force involved	Can be both. Either on supply side aspects (adoption of new practices or technique, participation in EU or national schemes, developing new products or markets, etc.) or it can be towards the demand side (to inform consumers, or if the network is consumers - they can put pressure on the supply side).
Policy recommendations: making the link between policy and non-policy factors	
Possible indicators	The information from the countries on the implementation and effectiveness of LEADER can be one type of indicator here. Also, if there are other information about the occurrence of networks at national or regional level (but it is generally difficult to find out what such networks are working on explicitly in relation to greening of the sector and what kind of interaction they might have with farmers).

Heterogeneous application of CAP Policies at the national/regional level

Description	By this factor it is meant the CAP agri-environmental policy and the way it is implemented and used at the regional scale. The fact that this factor in included here, although it is a policy, is the fact that it is used in such a different way in different countries and regions. The same policy package is available at the European scale for all countries, but they have a very high degree of autonomy in applying these schemes at the national level. In some countries the focus have been more on renewal in the agricultural "conventional production" and on developing enterprises from a competitiveness perspective. In other countries the focus has been on agri-environmental measures and providing funding for provision of environmental and cultural public goods. This will provide a large different for what prerequisites that have been created in regions during the last 10-15 years for how to respond do the challenge or greening the agricultural sector. In countries that have invested in environmental payments there might be a scope for utilising such features now in the development of greener agriculture – for instance in Sweden the evaluators of the RDP have stressed this aspect of utilising such values and resources in the future sustainable development of farm enterprises. In countries that have focused on primary sector competitiveness there might be a larger scope for developing new products, marketing schemes, adopting new technologies, etc. Wider rural initiatives could give a local capacity to work together, and integrate strategies for local greening of many strands of society.  Map: The different profiles of countries when it comes to the

	application of CAP pillar II funding. Source: RuDi project.
Specificity for the green economy	This factor is extremely specific for the greening of the sector. Also the schemes that have to do with primary sector competitiveness have the overall ambition to improve the capabilities of the firms from a sustainable perspective. Obviously the agri-environmental schemes have this perspective more clearly. Rural development schemes capture in a more explicit way also the social aspects of greening of agriculture.
Provable impact on the green economy spheres	From the national evaluations of the programs there are clear evidence on the positive impact of schemes on the development of the sector. It is extremely difficult to gain a large overview on the European scale but in general it is perceived that the impact for positive environmental impacts, and for mitigating negative externalities, is important. In the context of developing businesses and competitiveness the investment support might crowd out ordinary channels for funding and create dead-weight. Project support for improving competitiveness through learning and networking (and building human capital) is more difficult to assess. The rural development support and mobilisation of actors and resources in rural areas is generally perceived as positive, especially through LEADER.
Trade-offs: mixed +/- impacts on green economic spheres?	
Externalities: impact on other sectors / case studies	The “direct” impact of CAP spending on other sectors is very limited. “Indirect” impacts are profound since agriculture has such a large impact on the landscape and on the supply –demand chain before and after the farm itself.
Interactions with other factors	Yes, it relates to “Consumer awareness”, “Labour and skills development and the availability of capacity in a region for the restructuring of the agricultural sector”, “Local networks and local initiatives” and, “Land and land-based resources”
Causal level of operation (proximate/direct versus underlying/indirect factors)	It could be defined as a direct factor in that it requires the farmer to do something very specific to receive the funding. If the farmer participates in a scheme to create a wetland, the wetland has to be created and it is not up to some indirect effect. But there are probably indirect effects as well, some studies have investigated the change in farmers perceptions from participating over a longer period of time in stewardship schemes. Hence, the long run green economy impact might be an indirect one.
Spatial level of operation (internal versus external factors)	This is an internal factor which is specific for countries or even regions.

Type of market force involved	- a policy factor
Policy recommendations: making the link between policy and non-policy factors	
Possible indicators	It is possible as the RuDi project demonstrated to look at the country profiles for how the support from Pillar II has been implemented.

Annex II.1.2. Fisheries sector

Interaction/impacts with/on/from other sectors

Description	In the report, Green Economy in a Blue World (UNEP 2012), it is argued that the ecological health and economic productivity of marine and coastal ecosystems can be boosted by shifting to a more sustainable economic approach that taps their natural potential - from generating renewable energy and promoting eco-tourism, to sustainable fisheries and transport (FAO 2013). These regions are according to the report currently in decline around the globe, but their livelihood which are limited to only a few factors tend to become less sensible to both economic and social stress when human depending economic activities enter the regions. And with as much as 40 per cent of the global population living within 100 kilometres of the coast, the world's marine ecosystems (termed the 'Blue World' in the report) provide essential food, shelter and livelihoods to millions of people. This situation creates both positive and negative interactions which may become important to consider in relation to green growth and green economy.
Specificity for the green economy	Several relevant sectors could be mentioned, but as an illustration the symbiosis between fisheries - especially small scale fisheries - and tourism could be brought forward. The tourism economy represents 5 per cent of global GDP and contributes 6 to 7 per cent of total employment. Estimates are that more than one-third of travellers favour environmentally friendly tourism. There is therefore considerable potential for creating more green jobs in the tourism sector as tourism is human-resource intensive. And sourcing local products (from sustainable farming and fishing) and safeguarding local culture are examples of where green investments could be targeted.
Provable impact on the green economy spheres	Efficiency improvements, local hiring, sourcing local products and safeguarding local culture and environment can reinforce employment potential. As stressed by Guyader et al (2012) results from a number of case studies show that (as compared with large-scale fleets, their main competitor) small-scale fleets: (i) are composed of smaller vessels and, consequently, travel lower distances to fishing grounds, and are more reliant on coastal areas; (ii) have smaller crews (although the global employment figure is similar to that of large-scale fleets in Europe); (iii) use mostly, but not exclusively, passive gears; (iv) use multi-purpose fishing approaches, and can change the fish species they target during the year; (v) have lower extraction rates; (vi) have lower total capital investments (including fishing rights), turnover and costs; and (vii) have lower fuel consumption, making them less sensitive to changing oil prices. Dependence on subsidies is lower (viii). Involvement in fisheries management is variable,

	conservation and access regulation measures are largely local in origin. For the selected case studies, the most significant competitors are large-scale fleets, and recreational fisheries, but other sources of interaction (water quality, invasive species, etc.) cannot be ignored. The development of local food systems for tourism can generate jobs in sustainable farming and fishing. And when returning they often bring food habits with them related to fisheries – an activity which brings along several benefits: On the demand side, more than a third of travellers favour environmentally friendly experiences. The share of spending in the local economy determines local economic effects of tourism. Increasing involvement of local communities in the value chain can contribute to the development of local economies and poverty reduction. Positive impacts can stem from engaging local supply chains and increasing "green services" in energy, water and waste management efficiency. Tourism's impacts on local communities are complex and demand careful planning (UNEP 2012).
Trade-offs: mixed +/- impacts on green economic spheres?	An important issue in a greening of the food sector is to reduce the needs for transport of products in order to save energy. And tourists bringing back food habits from short or long term visits in other regions may create a demand for imported food, and thereby a situation where an increase in energy consumption may become the result and therefore generate a negative impact. The opposite may be the situation, however, when experiences from visits in other regions creates a demand for local fishery resources in the visitors home regions.
Externalities: impact on other sectors / case studies	The processing of fish often creates a distinct odour which may be considered being a menace in relation to other activities. The process to dry fish generally involves gutting, washing, soaking the fish in brine or a salt solution and letting it dry. Liquid and solid wastes are generated during the separation of the fish from the by-products (skin, bones and other parts). Odour can occur from microbial decomposition at several steps of the fish drying process, and depend on several factors such as the quality and freshness the fish to be processed, solid and liquid waste disposal, temperature, and storage conditions (Global Community Monitor, 2012. Dry fish has been one of the most common preserved foods used by peoples of all cultures. However, fish processing such as drying may cause environmental contamination, not only by the odours generated, but the wastes generated are a potential source of environmental pollution (water, soil) that may affect public health Sucker K et al. (2001) emphasize how it may be needed to provide field measurements with panels and dispersion modelling in order to determine what may be thresholds for the determination of odour loads. Similarly the disposal of waste may create similar responses and thereby impact the same effects.
Interactions with	Cultural codes on taste, smell, presentation etc. differs very much

other factors	which makes it very difficult to adjust common policies accordingly. The most famous/infamous case is probably the “Surströming” produced in the Baltic Sea region. It is a fermented Baltic herring and has previously been considered a staple of traditional northern Swedish cuisine. Species of 'Haloanaerobium' bacteria are responsible for the in-can ripening. These bacteria produce carbon dioxide and a number of compounds that account for the unique odor: pungent propionic acid, rotten-egg hydrogen sulfide, rancid-butter butyric acid, and vinegary acetic acid (McGee, 2004). According to BBC NEWS several major airlines (such as Air France and British Airways) in April 2006 banned the fish citing that the cans the fish come in can be classified as potentially explosive due to the fact that the natural fermentation process cause the cans to be pressurised. The sale of the fish was subsequently discontinued in Stockholm's international airport. Those who produce the fish have called the airline's decision "culturally illiterate," claiming that it is a "myth that the tinned fish can explode." However, they did admit that t the fish can emit a foul smell. http://news.bbc.co.uk/2/hi/europe/4867024.stm
Causal level of operation (proximate/direct versus underlying/indirect factors)	A systematic survey (Fernandes et al, 2012) for articles published from 2003 and May 2011 on the key words: fish, food intake, omega-3 fatty acids, fatty fish, benefits, risk, and consumption resulted in 25 articles on possible benefits, 61 on risks and 10 studies that assessed the "risk/benefit" relation. Of the 25 works, 14 suggested a preventive effect of fish consumption related to cardiovascular diseases, depression, cataract and some types of cancer. Evidences of a relation between exposure to mercury and an increase in the risk of neurological disorders, but not of cardiovascular diseases, were also found. Given the importance of fish consumption, it is important to conduct more longitudinal studies that assess both the benefits and risks of fish consumption for the human health.
Spatial level of operation (**internal versus external factors)**	As discussed in the fisheries sector report the divergent interests of small scale versus large scale fisheries cause problems. Not only is the resource base of the small-scale fishery limited by its fishing range and natural productivity, but often it has to compete for this limited resource with other fisheries using more advanced technology. Often the resource available to a coastal fishery is also exploited in offshore waters, whether this involves or not clear displacements perpendicular to the coast of different age groups (spawners, juveniles, etc.) of the stock. Large-scale fisheries operating offshore may thus reduce the fish available to small-scale fishermen. Similarly, small-scale fishermen's operations may reduce the recruitment to the offshore stocks. Small-scale fisheries are further handicapped by their dispersion and remoteness which precludes economies of scale in the marketing of catch and procurement of inputs which may only partially be compensated by their low opportunity costs and low capital and fuel costs. Although in social terms small-scale fishermen often may be low-cost producers, in private terms their unit cost may be relatively high because of inadequate infrastructure, and high cost of borrowing.

	The reverse, of course, might be true of large-scale fisheries if the capital subsidies (explicit or implicit) are removed and capital and foreign exchange (imported machinery, fuel) are shadow-priced at their true social costs. (FAO 1982).
Type of market force involved	A general challenge for fisheries is the competition from other protein sources in connection with the diet. As shown in the sector report on Fisheries there are marked regional differences in consumption patterns throughout Europe. Even seafood is emphasized due to its health qualities the limitations of fish demand research through the development of a variation of the almost ideal demand system model for disaggregate fish products at the retail level. Price and expenditure elasticities, as well as elasticities of substitution between fish products and other protein commodities, determined from this work may be used in the context of fisheries management and market development and promotion. Results indicate that with the exception of shellfish, demand for the various fish products is relatively inelastic. Cross-price elasticities are generally moderate while expenditure elasticities are large and positive for fresh fish and shellfish. Demographic effects, especially geographical division, season, race, occupation, age–sex household composition, and price–income interaction, as a proxy for quality, are highly significant variables.
Policy recommendations: making the link between policy and non-policy factors	It is important in policy development in relation to green fisheries development to take into account the fact that regional differences both in fishing technology, fishing economy and fishing cultures are both diverse and distinct. So even policy measures tend to provide equality in relation to the usual policy measures there will be important differences which may be difficult to put exact measures on to take into account as well.
Possible indicators	

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Annex II.2. Energy sector

Natural capital

Description	Energy security implies not only the provision of sufficient and reliable energy supplies to satisfy demand at all times and at affordable prices, but also the mitigation of environmental impacts related to the exploitation and use of energy sources. This reconciliation between availability and affordability with sustainability has evolved especially during the last two decades as the environmental impacts of fossil fuel have become a matter of great concern for nations (Müller, et al., 2011). The main factors are thus: **Natural capital (Energy availability)** Availability of energy sources is among the most central drivers in the energy sector, implying both sufficient availability of primary resources and the infrastructure needed to transform and transport these resources to final users. Natural capital is recognized here as a territorial factor of energy production that are provided by nature such as fossil fuels, sun- and wind exposed areas, agricultural and forest land. **Energy prices (affordability)** The price of primary energy has a fundamental impact on the entire commodity chain of energy from producers to consumers, and therefore among the most influential driver in the decision of these. Energy affordability consists of two key dimensions; price volatility and price uncertainty (Müller, et al., 2011). Price volatility refers to the range in which market prices fluctuates over time while price uncertainty refers to the average price of energy. Both aspects have negative economic impacts on societies being oil prices is a good example.
Specificity for the green economy	Very specific
Provable impact on the green economy spheres	High impact
Trade-offs: mixed +/- impacts on green economic spheres?	
Externalities: impact on other sectors / case studies	
Interactions with other factors	

Causal level of operation (proximate/direct versus underlying/indirect factors)	Proximate driver
Spatial level of operation (internal versus external factors)	
Type of market force involved	Demand force
Policy recommendations: making the link between policy and non-policy factors	•
Possible indicators	Energy prices

Territorial factors

Description	**Land-use** Land-use practices and traditions are central territorial aspects in the energy sector. Specifically, the exploitation of energy resources and its subsequent transport, transformation and generation are land-use intensive activities. Land-use activities that relate to the exploitation of energy illustrated in the following list: • mining activities; coal, lignite, oil and peat • agriculture and forestry; biomass • collection; sun energy and hydropower **Settlement structure** The size and distribution of settlements across territories have important repercussions on the nature of the energy carrier that is made available and how it is transmitted (transported) to consumers. Larger and more concentrated settlement structures are often supplied by more centralized energy systems while disperse settlement structures tend to rely on decentralized energy solutions. **Accessibility** The access to primary energy resources plays a decisive role in securing energy supply in regions and countries. This implies that efficient transmission infrastructure has to connect areas where primary energy is exploited, transformed and consumed (Rasmussen, et al., 2010).
Specificity for the green economy	
Provable impact on the green economy spheres	
Trade-offs: mixed +/- impacts on green economic spheres?	
Externalities: impact on other sectors / case studies	
Interactions with other factors	
Causal level of operation (proximate/direct versus underlying/indirect factors)	

Spatial level of operation (internal versus external factors)	
Type of market force involved	
Policy recommendations: making the link between policy and non-policy factors	•
Possible indicators	

Consumer behaviour

Description	The behaviour of energy consumers namely industries and individuals, and the scale of consumption are important territorial elements in energy development. The role of individuals on the energy sector is complex to analyse due to cultural perceptions and values as well as socioeconomic factors. Despite factors that constrains individual's possibilities to direct take decisions upon the type of energy that is consumed, cultural views of communities and nations have had an important role due to the energy sector's dependence on political decisions. An example that illustrates cultural perceptions in energy policy is found in Sweden and Denmark where cultural ties to nature conservation have been an important driver behind increases in RES consumption. Cultural values are also boosting the deployment of small scale generation of RES especially wind and solar. Initially, the generation of electricity through these technologies was not very profitable being the individuals values an important driver. Today, these technologies have become significantly more efficient and their increasing demand has contributed in reducing their price in markets (Rasmussen, et al., 2010).
Specificity for the green economy	
Provable impact on the green economy spheres	
Trade-offs: mixed +/- impacts on green economic spheres?	
Externalities: impact on other sectors / case studies	The scale energy consumption in industries is high which requires that energy supply needs to be stable and reliable. Therefore hydro, nuclear and thermal power is often suitable for these industries (Rasmussen, et al., 2010). Energy efficiency also becoming important for heavy industries as many of them reincorporate residual heat and materials back in their processes. Pulp and paper industries and sawmills, both in Sweden and Finland, are good examples of energy efficiency measures because they use wood residues as source of energy (Galera-Lindblom, et al., 2012). In Denmark, an example of industrial symbiosis also exists in Kalundborg where energy and manufacturing industries exchange and reincorporate residual heat and materials (Rasmussen, et al., 2010).
Interactions with other factors	

Causal level of operation (proximate/direct versus underlying/indirect factors)	
Spatial level of operation (internal versus external factors)	
Type of market force involved	
Policy recommendations: making the link between policy and non-policy factors	•
Possible indicators	

Technological capital

Description	The access to technology is a vital element in energy development. It allows the extraction and collection of primary energy as well as their transformation into electricity and other energy carries and transmission and utilization by end users. The fact that technology enables the utilization of energy sources implies that the energy sector is characterized by a mutual dependency between accessibility to energy sources and technology (Galera-Lindblom, et al., 2012). According to Müller et al. (2011, p. 16) first-mover countries that have specialized in renewable energy technology such as Denmark and Germany are characterized by high knowledge intensity and learning potential.
Specificity for the green economy	
Provable impact on the green economy spheres	
Trade-offs: mixed +/- impacts on green economic spheres?	
Externalities: impact on other sectors / case studies	
Interactions with other factors	
Causal level of operation (proximate/direct versus underlying/indirect factors)	
Spatial level of operation (internal versus external factors)	The availability of technology can be domestic, in other words, developed locally by actors directly or indirectly involved in the energy sector, or it can be imported.
Type of market force involved	

Policy recommendations: making the link between policy and non-policy factors	• Strategically, locally developed technologies are often more advantageous than dependence of imported ones, not only because new jobs and value added are generated but also because it allows the energy sector to rapidly adapt to shifts in energy markets. • However, imported technology serves in many cases as the foundation for the creation of new industries, often referred as the 'fast followers'. This was the case of the Navarra province in Spain where wind energy technology was initially imported from Denmark. Strong support from public agencies and private companies and long tradition in R&D and innovation gave the bases for the creation the Navarrese wind energy industry which currently is recognized as one of the world's leaders (Rasmussen, et al., 2010).
Possible indicators	

Human capital and innovation capacity

Description	Human capital needed in the energy sector comprises of a high diversity of labour groups. Human capital is therefore a crucial asset that not only makes the energy sector's operation possible, but most important it enables adaptation processes through innovation (Rasmussen, et al., 2010). The energy sector is dependent of the availability of technology and therefore innovation capacity of both professionals and researchers play decisive role in how efficient the operations perform and enable adaptation.
Specificity for the green economy	Innovation capacity does not only involve the process of developing technologies for the transformation and transmission of energy but also involves other non-technical operations A good example is the case of Kalundborg in Denmark were the key aspect of success in the establishment of the so called 'industrial symbiosis' was the creation of solutions to improve collaboration between energy producers and industries (Rasmussen, et al., 2010).
Provable impact on the green economy spheres	Innovation is central in energy development as it enables the energy sector to adapt to new circumstances and increase productivity and efficiency. While the correlation between green growth and regional development is strong, investments in energy development are usually higher in regions with well-developed R&D policies.
Trade-offs: mixed +/- impacts on green economic spheres?	
Externalities: impact on other sectors / case studies	A new phenomenon in the energy sector is the incorporation of new sectors. This implies that sectors diversify their activities and open access to new markets that are economically viable in the long term (Müller, et al., 2011) (Galera-Lindblom & Rasmussen, 2008).
Interactions with other factors	
Causal level of operation (proximate/direct versus underlying/indirect factors)	
Spatial level of operation (internal versus external factors)	
Type of market force involved	

Policy recommendations: making the link between policy and non-policy factors	•
Possible indicators	

Economic capital

Description	A great challenge related to RES technologies has been the large amount of investments required for their development and introduction in markets. Moreover the lifecycle of RES projects are long implying that investors seek long-term planning regimes that can provide stability and predictability for their investments. Generally large scale RES projects are perceived by investors as risky because the technology's profitability has not been proven until demonstration is successful a situation that hinders developers to secure the necessary financing. This phenomenon commonly known as the 'valley of death' incurs when financial means are absent before energy technologies reach commercialization (Müller, et al., 2011). The combination of technology-push by governments and market-pulls forces from business in early stages of RES technologies plays a fundamental role on how these develop. Lack of funding often occurs when a mismatch of these two phenomena occurs. Here, governments represent the technology-push through RD&D support, grants and direct investments while business provide direct investments later in the market pull, when technologies are commercialized (Müller, et al., 2011).
Specificity for the green economy	
Provable impact on the green economy spheres	
Trade-offs: mixed +/- impacts on green economic spheres?	
Externalities: impact on other sectors / case studies	
Interactions with other factors	
Causal level of operation (proximate/direct versus underlying/indirect factors)	
Spatial level of operation (internal versus external factors)	

Type of market force involved	
Policy recommendations: making the link between policy and non-policy factors	• A general understanding in RES deployment is that countries that are most able to afford a package of measures necessary to promote RES are likely to be early adopters and developers of these technologies.
Possible indicators	

Environment protection

Description	The exploitation of energy resources implies impacts on the environment and landscape. However, the degree of these impacts depends of several factors including the type of exploitation, the methods, the modes of transportation and the sensibility of the ecosystem and the landscape subject to exploitation: Exploitation of fossil fuels, such as **coal and lignite** implies often that larger quantities of soil are removed, a process that alters not only the geophysical characteristics of those areas but also generates soil waste products, changes ground and surface water regimes, releases both hazardous organic compounds and heavy metals into water streams, etc. (Mamurekli, 2010). **Oil and gas extraction** involves various environmental risks, most notably oil spills from oil tankers or pipelines transporting oil. Residual process water is also generated, which contain varying amounts of oil, chemicals and heavy metals. Being a fossil fuel emissions resulting from oil combustion contain the same type of pollutants present in coal combustion. Even if **biomass production** is entirely based on residues it still implies environmental risks if proper measures are not taken. Both in the case of agriculture and forestry residues help to preserve the soil structure and nutrient balance. Moreover, dead wood in forest serves as habitat for different organisms including insects, fungi and plants. This means that limitations regarding the amount of residues that may be removed have to be considered. Cultivation of monocultures both in agriculture and forestry can also have negative impacts on biodiversity the cultural landscape (Galera-Lindblom, et al., 2012). In terms of emissions energy generation from biomass consumption is less convenient compared to other renewable energy sources. This is because biomass combustion can result in relatively high levels of SO_2 and NO_2. However, emission levels are strongly dependent on the composition of the biomass and on harvesting conditions, transport and conversion processes (Müller, et al., 2011). **Climate change mitigation** is considered the main driver for the integration of environmental policy in European energy policy since the 1990's, in particular in connection to the Rio Conference in 1992. While perceptions of security of supply and economic development vary among MS, climate change as the consequence of fossil fuel energy use is unanimously acknowledged. Moreover, all MS have committed on taking measures to reduce CO_2 emissions (Solorio Sandoval & Zapater, 2012).
Specificity for the green economy	Very specific

Provable impact on the green economy spheres	RES technologies play already an important role in reducing CO_2 emissions and therefore their deployment is a central measure in climate change mitigation. In Europe only, CO_2 savings in 2008 accounted for 297 million tonnes, and globally 1,718 million tones (Müller, et al., 2011, p. 20).
Trade-offs: mixed +/- impacts on green economic spheres?	The sustainability of biomass production for energy purposes from agriculture and forestry has been questioned. In the case of agriculture it has been considered having negative impacts on food production while in forestry conflicts with wood dependant industries have already been experienced, for example in Sweden and Finland. Due to those reasons biomass from agriculture and forestry is becoming oriented towards harvesting residues, especially in the case of forestry (Galera-Lindblom, et al., 2012) From a land-use perspective production of biomass from agriculture and forestry show several trade-offs with the traditional 'hosting' sectors. In particular, both agriculture and forestry also give room for 'multifunctional land uses' as they can be combined with activities such as tourism and wind power generation (Galera-Lindblom, et al., 2012).
Externalities: impact on other sectors / case studies	
Interactions with other factors	
Causal level of operation (proximate/direct versus underlying/indirect factors)	Proximate driver through policy enforcement.
Spatial level of operation (internal versus external factors)	
Type of market force involved	
Policy recommendations: making the link between policy and non-policy factors	•
Possible indicators	

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Annex II.3. Manufacturing sector

Economic drivers

Description	The principal driver for change in Manufacturing is economic. Either as direct cost reduction (savings) or as indirect cost reduction (increasing productivity). In such a context, resource efficiency is a strategy for cost reduction, by: • Increasing energy efficiency (since Manufacturing is very energy-intensive) • reducing emissions and waste • maximising material efficiency: doing more with less and wasting not. In addition it is also a strategy to reduce vulnerability in the context of material scarcity, changing prices, energy security, etc. In the end it contributes to increasing productivity and thus competitiveness.
Specificity for the green economy	Since cost reduction most often takes place by increasing resource efficiency, this driver is by definition the greening of Manufacturing.
Provable impact on the green economy spheres	**Economic: uncertain impact (+/-)** In theory, an enhanced resource efficiency at firm level should have a positive impact at firm level. However, studies examining the impact of resource efficiency measures on the competitiveness of the firm have not been decisive. Some showed that investment in resource efficiency is likely to increase firms' competitiveness (e.g. through improved sales), while others attributed the lower market shares to the higher prices associated with better environmental performance. (Raedemakers et al. 2011b). **Environmental: positive impact (+)** Resource efficiency by definition reduces environmental pressures associated to resource use (doing more with less, waste no, etc.) **Social: positive impact (+)** A more resource efficient Manufacturing sector will deplete environment less, which is positive for the society as a whole. **Territorial: unknown (o)**

Trade-offs: mixed +/- impacts on green economic spheres?	
Externalities: impact on other sectors / case studies	Manufacturing sectors also have the highest multiplier effects; inter-linkages can generate positive, but also negative, changes in terms of production or employment in other sectors (European Commission (EC) DG Enterprise and Industry (2011)). Therefore, the potential of having an impact on other sectors, such as transport and construction is high.
Interactions with other factors	This driver is potentially linked to the technological lock-in barrier. In some cases even if the motivation exists, the right technologies might not be in place and limit the deployment of resource efficiency measures. In addition, financial barriers and economic drivers are inter-related. However, while the first is demand-side driven, the latter is supply-side driven.
Causal level of operation (proximate/direct versus underlying/indirect factors)	Proximate/direct Reducing costs by means of increasing resource efficiency directly makes Manufacturing greener.
Spatial level of operation (internal versus external factors)	External Economic drivers within the industry sector can be labelled as an external barrier, whose manifestation on specific territories might vary.
Type of market force involved	Supply-side factor
Policy recommendations: making the link between policy and non-policy factors	• Foster benchmarking, labeling, etc. • Improve waste separation policies • Correct pricing of resources • Raising awareness • Technical assisstance programmes • Access to finance • Foster adoption of BAT • Investement in technology breaktrhoughs
Possible indicators	Change in time of: • Domestic material consumption (DMC) • Raw Material Consumption (RMC) • Energy consumption • Waste generation by EWC And analyze if decoupling from GVA.

Technical or technological lock-in and path dependence in the industry sector

Description	The technological development towards a pattern of production less aggressive to the environment is seen as a partial solution to the problem (Tilman Santarius, 2012). Technological change in the direction of cleaner technologies entangles innovation. The innovation process corresponds to all the activities that generate technological change and dynamic interaction between them, not necessarily primary inventions alone. Against this background, the European Commission defines eco-innovation as any innovation that reduces the use of natural resources and decreases the release of harmful substances across the whole lifecycle. Eco-innovation can be found in all forms of new, or significantly improved, products, goods, services, processes, marketing methods, organisational structures, institutional arrangements and lifestyle and social behaviours, which lead to environmental improvements compared to relevant alternatives (DG Regio, 2012). While innovating, companies seek solutions to problems that are tackled within, and often created by, a given technological paradigm. Thus, once the technological paradigm is established, innovations become selective in the ability to solve problems, while hindering other solutions that would be outside the technological paradigm in that specific period. In other words, technologies are elected according to the predominant features of the selective environment. Liebowitz & Margolis (Liebowitz & Margolis, 1995) illustrate how under the different forms of path-dependency mechanism technologies become more attractive as they are more used. That is, the technology is not elected because it is the most efficient, but it becomes more efficient because it has been elected. Formally, the process can adopt the form of temporal autocorrelation in linear modelling. This can lead to a socially undesirable technology lock-in effect – where lock-in is defined as market dominance of an inferior incumbent technology at the expense of a superior contender. When there are two or more technologies that are substitutes, profit-maximizing innovators may focus their efforts on improving productivity of existing technologies to the extent that the market size for these technologies is large and the return higher technology (Dutz & Sharma, 2012). This way, companies get caught in the more widespread technology linked to the prevailing technological paradigm. These events have major effects on the company's ability to find solutions to specific

	problems, that is, on its ability to innovate, including in the direction of Environmentally Friendly Technologies (EFTs). Hence, technology has temporal interdependence (path-dependent) since it is the result of predefined trajectories (Lustosa, 2011). In addition, currently, existing environmental technologies (e.g. BAT) are not necessarily widely used nor adopted on an industry-wide level, for many reasons, including lack of access to finance, long pay back time, and access to knowledge. Moreover, having reached the technical limits in some industries find little incentive for investment in resource efficiency measures (Raedemakers et al. 2011b).
Specificity for the green economy	Although this factor is not specific for the green economy transition, it is a key element for technological transitions in general. Considering that the shift towards a green economy also involves a technological transition to a post-carbon low-resource economy, the selection of path-dependency as one of the headline factors for the green manufacturing sector seems completely justified.
Provable impact on the green economy spheres	Economic: negative impact (-) There are countless examples on how path-dependence links to the economic sphere, impacting the efficiency of many markets. See for example of Messner (Messner, 2002) for a empirical evidence on the substitution of copper for aluminium and Kalkuhl et al. (Kalkuhl, Edenhofer, & Lessmann, 2012) for market failures in energy innovations. Environmental: negative impact (-) Countless contributions argue that industrial economies have been locked into fossil fuel-based energy systems through a process of technological and institutional co-evolution driven by path-dependent increasing returns to scale. See for example Unruh (Unruh, 2000) for an overview of such general approach. Social: uncertain to negative impact (o/-) Current institutional arrangements, including the lack of incentives for the private sector to innovate for sustainability, and the lags inherent in the path dependent nature of innovation, contribute to lock-in, as does our incapacity to easily grasp the interactions implicit in complex problems, referred to here as the ingenuity gap. Large-scale transformations in information technology, nano- and biotechnology, and new energy systems have the potential to significantly improve our lives; but if, in framing them, our globalized society fails to consider the capacity of the biosphere, there is a risk that unsustainable development pathways may be reinforced. Nonetheless, promising social and technical innovations with potential to change unsustainable trajectories need to be nurtured and connected to broad institutional resources and responses (Westley et

	al., 2011). A more articulated and critic approach can be found in Mahoney, J. (Mahoney & Aug, 2000) Territorial: unknown/unexplored to negative impact (o/-) Martin and Sunley (Martin & Sunley, 2006, 2010) and Martin (Martin, 2011) have argued that in many important aspects, path dependence and lock-in are place-dependent processes, and as such require geographical explanation. Authors claim that "path dependence may help explain why regional growth disparities persist; it may help explain why particular industries and technologies develop in certain locations but not in others; and it may help us to understand why some regional economies are better able to adapt over time than others" (Martin & Sunley, 2010). However, authors argue that the precise meaning of "regional lock-in" is unclear, and little is known about why it is that some regional economies become locked into development paths that lose dynamism, whilst other regional economies seem able to avoid this danger and in effect are able to 'reinvent' themselves through successive new paths or phases of development. The issue of regional path creation is thus equally important, but has been rarely discussed. Authors conclude that whilst path dependence is an important feature of the economic landscape, the concept requires further elaboration if it is to function as a core notion in an evolutionary economic geography.
Trade-offs: mixed +/- impacts on green economic spheres?	In this specific case, there are not provable trade-offs between the green economy spheres. All the dimensions involved are impacted negatively, particularly the territorial dimension. For example, path-dependence could explain why some attempts to create new industrial development or clusters fail in some regions, because it can constrain the scope for policy-makers to influence regional economic outcomes (Martin, 2011).
Externalities: impact on other sectors / case studies	Technological lock-in and path-dependence within the industry sector has obvious impacts on other sectors such as e.g. transport, building and construction, as well as water and waste management.
Interactions with other factors	In a context of path-dependence, when difficulties increase and finding solutions becomes more complicated, there is a strong incentive for a shift on the technological paradigm. Still, in order to a new technological paradigm to emerge, it is necessary that advances in basic knowledge occur, as well as other institutional and market

	factors. Thus, technological transitions towards environmental sustainability are characterised by involving many aspects (economic as well as non-economic factors such as (1) development of specific capabilities of enterprises, (2) infrastructure and (3) institutional changes) included in an evolutionary process that faces nonlinearity, cumulativity and temporal interdependence.
Causal level of operation (proximate/direct versus underlying/indirect factors)	Direct/proximate Technological lock-in and path-dependence within the industry sector is clearly a barrier directly preventing new environmentally-friendly technologies to spread and disseminate. More than triggering a given process, what technological lock-in and path-dependency do is preventing economic-efficiency driven factors to operate within a given economic context. Thus, it can be said that path-dependency blocks technological triggers.
Spatial level of operation (internal versus external factors)	External Technological lock-in and path-dependence within the industry sector can be labelled as an external barrier, whose manifestation on specific territories might vary..
Type of market force involved	Supply-side factor
Policy recommendations: making the link between policy and non-policy factors	"Policies to redevelop a region's economy are more likely to succeed if they take proper account, and built upon, the legacies (specifically, of course, the strengths and competences) inherited from the region's previous developmental history"(Martin, 2011; Sydow, Lerch, & Staber, 2010). "At the same time, a path-dependence approach may help identify appropriate moments of policy action, such as when a new technological and industrial path appears to be emerging in a region. Policy intervention at this stage can help establish the new path, for example by promoting externalities of various kinds, or perhaps even steer in different directions. More generically, path-dependence suggests an important role for regional policies that are aimed to foster and facilitate constant cumulative adaptation and innovation in a region's economy so that its industrial development paths do not get 'locked-in' and the region does not lose its dynamic competitiveness" (Martin, 2011).
Possible indicators	Temporal autocorrelation in the penetration of specific technologies

Annex II.4. Waste sector

Technical and market drivers and barriers

Description	**Infrastructure and capacity building:** There is a need for adequate capacity for separate collection and recycling. Balance between separate collection and treatment capacity. Systems for WEEE collection, disassembly and treatment. Dedicated incineration capacity The more capacity is available the more incineration is and would be a preferred waste treatment option. Compost capacity Composting capacity has increased significantly in several EU countries like Finland, Germany, Hungary and Italy. However, separate collection schemes have struggled to keep up with the increase. There is also the issue of introducing and keeping quality standards in order to ensure product quality (ETC/RWM, Diverting waste from landfill, 2009) **Market development**: A level playing field in terms of levies, fees, etc, so that waste shipments decrease. Development of markets for separately collected waste products. **Stimulate the recyclability of the products** and the integration of recycled materials into products; for example, the development of minimum requirements and criteria in the context of the eco-design directive, which will be supported by studies and the possible development of related standards. Many of the materials needed by EU industry can be increasingly obtained through recycling and recovery
Specificity for the green economy	The above factors are preconditions for greening the waste sector.
Provable impact on the green economy spheres	**Economic: positive impact (+)** The economic impact of technical and market drivers is unequivocally positive. On one hand the construction of the waste treatment infrastructure brings positive economic effects. On the other hand, its availability unblocks preferable waste treatment options which leads to job and GVA creation. **Environmental: positive impact (+)** The construction of any infrastructure (including waste management) takes a toll on the environment and modifies the landscape. However, once it is in place waste treatment becomes less environmentally damaging compared to landfilling.

	Social: positive (+) It has been demonstrated that more jobs are created in recycling than in landfilling. **Territorial: positive (+)** The construction of any of the above mentioned facilities necessarily has territorial argumentation and territorial meaning. The available capacities make certain territorial sense and in the planning phase waste generation within a certain territory (big city or region) is taken into consideration.
Trade-offs: mixed +/- impacts on green economic spheres?	The above mentioned waste treatment infrastructures are mutually competing/ For example, the good availability of incineration capacity within a region might divert the focus of policy makers from waste prevention and resuse.
Externalities: impact on other sectors / case studies	Waste, being a horizontal sector, influences all other sectors studied within GREECO. A better waste infrastructure would improve waste management in industry, building, agriculture and tourism. It will decrease the environmental pressures of the sectors and it could also create new dynamics within the sectors.
Interactions with other factors	Available technical capacity is closely interlinked with the policy and economic factors. Its functioning is closely dependent on the administrative capacity within the region/municipality.
Spatial level of operation (internal versus external factors)	Mainly regional or municipal (in the case of big cities). The technical characteristics of the installations in terms of volume of waste that can be treated dictate their territorial coverage/relevance.
Type of market force involved	The involvement of the private sector depends on the profit opportunities. Profit opportunities depend on the cost of the service in terms of gate fees which might be market or administratively driven.
Policy recommendations : making the link between policy and non-policy factors	Development of waste treatment infrastructure is a matter of policy drivers and available funding. For example, with the support of Cohesion policy, New Member States have recently built significant sanitary landfill capacities. Without any doubt a sanitary landfill is better than wild dumping or non-sanitary landfills. However, this development is ambiguous as available sanitary landfill capacities might divert policy attention to landfilling instead of other waste treatment options. Designing the right gate fees (landfill and incineration) will determine to a big extent the demand for the waste treatment method on one hand and the supply of capacity on the other hand.
Possible indicators	• Available landfill capacity; • Available compost capacity; • Available incineration capacity;

Administrative drivers and barriers

Description	**Administrative competence and capacity:** • availability of sufficient number of competent staff; • cooperation of implementation between different bodies; • training on new regulation. **Enforcement measures**: the monitoring, penalty imposition and prosecution of infractions contribute significantly to better policy implementation. **Non-legally binding drivers** • Voluntary instruments: EMS and EMAS, business projects that include environmental improvements, consumer information and education, eco-labels, green or full-cost accounting (Huhtinen, 2009) For example, local governments can enter in voluntary agreements with businesses to undertake special measures for the management of particular waste streams. • Corporate Social Responsibility – waste aspects **Availability of standards for reusable products.** (Huhtinen, 2009) If those are in place marker operators know what to expect and adapt their technical processes. **Agreements** between the government and industry sectors to engage into better waste management than required in by law. Technology spending programmes for regions and municipalities
Specificity for the green economy	Administrative capacity is key for good waste management as the waste management systems need to be created and later managed. These are not purely market-based system hence the importance of strong administrative waste management capacity.
Probable impact on the green economy spheres	**Economic: positive impact (+)** Properly managed waste management system unlocks market interactions. **Environmental: positive impact (+)** The administration is in the capacity to design such poilicies and economic instruments which drive waste management to less

	environmentally harmul treatment methods. **Social: positive (+)** **Territorial: positive (+)** Competent administration brings numerous benefits to the territory under its jurisdiction.
Externalities: impact on other sectors / case studies	Close link to the technical infrastructure but also regional/local policy making
Interactions with other factors	Enforcement and compliance goes hand in hand with regulatory drivers. If the enforcement is weak the effectiveness of policy drivers is also weak. There is a need to integrate waste policy with other sectors and not develop it in isolation (UNEP, 2012)
Spatial level of operation (internal versus external factors)	Usually, competences are on municipal (NUTS-3) level but depending on the waste management system in certain countries there are regional waste management structures such as regional waste management associations.
Policy recommendations: making the link between policy and non-policy factors	The level of implementation of policy depends on the size and quality of the administration. With the adoption of each new waste policy a respective administrative backing should be secured.
Possible indicators	• Number of staff responsible for waste management on local level; • Number of staff responsible for waste management on municipal level; • Number of inspectors dealing with waste issues. • Number of infringement procedures (measuring the enforcement capacity)

Knowledge drivers and barriers

Description	**Gaps of knowledge about state-of-implementation:** lack of reliable data on waste streams, volumes and management systems. New tools: waste management plans and waste prevention systems; Inspections need to target implementation deficits and training should focus on problematic areas; **Cooperation and stakeholder involvement.** Cooperation between bodies is a key driver; multiple stakeholders involved and therefore knowledge sharing is key; **Awareness raising**: important among general public and public authorities for policy implementation on local level; understanding of separate collection practices and waste products; communication campaigns to encourage participation in return, collection and recovery schemes, **Educational tools** Better waste management is also about change of mindsets of different stakeholders. It starts with the design of the product and its composition as well as the organisation of industrial processes. Consumers are a main target for awareness as they are an indespensble part of any waste management system through their efforts for prudent consumption, separation at source and recycling. Consumers can be urged and educated to make a variety of productive changes: reduce their purchases of products that contribute to the waste stream, eg by buying unpackaged or more lightly packaged goods; reuse or recycle goods rather than discard them; Compost food wastes at home; separate their wastes at source for contribution to recycling programs; and keep hazardous materials out of MSW. **<u>Networking</u>** **- Eurocities** (<u>www.eurocities.eu</u>). A network of progressive cities. There is a working group on waste which addresses the issues of waste recycling, bio waste and sludge. It contributes from the city perspective to European policy initiatives on prevention and recycling of waste. **The WG** analyses new European, produces case studies of waste reduction plans in European cities, and assesses the waste life cycle applied to case studies. It develops waste management practices, supervising and controlling in participating cities, coordinating and disseminating R&D activities. - The movement from Local Agenda 21 to **Local Action 21** ushers local governments from general sustainable development planning to work with local stakeholders address inter-related challenges to poverty and sustainability. ICLEI seeks to build **Sustainable Communities and Cities** by enabling local governments achieve justice, security, resilience, viable economies, and healthy

	environments. (www.iclei.org) The **Lead Market Initiative** in recycling aims to boost markets for technologies, products and processes relating to the recycling and re-use of products and materials.
Specificity for the green economy	While waste management is not an extremely complex system nevertheless the general public needs a certain amount of basic knowledge about environmental impact of waste as well as good waste management practices.
Probable impact on the green economy spheres	**Economic: positive impact (+)** Better knowledge will increase the separately collected waste and therefore increase different market development opportunities. **Environmental: positive impact (+)** Better knowledge and awareness will has a significant impact on the environment as individual consumption is the main cause for waste generation. More responsible consumption and better knowledge of less environmentally harmful treatment methods is key to any successfully run waste management system. **Social: positive (+)** Employment is created through improved recycling but also people get additional satisfaction from leading less environmentally harmful lives. **Territorial: neutral**
Externalities: impact on other sectors / case studies	Better knowledge of waste management will benefit agriculture, construction and industry dramatically. There is a potential for complete change of paradigms in these sectors due to better and innovative waste management techniques and interactions.
Interactions with other factors	Strong administration and NGOs sector are mainly responsible for improving the awareness of citizens and business operators. Policy and economic drivers may urge citizens to become better educated in waste management in order to save costs and avoid fines.
Spatial level of operation	Knowledge drivers can operate on different spatial level: EU, national, regional, local. There is a place for all of them as they approach the knowledge gap issue from a different perspective.
Policy recommendations	Policy implementation is closely dependent on business and citizen awareness therefore it should not be underestimated. New policies should be accompanies by capacity building.
Possible	• Membership in EU networks for waste management;

indicators	

Economic drivers and barriers

Description

Economic instruments direct individual and company behaviour to **certain waste treatment options.** Their efficiency depends on their levels but also on price elasticity. Ecocnomic instruments include: landfill gate fees, landfill taxes, penalties to municipalities not meeting the targets, tax incentives for packaging recovery schemes.

Landfill tax

Landfill tax on BMW has been one of the most significant drivers for preventing waste from the landfills and managing it in alternative ways. The landfill tax, together with **closing of old landfills**, unregulated landfills have been identified by Estonian policy makers and other stakeholders as the most effective drivers and enablers for the decrease of landfilled MSW and the uptake of alternative waste management methods, i.e. greening the waste sector.

Table 4 Evolution of landfill tax in Estonia, EUR/t

	Pollution Charges Act 2002				Environmental Charges Act 2005			
	2002	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**
Non-hazardous waste basic	0.2	0.2	0.3	1.9	7.8	7.8	8.5	10
Factor for non-compliant landfills	6	6	6	4	2	2	2	3
Old non-compliance landfills	1.1	1.3	1.5	7.7	15.6	15.6	17	30.1
Oil-shale gangue and enrichment resid	0.1	0.1	0.1	0.2	0.4	0.5	0.6	0.8
Oil-shale ash	0.3	0.3	0.3	0.3	0.4	0.5	0.6	1
Oil-shale semi-coke	0.3	0.3	0.4	0.4	0.4	0.4	1	1
Factor for non-compliant landfills	3	4	2.5	2.5	2.5	2.5	5	8

Source: Presentation. Peeter Eek, Estonian Ministry of Environment

According to a recent study, a minimum rate of EUR 40 should be set progressively in place to start moving waste management up the waste hierarchy. This could contribute to move to a minimum access cost to landfill of EUR 100/tonne (ideally EUR 120) (taxes + gate fees). The revenues of such taxes should be invested in new infrastructures aiming at increasing recycling and reuse rates.[15]

[15] EC Annual Growth Survey

	Full cost collection tariffs Designing a tariff for waste collection from households and businesses which reflects the full cost of waste landfilling is a driver for waste separation at source. **Incineration gate fees** The level of gate fees is in direct correlation with incineration being chosen as a treatment option. **Funding through Cohesion policy** Thanks to the availability of Cohesion policy funding has improved significantly during the last ten years. However, as mentioned above, it may create lock-in effects by keeping waste to better, sanitary landfills. In order to avoid this, prevention, reuse and recycling policies have to be developed at the same time with the construction of landills. The availability of funding is an extremely important driver or barrier as waste management is expensive and often municipalities lack the necessary funding for the establishment of integrated waste management systems. The efficiency of funding is another issue. **Profitability** Many changes at the level of the industry, the company or the individual production facility aimed at reducing waste generation can be profitable or at least break even financially. Producers can be encouraged or educated to examine and adopt changes in product and process design, and improvements can result from a variety of motives: • some actions will be justified for purely financial reasons; • others will enable the producer to gain a marketing advantage, for example by building brand reputation; • others may be undertaken to avoid encouraging regulatory action; and • others – probably most - may result from a combination of reasons and motives. (UNEP, 2012) **Changes in the prices of materials** may alternatively encourage and threaten recycling (for example current moderately high metals prices may collapse, leaving recovery operations financially uneconomic even if still environmentally beneficial). (UNEP, 2012) **Private sector involvement** The need to harness the efforts of the private sector in various different roles – producers, suppliers, service deliverers, recyclers, traders as well as first line generators of waste streams; (UNEP, 2012) Improve understanding of market conditions in recycling (*Lead Market Initiative*

	for Europe, Mid-term progress report, 2009) Possibility that environmentally damaging or hard-to recycle products will be taxed. (*ZeroWin*)
Specificity for the green economy	Economic instruments are major drivers of greening the waste sector.
Probable impact on the green economy spheres	**Economic: impact depends on levels (+/-)** They might have positive as well as negative impact and this is closely dependent on their levels. A high landfill tax will divert waste from landfill and favour economically other waste management sectors (i.e. incineration) while a low tax will attract it. **Environmental: impact (+)** The environmental impact depends on the waste management option which is stimulated by the level of economic instruments. **Social: depends on level** The choice of waste treatment methods (and associated employment) depends on the level of taxes and fees. **Territorial: neutral**
Trade-offs: mixed +/- impacts on green economic spheres?	The level of taxes triggers a change in attitude of economic actors. Therefore the levels of taxes (landfill, incineration, etc.) should be set in such a way that the biggest incentive is to treat waste in the best possible way from a waste hierarchy point of view.
Interactions with other factors	Economic drivers are closely linked with the available administration to implement them.
Spatial level of operation	National
Type of market force involved	Economic instruments determine behaviour of market players in the framework of waste management systems. They determine the treatment methods but also the prices of recycled materials versus vergin materials.
Policy recommendations: making the link	Adoption of new policies should be accompanied with carefully designed economic instruments which should send the right signals to the economic operators and stimulate waste treatment methods high on the waste hierarchy.

between policy and non-policy factors	
Possibile indicators	• Level of landfill tax and landfill gate fee • Level of incineration gate fee • Level of cost recovery

Annex II.5. Water sector

Economic drivers and barriers

Description

Economic instruments such as tariffs, taxes and subsidies are used to influence consumer's and producer's behaviour. They addresses environmental externalities and market failures and can thus contribute to green economy development. They can also create dynamic incentives for continuing to improve efficiency and pollution abatement via innovation and industrial restructuring. Water pricing can be a very powerful instrument in pursuing the different water policy objectives.

Table 5 Marked based instruments for water

Type	Description	Examples
Tariffs or charges	Can include several types of charges. Water charges - Cover costs of providing environmental services and abatement. Compromises the costs for water utilities to process the water; collecting, storing, treating, supplying, Water pollution levies that encourages reduced pollution and applying the PPP. Revenue generated to compensate damage.	In several MS water-tariffs have been introduced recently (AT, BG, BE, EE, ES, NL, SE, UK) or are under development (CY, CZ, IE, RO, SK) in order to ensure cost recovery for water services. The Dutch water pollution charge gives a good example of an incentive of an economic instrument in environmental policy that led to that industry started to reduce polluting discharges to water, both by means of pollution prevention and by investing in their own wastewater treatment.
Taxes	Aims to alter the behaviour of consumers and producers and is raising revenue to finance investments to water infrastructure. Required payment to general governments.	Traditionally, national budgets have to a large extent financed water management and water abstraction taxes can be found in several MS. For instance, Germany, have introduced effluent taxes to internalise the externalised costs of discharging polluted water, Denmark and the Netherlands are other examples.
Subsidies	Payments from governments to producers to influence their behaviour. Examples are to stimulate development of new technology, create new markets, encourage consumer choices. Can also have cause negative effects by Environmental Harmful Subsidies (EHS).	EHS – Spain's irrigation subsidies enables farmers to continue with in efficient irrigation methods Water stewardship Programme, initiated by European Water Partnership introduces management standards for industry.
Tradable permits schemes	Limits the possibilities to resource use and to pollute. Market mechanism to reward users that reduce or cease a water-affecting activity	Wetland banking schemes developed in the USA, requires a user that wants to drain one wetland to restore or protect another. (OECD, GE)

Source, Adapted from (EEA, 2012a) and (EU Water Initiative, 2012)

	Water policymakers often apply water pricing for its revenue effects. The revenue raised by water pricing instruments can then be used to fund the variety of water resource management functions needed to achieve the water policy objectives. In some countries they are the main source of revenue for the water sector – over 90% for countries like France and the Netherlands. It is difficult to find complete and consistent data on supply of finance for an area such as wastewater collection and treatment. At national level the use of national budgets (BG, FR, EE, ES, LU, MT, PT, SK), EU funds (CY, CZ, HU, MT, SK) and private funds (IT, PT) were reported to be used to finance better water management and to improve water efficiency (EC, 2011d). In many Member States, wastewater investments are financed through user charges which are either relatively independent utilities or under municipal ownership (EC, 2011a). **Water pricing** Historically, the price of water in Europe has rarely reflected its true value. Water tariffs set below the cost-recovery level face the risk of not being sufficient to fund infrastructure replacements and reduce leakages and thus not achieving green economy objectives. The 'polluter pays principle' requires that the polluter should bear the cost of reducing environmental impact from economic activity. Often it has been the citizens that have stood for the costs of treating water polluted by industries, though its tax payments (EEA, 2012a). Better water pricing to ensure a sustainable use of water is a key provision of the WFD and is stipulated in Article 9 through the concepts of cost-recovery; polluter pays principle and incentive pricing. The WFD requires Member States to take account of cost recovery of water services (including environmental and resource costs) from users including farmers, industry and ordinary household consumers, based on the polluter-pays principle. ***Current barriers*:** The price of water is in general to low, if viewed upon having the ambition to achieve cost-recovery of WWS investments. Low water tariffs leaves limited possibilities of funding further developing the water sector as described above. The low price of water is also problematic in the sense that it does not create an incentive for water savings for consumers and industries. **Water metering** is a key condition for proper pricing, forming an important part of the tariff setting. Metering increases the transparency of price setting and provides, communication and control mechanisms for the users. The metering of water consumption was reported being extended in most Member States (EC, 2011d) however it is still insufficient despite the fact that this is a necessary pre-condition for the implementation of incentive pricing policies (EC, 2012d). Water metering is also an important tool for raising awareness about water use. The Impact assessment undertaken in the Blueprint process states that a key problem to achieving sustainable growth in the water sector is the insufficient use of economic instruments to address market failures that prevent the implementation measures including the current pricing schemes across Europe that often fail to combine the objectives of efficiency and fairness and do not allow a sustainable degree of cost recovery for the financing of the greening the sector. An assessment of the WFD RBMPs reveals a poor quality of the assessments of costs and benefits and that incentive and transparent water pricing is not applied across all Member States and water-using sectors, also due to the lack of metering. Only 49 % of RBMPs plan to change the water pricing system to foster a more efficient use of water and only 40 % include measures to improve water metering (EC, 2012b). There are very few Member States that have implemented a transparent recovery of environmental and resource costs. Cost recovery is implemented, to a greater or lesser extent, in households and industry. For agriculture, in many areas, water is charged only to a limited extent.
Specificity for the green economy	Economic instruments are major drivers of greening the water sector. To move towards a green economy usually includes a commitment to charge for the full cost of resource use. Pricing can also be an effective awareness-raising tool for consumers and combines environmental with economic benefits, while stimulating innovation.
Probable impact on the	**Economic: impact depends on levels (+/-)**

green economy spheres	They might have positive as well as negative impact and this is closely dependent on their levels. **Environmental: impact (+)** Water pricing is a mechanisms that can be used which signal scarcity as well as it creates incentives for water efficiency across sectors; agriculture, industry, public supply, etc.. Positive environmental will be achieved if economic instruments reduced the water consumption and waste water discharges across sectors leading to less water and water stress and pollution on water bodies. **Social: depends on level** Water pricing should take into account the social aspect of water and that it is a basic human need. The share of the dispensable income that is used to pay the water bill is very different across Europe. The highest, relative price as compared to income, is found in Hungary with 4.6 %. Spain and Romania is at the other end of the scale with app 1.4 % and 1.5% respectively (DANVA, 2012). **Territorial: varies** Water pricing instruments are applied at different levels (national, regional, municipal, river basin) and by many different agencies. The level of water charges are in many MS set on municipal level.
Trade-offs: mixed +/- impacts on green economic spheres?	The use of water pricing involves considering impact of the trade-offs between different water policy objectives. For example, water can be allocated to productive uses or to ecological flows. In this case, water pricing may help to ease the trade-off by reducing the demand of water for productive uses. In the area of Water Supply and Sanitation (WSS) services, water pricing is at the heart of a trade-off between financial sustainability of service providers on one side and economic efficiency and environmental protection on the other side (EU Water Initiative, 2012).
Externalities: impact on other sectors / case studies	Water efficiency gains can also be realised across all sectors using water pricing. **Agriculture** is a large water consumer. Historically, the water charges imposed on the agricultural sector have rarely reflected water scarcity or other environmental and resource costs, which is a result of CAP policy among others. A key challenge lies in establishing water pricing in agriculture that minimises impacts on farm income but incentivises water conservation and recovers a larger share of costs, including those related to environmental degradation. The process needs to reflect local and regional circumstances and incorporate broad stakeholder consultation to help establish prices that are socially and politically acceptable. Appropriate pricing levels and tariff structures should encourage industries that send high concentration wastewater to a municipal plant for treatment to undertake greater on-site treatment, including recycling and reusing water and chemicals. (EEA, 2012b)
Interactions with other factors	
Causal level of operation (proximate/direct versus underlying/indirect factors)	Indirect factor
Spatial level of operation (internal versus	

external factors)	
Type of market force involved	Economic instruments determine behaviour of market players in the framework of water management systems. Incentive pricing involves price-setting that gives incentives for users to use water resources efficiently.
Policy recommendations: making the link between policy and non-policy factors	Adoption of new policies should be accompanied with carefully designed economic instruments. As stipulated in the WFD, the water price should be set to first reflect the environmental externalities from water use and secondly to achieve full cost recovery which is necessary to maintain infrastructure and cover future investments. It is necessary to improvement the assessment of cost and benefits of sustainable water management (including environmental and resource costs) and benefits (including ecosystem services).
Possibile indicators	• Water price levels

Market based drivers and barriers

Description	Water allocation, such as water accounts, tradable permit schemes and compensation schemes are instead new markets for water activities. **Water accounting** is a method of providing decision-makers with suitable indicators for estimating the economic value and allows informed prioritisation of water allocation. Water accounts include indicators on e.g. water availability, use and productivity and water associated expenditures and benefits. Such indicators can be expressed in physical units or as monetary values. Water accounting can fill a similar function of e.g. carbon intensity of GDP. According to the Third Follow up Report to the Communication on water scarcity and droughts in the European Union COM (2007) 414 final, the use of an authorization procedure for water abstraction is widespread in the EU, and some Member States (MT, IE) are improving their current procedures in order to comply with the WFD. In the EU and in Switzerland restrictions in water use are applied in order to preserve aquatic life and ecological status of water bodies (AT, CY, CZ, ES, FR, HU, IT, NL, PT, RO, SK, SE, UK) although these have not yet been fully implemented everywhere (BE, BG, EE, IE, LU, MT) (EC, 2011a). Current water account systems in Europe are compiled largely on a country-wide basis and presented yearly (EEA, 2012b). The UN's System of Environmental–Economic Accounting for Water (SEEA-W) could serve as a central framework for arranging data from different data sources (such as hydrological services and statistical agencies) and generating a comprehensive picture of the natural hydrological cycle and its links to the economy. A different model is Water Footprint Assessment. **Water trading** - Payments for water-related tradable rights do not generate major financial resources to undertake WRM functions, but on certain contexts they can be useful instruments to ensure that water and water-related ecosystems are better managed. There are three basic types of water-related tradable rights: tradable water abstraction rights, tradable water pollution rights and wetland development rights. Water abstraction rights allow the owner of an abstraction right to trade it in exchange of money. In Europe, Spain is the only country where, since 1999, trading water use rights has been possible. Since 2005, water markets emerged with a diversity of informal and formal trading mechanisms. During the 2005-2008 drought in Spain, water market exchanges alleviated the conditions of those basins where water scarcity was most severe (EC, 2012a).
Specificity for the green economy	Marked based instruments act a driver towards greening the water sector. Water allocation mechanisms, such as water rights, can be used to allocate water where it is most needed (OECD, 2012). Especially in water scare areas, water allocation between productive sectors and the needs of aquatic ecosystems becomes a central issue for the overall green economic development of a given territory or country.
Probable impact on the green economy spheres	**Economic: positive (+)** Might have positive as well as negative impact and this is closely dependent on their levels. Water can be allocated where the economic gains can be most efficiently achieved. Water trading can generate revenue to finance water-saving measures **Environmental: impact (+)** Water allocation can ease pressure on certain stressed areas as seen in the example of Spain above. It also provides and incentive for water efficiency and savings. **Social: depends on level**

	Territorial: varies
Trade-offs: mixed +/- impacts on green economic spheres?	Marked based instruments such as water markets (e.g. water trading) is efficient in allocating the water to optimise production and economic gain but it also as several limitations. The difficulties of market oriented water mechanisms result from water's fundamental importance in sustaining biological, social and economic systems. To merely allocate water to the highest bidder is potentially deeply problematic if humans or ecosystems are unable to meet their basic needs. Water character as a public good (and in some cases private good or common good), further complicates market orientation (EEA, 2012a).
Externalities: impact on other sectors / case studies	
Interactions with other factors	
Causal level of operation (proximate/direct versus underlying/indirect factors)	Indirect factor
Spatial level of operation (internal versus external factors)	
Type of market force involved	Influences the behaviour of market players in the framework of water management systems. Provides incentives for water savings and investments into water efficient technology.
Policy recommendations: making the link between policy and non-policy factors	The report concludes that there is an absolute need to asses water-resource use and management against ecosystem resilience and the limits of sustainability when developing policy options in order to balance the competing needs of water users. Water accounts could provide a way to allow an informed priotitisation process of water investments towards a green economy. Indicators of indicators on e.g. water availability, use and productivity and water associated expenditures and benefits could be used in addition to national accunts such as GDP, to give a more holistic view on a country or a regions performance.
Possibile indicators	•

Innovation - drivers and barriers

Description	Innovation and new technology development is a key driver for meeting the challenge of sustainable development of the water sector. Innovation could increase efficiency throughout the water management cycle, reducing leakage and consumption supporting green growth. EC has a role here to support innovation. Innovation is already a key driver of increased energy; carbon, water and material efficiency; and the improved performance of goods and services. *Innovation is a driver of multi factor productivity change through new products, entrepreneurship and business models, and new consumption patterns.* In this context, the term 'water technologies' is taken in its broadest meaning. Water saving techniques, prevention and reuse approaches, clean processes, end-of-pipe treatments, system design, IT-tools for management, monitoring and control systems, flood forecasting techniques, ecological engineering, appropriate technologies, desalination, etc. should all be embraced. And they should also carry with them the framework conditions – institutional settings and governance – to be effectively deployed. With a large part of Europe's water infrastructure being up for renewal it is vital to use this opportunity for technological improvements instead of sustaining inefficient solutions. The production of these technologies is also considered as a part of the water management related economy. It is also important to stress that the uptake of existing BAT and technology transfer also drives the green economy development. Water saving measures and leakage reduction in water supply systems have big potential to improve the efficiency in public water supply systems. As much as 50 % of water abstracted is lost along the distribution system in some parts of Europe, although large differences exist across regions in Europe. It is illustrative that only 20 % of water used by the sectors receiving a public water supply is actually consumed. The remaining is returned to the environment, primarily as treated wastewater (EEA, 2012c). In a Europe where water resources are overexploited in many areas efficiency measures of water use offer an important tool that enables society to maximise its earnings from scarce water resources
Specificity for the green economy	Technology development and eco-innovation in the water sector is an important driver for green growth. Water technology development has a
Provable impact on the green economy spheres	**Economic: positive impact (+)** Innovation and technology development brings positive economic effects. Export of water technology is an important factor for green growth in several European countries and regions, especially in the Nordic Countries and in e.g. Austria, Germany and the Netherlands. It has large potentials of creating jobs and providing value added to the economy as a whole. **Environmental: positive impact (+)** Production and manufacturing of technical components and infrastructure a toll on the environment and modifies the landscape. However, once it is in place water management becomes more efficient and less polluting and is bringing positive long-term effects on the environment. **Social: positive (+)** Possibility of job creation and employment opportunities.

	Territorial: positive (+) The construction of any of the above mentioned facilities necessarily has territiorial argumentation and territorial meaning. The available capacities make certain territorial sense and in the planning phase waste generation within a certain territory (big city or region) is taken into consideration.
Trade-offs: mixed +/- impacts on green economic spheres?	Technology lock-in.
Externalities: impact on other sectors / case studies	Water, being a horizontal sector, influences all other sectors studied within GREECO. Technology development would improve water performance and "greening" across sectors. A better water infrastructure would improve water management in industry, building, agriculture and tourism. It will decrease the environmental pressures of the sectors and it could also create new dynamics within the sectors.
Interactions with other factors	Available innovation capacity is closely interlinked with the policy and economic factors (such as expenditure on R&D. Its functioning is closely dependent on the administrative capacity within the region/municipality.
Causal level of operation (proximate/direct versus underlying/indirect factors)	
Spatial level of operation (internal versus external factors)	Innovation is in general connected to the availability of public investment in research and development. But also regional enabling conditions is influencing such as the availability of regional clusters etc.
Type of market force involved	The involvement of the private sector depends on the profit opportunities. Profit opportunities depends on the cost of the service in terms of gate fees which might be market or administratively driven.
Policy recommendations: making the link between policy and non-policy factors	Strengthening the water technology development and innovation has potential to support green growth in the water sector through developing water effieicent technology and water treatment methods at the same time it is providing GVA and jobs.
Possibile indicators	• Number of patents (per capita) in the water sector • Share of water technologies in total export • Public investments in water supply and waste water

Administrative drivers and barriers

Description	Functioning governance and institutional capacity are key to realizing green growth in the water sector. Administrative competence and capacity includes: - availability of sufficient number of competent staff; - cooperation of implementation between different bodies; - training on new regulation. **Gaps in governance structures and capacity** The governance systems and the support, or lack of, from governments and responsible authorities is an enabling condition in realizing the potentials of greening the water infrastructure. Lack of institutional capacity is a common obstacle to planning and implementing key water infrastructure. The cross-sectoral significance of water can be a hindering factor towards an inclusive green growth. The often wide distribution of responsibilities of issues related to water can lead to fragmentation resulting in gap in funding, institutional framework and policy coherence. Responsibilities can easily fall between the chairs. Shaping governance to achieve efficient and equitable allocation of water requires an effective stakeholder dialogue within a catchment and at other relevant scales, which can help foster cross-sectoral integration and Exchange" (McGlade, J., Werner, B., Young, M., Matlock, M., Jefferies, D., Sonnemann, G., Aldaya, M., Pfister, S., Berger, M., Farell, C., Hyde, K., Wackernagel, M., Hoekstra, A., Mathews, R., Liu, J., Ercin, E., Weber, J.L., Alfieri, A., Martinez-Lagunes, R., 2012). Regions are particularly important drivers in the green economy development as much of the water policy is designed and governed on local level. **Enforcement measures:** the monitoring, penalty imposition and prosecution of infractions contribute significantly to better policy implementation. **Non-legally binding drivers** • Voluntary instruments: EMS and EMAS, business projects that include environmental improvements, consumer information and education, eco-labels, green or full-cost accounting (Huhtinen, 2009) • Corporate Social Responsibility – water aspects
Specificity for the green economy	Administrative capacity is key for good water management as the water management systems need to be created and later managed. The level of implementation of policy depends on the size and quality of the administration. Long-term solutions such as the establishment of reliable, stable governance arrangementsnts for the supply of water are central to a green economy. By building functioning administrative set-ups on all relevant governance levels there are more opportunities to speed up the green economy transition (UNEP, 2011b).
Probable impact on the green economy spheres	**Economic: positive impact (+)** Properly managed water management system unlocks market interactions. **Environmental: positive impact (+)** The administration is in the capacity to design such policies and economic instruments which drive water management to less environmentally harmul

	treatment methods. **Social: positive (+)** **Territorial: positive (+)** Competent administration brings numerous benefits to the territory under its jurisdiction.
Trade-offs: mixed +/- impacts on green economic spheres?	-
Externalities: impact on other sectors / case studies	Close link to the technical infrastructure but also regional/local policy making
Interactions with other factors	Enforcement and compliance goes hand in hand with regulatory drivers. If the enforcement is weak the effectiveness of policy drivers is also weak. There is a need to integrate water policy with other sectors and not develop it in isolation (UNEP, 2012) For instance, urban policies will be important for developing water efficient buildings and distribution systems and rural policies will be important e.g. in managing the water resources and maintaining resilient water bodies. Issues of multi-level governance are at the heart of the search for environmentally sustainable models of growth (OECD, 2011b).
Causal level of operation (proximate/direct versus underlying/indirect factors)	Indirect
Spatial level of operation (internal versus external factors)	The response to water-governance challenges relies on place-based approaches that take into account territorial specificities and local concerns and where cities and regions should get bigger responsibility in developing a sustainable and "adaptive" water policy in the context of fiscal consolidation, social, technological and environmental transformation, in response to climate change, demographic and urbanisation pressures.
Type of market force involved	
Policy recommendations: making the link between policy and non-policy factors	Improved communication between the water sector and other sectors will be important in efforts to balance the water use of competing economic sectors (agriculture, industry, utilities, etc.).
Possible indicators	• Number of staff responsible for water management on local level; • Number of staff responsible for water management on municipal level; • Number of infringement procedures (measuring the enforcement capacity)

Knowledge drivers and barriers

Factor	*Knowledge drivers and barriers*
Modifiable only in the long term	
Description	Education and awareness of sustainable water management practices is an enabling condition for green growth in the water sector. In order to foster a water saving culture in Europe needs to involve all sectors of the economy. If a sense of responsibility of members in a community is established the chance the concern for sustainability of the water management increases significantly (UNEP, 2011b). **Awareness raising**: important among general public and public authorities for policy implementation on local level **Voluntary agreements** Voluntary agreements for business or private sector, such as certification and labelling schemes enable consumers to express their environmental and social values through their purchasing decisions, making the production and supply chain values of the product more transparent. The European Water Stewardship scheme defines sustainable water management principles and criteria and addresses operational evaluation of sustainable water management, including issues such as impacts on local river basins, integrated response solutions and risk management. Criteria for certification are closely linked with the main WFD requirements and the EWS can therefore be a useful tool to organize water management at RB level (EC, 2012a). Labelling products based on their water efficiency can be an effective way of reaching consumers as well as water efficiency standards for e.g. new buildings. The European Water Label is a voluntary labeling scheme for the reduction of water consumption in sanitary tap ware, initiated to improve the water consumption and performance of taps, valves and shower heads. **Gaps of knowledge about state-of-implementation:** lack of reliable data on water consumtion. New tools: waste management plans and waste prevention systems; Inspections need to target implementation deficits and training should focus on problematic areas; **Cooperation and stakeholder involvement.** Cooperation between bodies is a key driver; multiple stakeholders involved and therefore knowledge sharing is key. **Educational tools** Better water management is also about change of mindsets of different stakeholders. It starts with the design of the product and its composition as well as the organisation of industrial processes. Consumers of key sectors (both industries, agriculture, public sector as well as households) are a main target for awareness as they are an indispensable part of any water management system through their efforts for sensible consumption.
Specificity for the green	Improved knowledge is necessary to change the behaviour of consumers (especially among industries and agriculture) to move a more sustainable

economy	water management based on water efficiency.
Probable impact on the green economy spheres	**Economic: positive impact (+)** Water savings could be achieved by raising awareness among key consumers. That would allow water saved to be returned to ecosystems providing services which have positive impact on the economy as a whole. Water savings in one sector would also make water available for use in different sector. **Environmental: positive impact (+)** Better knowledge and awareness will has a positive impact on the environment as water consumption and following water discharged could be reduced being the main causes for water scarcity and a source of pollution. **Social: positive (+)** **Territorial: neutral**
Trade-offs: mixed +/- impacts on green economic spheres?	
Externalities: impact on other sectors / case studies	Better knowledge of waste management will benefit agriculture, construction and industry dramatically. There is a potential for complete change of paradigms in these sectors due to better and innovative waste management techniques and interactions. Schemes that focus on water consumption can be problematic, however, if they inadvertently cause other aspects of production, such as the wider environmental, social or economic burden, to increase
Interactions with other factors	Strong administration and NGOs sector are mainly responsible for improving the awareness of citizens and business operators. Policy and economic drivers may urge citizens to become better educated in waste management in order to save costs and avoid fines.
Causal level of operation (proximate/direct versus underlying/indirect factors)	
Spatial level of operation (internal versus external factors)	
Type of market force involved	
Policy recommendations: making the link between policy and non-policy factors	Policy implementation is closely dependent on business and citizen awareness therefore it should not be underestimated. New policies should be accompanies by capacity building.
Possible indicators	•

Annex II.6. Building sector

Age of existing buildings

Description	The age of a building very likely has a close relationship to its energy performance, particularly for buildings that have not undergone an energy retrofit (Economidou, 2011). As such, a large supply of old buildings is a constraint in that it current facilitates poor energy consumption, but it is a potential in that it promotes domestic investment in improving the performance of these buildings. The distribution of building ages per country in the table reveals that Country-by-country variations are pronounced. In a vast majority of reporting countries (except Ireland, Spain and Poland), 75% of the building stock is at least 22 years old, while a number of countries, including Sweden, Denmark, France, United Kingdom, Luxembourg, Belgium, Latvia and Italy have proportionally high number of old buildings (pre-1946). Most countries reveal an abundance of buildings from the modern period (between 1961-1990), which reflects historical trends of population development (where population surges create the need for parallel increases in housing supply). Not only does this have a great impact on existing performance, but it also infers the importance that future population development will have on determining where new buildings will be needed in the future. The technical and economic potentials of green building have advanced substantially in the last 5-10 years. For instance, we are now seeing national and European policy mandating the development of passive and nearly-zero energy homes, which reaffirm them as the new norm of green building. Likewise, funding potential is also increasing as **¡Error! No se encuentra el origen de la referencia.** shows that all member states have at least one (and up to 11) financial instruments in place to support green building. The combined effect of these advancements means that entirely new expectations of the building and construction sector are justified. Not least, the recast Directive on the energy performance of buildings – 2010/31/EU – foresees that nearly zero-energy buildings will be mandatory for all new buildings by 2021. This implies means that at some point in the next 30-35 years almost all existing buildings in Europe will have to undergo a green retrofit. Related to this, the number of relatively old buildings and the incredible rate of construction during the modern period indicate that a vast majority of buildings in Europe are ripe for an energy retrofit. In terms of "old" buildings, we have to look no further than the fact that Luxembourg clearly dominates in two trends related to buildings: the number of very old buildings and the by far the highest per capita energy consumption. It is also apparent that sincere attempts to improve building efficiency

	must acknowledge the vast number of large-scale, modernist apartment blocks. Yet this also means that achievements can be made with the decision to retrofit just one or a few buildings. Third, more comprehensive knowledge of buildings is certainly needed - both within regions and among regions. For example, regions must know the age of their building stock, which buildings have undergone some sort of energy retrofit in recent years and which should be targeted for retrofit in the near future. Likewise, better interregional statistics allow for improved efficiency of policy support, particularly from the EU level. The focus on retrofitting existing buildings is crucial from multiple perspectives for green building. First, and closely connected to both urban mining and brownfield development, roughly 2/3 of the materials can be saved by retrofitting existing buildings compared to constructing new ones. Second, it implies no net loss of natural land to produce a well-performing building and it improves the quality of the urban built environment in existing areas. Third, and most importantly, viable green building policy must recognize the reality of an average building turnover rates, and that the vast majority of current buildings will exist in 2050. Therefore, all but the newest, most efficient buildings will require at least one renovation if Europe is to achieve its objective of reducing building sector emissions by 80% in 2050.

	Year	<1919	1919-1945	1946-1970	1971-1980	1981-1990	1990-2000	> 2000
Austria [1 2]	2009	15.2	8.2	28.0	15.2	11.5	13.6	8.3
Belgium [3 4]	2009	17.1	24.2	24.2	13.7	20.8		
Bulgaria								
Cyprus [5 6]	2001	na	7.4	16.9	20.7	27.4	27.1	-
Czech Republic [1 5]	2005	10.5	14.2	25.4	21.8	15.8	7.9	3.4
Denmark [7]	2009	19.7	16.1	26.4	16.6	9.1	5.4	6.7
Estonia	2009	9.4	14.2	30.0	21.5	19.6	2.0	3.3
Finland [4]	2009	1.5	8.1	27.6	21.5	18.5	11.5	9.8
France [18]	2006	17.0	13.2	17.4	25.2	10.2	8.5	8.4
Germany [9]	2006	14.4	13.6	46.3		13.2	9.2	3.3
Greece	2001	3.1	7.2	31.8	24.5	19.1	14.4	na
Hungary [10]	2005	-	20.8	27.2	23.1	17.8	7.9	3.2
Ireland	2002	9.4	8.0	15.9	14.2	13.2	19.5	19.8
Italy [11]	2001	14.2	9.9	36.8	18.8	12.2	7.9	-
Latvia	2008	13.8	13.1	22.1	19.4	20.2	7.0	4.4
Lithuania	2002	6.2	23.3	33.1	17.6	13.5	6.3	-
Luxembourg [3]	2008	21.8	25.6	29.2	11.6	5.1	4.5	2.2
Malta [12]	2005	12.2	10.0	22.1	16.2	19.1	17.0	3.4
Netherlands [13]	2009	6.9	13.9	27.0	17.0	15.4	12.0	7.9
Poland [14]	2002	10.1	13.1	26.9	18.3	18.7	12.9	-
Portugal [3]	2008	7.4	10.0	21.9	16.1	18.8	17.7	8.1
Romania [15]	2002	3.9	11.5	37.3	23.8	14.8	7.3	1.4
Slovak Republic [1 5]	2001	3.4	6.6	35.1	25.6	21.0	6.2	0.6
Slovenia [16]	2004	15.1	7.8	27.7	23.2	16.0	6.9	3.4
Spain [17]	2001	8.9	4.2	33.5	24.1	13.6	15.7	-
Sweden	2008	12.1	14.7	37.0	16.8	9.4	5.5	4.6
United Kingdom [18]	2004/5	17.0	17.0	21.0	21.8	20.0	na	na

Dwellings classified by the period in which the construction of the building containing them was completed.

1 (Permanently) occupied dwellings
2 1919-1944, 1945-1970, 1991-2000
3 Estimate
4 From 1981 and onwards
5 Difference of percentage totals 100% due to unknown age of stock
6 < 1945 covers convential dwellings
7 < 1919, 1920-1945, 1945-1969, 1970-1979, 1980-1990, 1991-2000 > 2000
8 <1915, 1915-1948, 1949-1967, 1968-1981, 1982-1989, 1990-1998, >1999
9 <1919, 1919-1948, 1949-1978, 1979-1986, 1987-1990, 1991-2000, >2000
10 <1944, 1945-1969, 1970-1979, 1980-1989, 1990-1999, >2000
11 <1919, 1919-45, 1946-71, 1972-81, 1982-91, >1991
12 <1920, 1921-1950, 1951-1976, 1977-1985, 1986-1990, >1990
13 <1906, 1906-1944, 1945-1970, 1971-1980, 1981-1990, 1991-2000, >2000
14 <1918, 1918-1944, 1945-1970, 1971-1978, 1979-1988, >1988
15 <1910, 1910-1944, 1945-1970,1971-1980, 1981-1989, 1990-1999, >1999
16 Data include holiday dwellings
17 Main residences only: <1920, 1921-1940, 1941-1970, 1971-1980, 1981-1990, 1991-2001
18 <1919, 1919-1944, 1945-1964, 1965-1984, >1984

Source: National statistical institutes
CZ Population and Housing Census 2001
DK Housing Census 2009
FR Enquête logement 2006
GR Housing Census 2001
MT Census of Population and Housing 2005
ES Censo de poblacion y viviendas 2001

Specificity for the green economy	Inclusive It is an inclusive factor that acts as a determining factor for the building and construction sector as a whole. This is quite specific to the green economy in that old and poorly performing existing buildings directly impact the resource intensity of society and economy (where the building sector is the primary consumer of energy). As such, the direct impacts are notably related to improved energy and resource performance of the buildings. In other words, this is often the primary rationale of making such an improvement (i.e. to reduce building costs by reducing operational resource consumption. At the same time, existing and aging buildings are also related to a potential to improve quality of life.
Provable impact on the green economy spheres	Economic: unknown/unexplored to negative impact (o/-) Not applicable due to the fact that buildings are not related to economic production per se. Environmental: negative impact (-) Where there is a direct correlation between increased age of buildings and higher energy consumption.

	Therefore, there is a positive potential in terms of linking economic growth opportunities to the renovation of existing buildings, and improved energy efficiency. Social: uncertain to negative impact (o/-) Aging buildings can be connected to a lack of demand for buildings in certain areas and social segregation. Territorial: unknown/unexplored to negative impact (o/-) High shares of older buildings can lead to a lack of high quality buildings which are often a component in creating desirable cities for attracting investment. In other words, it plays a role in determining underlying 'qualities of place' and is very closely connected to making cities desirable places to live.
Trade-offs: mixed +/- impacts on green economic spheres?	The key trade-off in this regard is how many of dense, urban centres (i.e. national or regional capitals) often have the highest shares of old buildings, but many of this buildings have very high architectural and cultural values. Maintaining these characteristics of the built environment can act as a constraint to creating a more resource efficient building sector.
Externalities: impact on other sectors	Has the potential for clear linkages to poor performance in terms of waste and water management, but especially in terms of the energy sector.
Interactions with other factors	None.
Causal level of operation (proximate/direct versus underlying/indirect factors)	Proximate – Direct It is a clear and general understanding that age of buildings is a chief driver of resource performance in the building sector.
Spatial level of operation (internal versus external factors)	Internal All buildings contributing to an economic and resource improvement potential are located within the regions itself.
Type of market force involved	Supply?

Policy recommendations: making the link between policy and non-policy factors	Should be supported by public procurement to kick start investment in green building. Age and performance of buildings should be well understood through comprehensive energy audits of all buildings. Improved awareness should be promoted, where people can be provided with information on costs and benefits associated with renovating buildings, and owners of old buildings should be provided with economic incentives for improving the resource performance of their buildings. This is a perspective that has been addressed in a number of ways by European policy. For instance, a number of European policies which clearly mention how public administrations need to lead by example, by proactively identifying and retrofitting existing public buildings to improve resource performance. Along these lines, the 2011 Energy Efficiency Plan notes that electricity and heat performance of existing public buildings must be improved through at least a doubling of current renovation rates.
Possible indicators	Age structure of buildings Available at the national level and quite often at the local level, but not generally at the regional level.

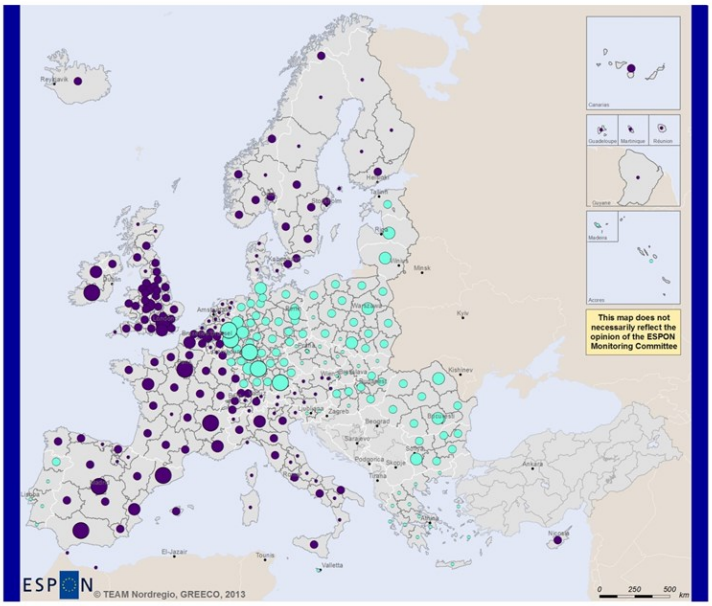
Population Growth

Description	Population development ought to be seen as a key indicator determining green building potential because additional buildings will be needed where people are going to be living, which in turn provides the opportunity to: Build greener buildings Provide jobs and growth in the construction sector While buildings in all urban areas should be put in focus for their inherent potential to become greener, local and regional building development policy must explicitly consider territorial dynamics, especially regarding demographic changes and the fluidity of migration. While the population of many regions is foreseen to grow substantially in the coming decades, research suggests even more regions should expect to shrink within the same period. Housing development policy must carefully consider expectations for its respective region, even though for many regions this is not an appetizing prospective. Quite simply, a territorially aware housing development policy for a shrinking region will in no way receive a long term benefit by continuing to add to its stock of buildings! In all likelihood this will generate more sprawl and will only add to the perceived unattractiveness of the region. In contrast, strategies for these regions should focus on planned redevelopment of the existing built environment, with a focus on green building that simultaneously promotes a sense of community and local ownership. At the same time, those regions expecting high population growth should be especially focused on having high green building standards governing new construction projects. Again, with the use of territorial evidence on population forecasts we can infer which regions should bear in mind the importance of having appropriate green building standards governing city planning and development.
Specificity for the green economy	Inclusive It is an inclusive factor that acts as a determining factor for the building and construction sector as a whole. More people equal more buildings, just as depopulation means less demand for floor space.

Provable impact on the green economy spheres	Economic: positive(+) People provide an economic base and the largest cities of Europe are also considered to be the economic capitals – as centres of various high value added, knowledge intensive sectors. Environmental: positive and negative(+ -) On one hand, concentrated population, cities, are centres of increased consumption, where resources are needed to meet the needs everyday life. This means they are more resource intensive. At the same time, through increased economies of scale they provide opportunities for improved building performance – through the impact of high densities. In this regard, population growth could be seen as appositive impact. Social: positive(+) – Population growth leads to improved provision of service, cultural diversity, and economic opportunity. More importantly in this connection, population decline leads to the loss of social services. Territorial: unknown : Population growth (or decline) is more of an outcome of other factors.
Trade-offs: mixed +/- impacts on green economic spheres?	Population growth provides opportunities for jobs and development of greener buildings, but it puts pressure on water and waste management. Land take for the built environment also comes at the expense of other land, notably in the agricultural sector.
Externalities: impact on other sectors	Naturally it impacts all sectors because it adds to the economic base and increased the demand for goods and services. Population is the fundamental driver of all economic activity in all sectors, but most explicitly in terms of the need for buildings for people to live and work in.
Interactions with other factors	Clear interaction with population density, where higher concentrations of people promotes opportunities for improved per capita resource efficiency in a number of sectors, including buildings.
Causal level of operation (proximate/direct versus underlying/indirect	Proximate – Direct Population growth has a direct demand on buildings, but as mentioned, this is regardless of their green performance.

factors)	
Spatial level of operation (internal versus external factors)	Internal Population growth is, by default, place based.
Type of market force involved	Demand
Policy recommendations: making the link between policy and non-policy factors	N.A.
Possible indicators	Regional Population projections, as provided in the building sector report.

Population Development Forecast - 2009 - 2050



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Regional level: NUTS 2
Source: Eurostat, 2012
Origin of data: Eurostat, 2012
© EuroGeographics Association for administrative boundaries

Legend

- + - 1 to100 000
- + - 100 001 to 400 000
- + - 400 001 to 600 000
- + - 600 001 to 1 415 538
- Reduction in population
- Growth in population

Projections are based on national data from Eurostat on population assumptions using basic demographic indicators (TFR and Mortality) plus total net migration. National indicators are regionalized using current population density. Note, indicator does not account for births/deaths related to the migrant population.

Energy Prices and a common energy market

Description	The most important factor determining the extent buildings will become greener is, and will continue to be, the market. In other words, a building owner will almost always base an investment decision on a cost/benefit analysis (where an additional investment of X dollars is recouped by a savings based on a mix between reduced energy service costs (the energy payback period), increased comfort and a higher property value. In the perspective of directly influencing the investors' decision within the cost/benefit perspective, we can say that three of the most important driver and enabling condition will be the cost of energy. Linked to the energy market, we can triangulate cause and effect between: key decisions influencing development of Europe's energy sector as a whole, potential energy savings available in the building sector, and the EU's 2020 and 2050 goals for emissions reduction. At the intersection of these factors, we can first and foremost envision institutional innovations towards a more liberalized and common energy market. But this can only be facilitated in part through a massive investment in technical innovation to Europe's electricity and gas transmission grid and the associated infrastructure. The goals of such an investment are expressed throughout the key documents of Europe's energy policy, including its Energy Roadmap 2050, Roadmap for moving to a competitive low carbon economy and regulation on the guidelines for trans-European energy infrastructure. Keys of a smart grid include increased measurement of consumption for all end uses (residential, commercial and industrial), the connection of decentralized energy sources to the common grid (i.e. wind and solar photovoltaic), new methods of power storage and replacing existing transmission lines with new cable that reduces energy loss. The point of this joined-up perspective is that if a European energy market becomes a reality, the traditional barriers of space, time and isolated energy markets are eliminated. Consequently, even nations and regions with an ample supply of clean, cheap energy will then have an incentive to invest in demand-side initiatives (such as the greening of buildings) because saved energy can be sold, on a European market, to regions that are not able to produce as much energy. Therefore, in addition to being a driver for increasing the overall potential for green building in Europe, it also highlights the clear link between development of the energy sector and its impact on a greening of the building sector.
Specificity for the green economy	Exclusive It is an exclusive factor specifically relates the green potential of the sector because it makes green technologies more economically

	efficient.
Provable impact on the green economy spheres	Economic: positive(+) By making green products and services in the sector more economically attractive, therefore promoting innovation and development specifically of the green elements of the sector. Environmental: positive (+) By promoting increased resource efficiency, and therefore reduced GHG emissions from heating and electric supply to buildings. Social: negative (-) As reflected in the ReRisk project, more people will be prone to situations of energy poverty (have troubles to fund their energy needs). Territorial: unknown : Based on the different levels of economic development in Europe, and therefore the different ability for regional populations to accommodate higher energy prices it will have differing impacts in the EU territory. Increasing the market territory promotes additional renewable energy production by ensuring there is always a market for produced energy.
Trade-offs: mixed +/- impacts on green economic spheres?	Potentially, yes. See above.
Externalities: impact on other sectors	By default, higher energy prices promote demand for energy efficient products that are spread across all sectors.
Interactions with other factors	Clear interaction with promoting population density, and capital investment in green building.
Causal level of operation (proximate/direct versus underlying/indirect	Underlying/Indirect While not influencing green performance directly, energy prices and energy market development provide market conditions that support

factors)	investment in the sector.
Spatial level of operation (internal versus external factors)	External Energy markets operate at diverse scales depending on fuel type, extent of the network, etc. Prices are very much dependent on global signals. Also, the overall objective it to promote a single market in order to make energy tradable, thereby promoting energy efficiency, and thus green building.
Type of market force involved	Demand
Policy recommendations: making the link between policy and non-policy factors	It is suggested that approximately EUR 120 billion in EU funding will be required for high voltage electricity transmission systems up to 2020, and in total, between 1.5 and 2.2 trillion Euros between 2011 and 2050 will be needed to transition Europe's energy system to support a decarbonized supply. This especially includes the proliferation of smart grids – from a one-way flow between centralized production and decentralized consumption – toward a two-way network that prioritizes energy savings and decentralized energy production from renewables. Energy policy should ensure that the price of energy reflects its true cost, including externalities.
Possible indicators	Due to its indirect impact on green building it is difficult to suggest a way of quantitatively accounting for the potential without complex economic modelling, which is beyond the scope of this project.

Population density and compact city development

Description	In the BPIE's report (Economidou, 2011) it is notable that there is no discussion on the relationship between existing building density and energy performance. However, many other reports comment that single family homes tend to be more resource demanding due to larger spaces for heating, increased number of exposed walls, the larger properties for maintaining, etc. At first sight, the results in **¡Error! No se encuentra el origen de la referencia.**, showing the capital regions in England, Norway, Austria and to a lesser extent Sweden with lower per capita energy consumption than their surrounding regions, seems to validate this notion. This parallels the notion that higher housing density is essentially a prerequisite for a plausible future of green building – in relation to resource efficiency of the building, critical masses to support for non-car mobility options, and even for improved quality of life. In speaking of the need to reduce GHG emissions, this is exemplified in the ESPON project SIESTA, which comments: "And, taking into account that it is clear that metropolitan areas concentrate GHG emissions, it is also clear that particular urban strategies for each individual city seem to be suitable. All this has direct implications in spatial and urban planning, for instance the need to reduce sprawl and to favour a (emphasis added). As it has been suggested by several scholars, the world needs a double revolution: achieving a reduction of GHG emissions and building better urban environment, given that people are concentrated in cities. They are both absolutely inter-related. However, much the discussion around these issues is placed in the context of new buildings and developments, rather than the existing stock of ever-aging buildings." (Main Author: Universidade de Santiago de Compostela, 2012) In response to this, and to the results in **¡Error! No se encuentra el origen de la referencia.** showing the large regional differences in residential energy consumption, GREECO has compared the regional data on residential energy consumption with population density (as an indicator of housing density). This seeks to determine if higher levels of *existing* building density are correlated to reduced per capita residential energy consumption. Table 6 Indication of relationship between energy performance and building density

Impact of population density on residential energy consumption		
	Correlation between per capita residential energy consumption(corrected for temperature) and population density	Rank of capital region in the national setting
Bulgaria	0,51	1 of 6
Hungary	-0,74	7 of 7
England	-0,12	4 of 30
Norway	-0,66	4 of 7
Croatia	-0,02	2 of 3
Austria	0,16	3 of 9
Sweden	-0,33	4 of 8
Italy	0,31	11 of 20
Average	-0,11	49th percentile

The results allow for a number of relevant findings in relation to territorial dimensions of green building. In terms of existing performance, at -0.11 we quite clearly see that, overall, there is almost no correlation between per capital residential energy consumption and population density. What is even more incredible is that in a number of countries there is a quite strong negative correlation (i.e. -0.74 in Hungary, -0.66 in Norway and -0.33 in Sweden). This indicates that regions with the lowest density actually have the better energy performance in buildings than regions with higher density.

The analysis of performance of regions with the highest density supports these findings. Only the capital region of Yugozapaden in Bulgaria has the lowest per capita consumption, and in this case it is notable that the energy differential is virtually zero between the highest and lowest performing regions of Bulgaria! Even more telling is the very poor performance in the capital region of Hungary, which has the highest per capita consumption of all Hungarian regions. The mediocre performance in Oslo and Stockholm is also quite surprising given the widespread dominance of multi-family dwellings in these regions, as well as the focus of developing eco-communities in Stockholm.

The results are clearly surprising given that it would be expected that smaller average living spaces in a denser built environment would produce a lower per capita consumption. So one must ask what a rationale is behind these findings. Why do denser, urban regions seemingly perform poorer than less dense regions? One reason is the dynamic relationship between larger, denser, more established cities and another is the tendency for buildings to be older and thus less energy efficient; and the issue of ownership – where there is likelihood that fewer dwellings are owner-occupied in cities. The latter creates problems in promoting investment in resource

	efficiency upgrades to existing buildings. At the same time, the EEA's (EEA, 2010) analysis on land use shows that the average "urban" European consumes approximately 29% less energy non-urban residents. At first glance, this does not align with the regional sampling of the relationship between density and energy performance. But if the poor performances of existing buildings are acknowledged, the positive relationship between density and resource performance becomes much clearer. In summary, this reflects the combined effects of the following green building drivers: The ability to focus on existing buildings in urban areas The expected continued growth of urban areas in Europe The higher density of buildings and smaller per capita living spaces compared to a sprawled or rural settlement structure that promote efficiency The ability to create mixed uses in urban areas, thus reducing the need for private car transport The feasibility of public transport in urban areas for limiting overall car use. Put together, while the EEA (2010b, pp 22) states, "The relationship between the urban layout and the potentials for energy and transport efficiencies is complex and needs further research" it is very likely that building and construction taking place in urban - rather than rural - is a key driver of green building.
Specificity for the green economy	Exclusive While being an underlying, indirect driver of resource efficiency, this is an exclusive factor because it enables a greening of buildings from a built environment, functionality perspective. However, it is not inclusive for the entire sector because low population density and urban sprawl can also provide economic growth opportunities for the sector.

Provable impact on the green economy spheres	Economic: neutral, no impact (o) Environmental: positive (+) By promoting increased building density, positive environmental spin-offs are encountered in terms of: Reduced land take Lower per capita living space Reduced need for private car transport Social: positive and negative (+ -) On one hand the impact could be perceived as negative, where it has been seen that one of the primary drivers of urban residential sprawl has been the demand for proximity to green space, perceived "safer" communities and therefore improved reproductive opportunities. At the same time, urban areas have been promoted for quality of life in terms of reducing commuting times, enabling socio-cultural diversity, providing access to *high quality* green spaces, etc. Therefore, while the opportunities are mixed, it appears the cities which are able to develop a high quality, mixed use, compact city model – one which promotes recreational opportunities in the city – can overcome a lot of the perceived shortcomings of urban living. Territorial: neutral to positive (o +) The importance of building a sense of place in urban areas (in order to promote compact city potentials) clearly emphasizes the importance of coordinated urban planning efforts at the local level. Linked to the importance of brownfield development, this type of potential is highly place-based – contextualized by the existing built environment and its opportunities for adaptation.
Trade-offs: mixed +/- impacts on green economic spheres?	No.
Externalities: impact on other sectors	Higher population density enables for efficient forms of transport (public, biking and walking, etc.)
Interactions with other factors	Clear interaction with brownfield development and reduced land take, population growth, role of local planning and governance.

Causal level of operation (proximate/direct versus underlying/indirect factors)	Underlying/Indirect While not influencing green performance directly, population density enables changing energy consumption patterns, as well as other drivers of reduced resource consumption (i.e. waste and recycling systems, district heating, CHP production, etc.)
Spatial level of operation (internal versus external factors)	Internal Because buildings are de facto place based and local governments and enterprise has a high degree of control over how they are developed.
Type of market force involved	Supply and demand
Policy recommendations: making the link between policy and non-policy factors	-Promote high quality green spaces and other social opportunities in existing urban areas -Infilling and re-use of existing land -Coordinated and cooperative planning between municipalities in one metropolitan area. -Stakeholder engagement to ensure that communities are planned with local residents (both existing and foreseen) in mind. Promote diversity with development of increased densities. -Coordinate between sectors to promote integrated, mixed use developments.
Possible indicators	Population Density

Brownfield development, reduced land take and retrofitting versus new construction

Description	GREECO's focus on the territorial dimension of *where* buildings are located means that the issues of land use are considered within the variety of resources that are consumed when a building is constructed. But such an importance goes beyond the benefits of preserving land in and of itself (i.e. reducing agricultural loss, landscape fragmentation, loss of open space, etc.). Rather, it includes the important factors that more compact urban development can provide a greener building typology and can reduce dependency on the private car (and the emissions and energy demand that results from it). As such, land use efficiency, especially in existing urban areas that are expected to grow in population, must be a planning priority. Here, we can make two policy based recommendations: That guidelines are needed at the European level to control how Member States and Regions are creating urban areas at the expense of rural land. In particular, there must be additional conditions to the allocation of structural funds that require region's (and the governments within them) make all feasible efforts to ensure that land take is minimized or eliminated. That information on land take (i.e. land use typologies or information on rates of land take in EU regions, derived through CORINE data) can used to assess performance, and to better inform regions that are performing poorly. Both of these perspectives illustrate a simple point – that we need increased monitoring and accountability of the way in which regions are developing spatially; because its connection to green building and transport reflect the cross-sector, multitude of impacts it will have on sustainability. But the fact that local governments have the main competency for land use planning in Europe means that the priority to reduce land take and urban sprawl is often undercut in favour of ensuring (at almost all cost) investment within municipalities or regions. The effects of such processes are notable throughout the world, not least in the fact that since the 1950's, the European population has expanded by 33% but cities have expanded by 78% (EEA, 2006). Similarly, we see urban centres such as Newcastle, England where existing built areas of both homes and former industry are completely vacated while new development is taking place on the outskirts of town. Such traditions must be overcome to promote a more territorially-aware perspective; where cooperation of municipalities within regions can generate more effective (efficient) spatial development. This will result in improved resource performance of buildings through higher densities that are more integrated in existing urban areas. Brownfield development is the redevelopment of previously

	developed land. It is a particularly relevant urban development concept in cities where shifts in the economy – from industry based production to domination of the tertiary sector – leave spaces of underutilized land. In their current state and context, these areas have often lost their market attractiveness, but with well-planned redevelopment they can become rejuvenated centres for urban development. This is especially the case when redevelopment is coordinated with transit development and maintenance of cultural or heritage features.
Specificity for the green economy	Exclusive All elements of this factor contribute explicitly to green building aspects.
Provable impact on the green economy spheres	Economic: neutral, no impact (o) Environmental: positive (+) By promoting increased building density, positive environmental spin-offs are encountered in terms of: Reduced land take Reduced material resource inputs Opportunities for more sustainable transit options Social: positive and negative (+) Promotes sense of place Can promote opportunities for consideration of society in the planning process Territorial: neutral to positive (o +) Promtes sense of place Adapts existing areas toward new types of demand Exemplifies the importance of local, community planning Exemplifies importance of integrated (multi-sectoral) planning for high quality urban environments.
Trade-offs: mixed +/- impacts on green economic spheres?	No.

Externalities: impact on other sectors	Promotes business opportunities in new communities if mixed use planning is emphasized. Infilling can also promote additional public transport opportunities.
Interactions with other factors	Clear interaction with population growth, role of local planning and governance and compact city development and population density.
Causal level of operation (proximate/direct versus underlying/indirect factors)	Direct While not influencing green performance directly, these measures promote the reuse of existing materials, which serves to reduce material intensity and the resources consumed during the construction project.
Spatial level of operation (internal versus external factors)	Internal Because buildings are de facto place based and local governments and enterprise has a high degree of control over how they are developed.
Type of market force involved	Mainly supply
Policy recommendations: making the link between policy and non-policy factors	-Promote high quality green spaces and other social opportunities in existing urban areas -Infilling and re-use of existing land -Coordinated and cooperative planning between municipalities in one metropolitan area. -Stakeholder engagement to ensure that communities are planned with local residents (both existing and foreseen) in mind. -Coordinate between sectors to promote integrated, mixed use developments. -Regulations on reducing or eliminating land take unless development opportunities in existing built areas have been exhausted. -Promote public procurement and investment in the retrofitting of public buildings.
Possible indicators	Potentially: Share of urban land management to Residential and Diffuse urban sprawl in CLC Land cover flows data. As presented in the EEA's SOER on land use, page 20. "Large variations in urban soil sealing rates emphasize the importance of brown-field development — the infilling and recycling of already-developed urban land — instead of using rural land. Land-cover analysis for 2000–2006 shows that there was more diffuse

	residential sprawl than brown-field development during that period. The comparison would be even worse if sprawl of commercial and industrial sites were included. The area where recycling of artificial surfaces occurred i.e. brown-field development, was only 18.2 % of the total area of land taken, suggesting sprawl, and in 17 countries it remained below 10 %.

Proactive, integrated and cooperative planning – network governance

Description	From a policy perspective, urban regions facing growth have special opportunities for comprehensively linking green building within wider notions of sustainable urban development. But these possibilities are greatly supported by the appropriate institutional arrangements – both across sectors (i.e. between municipal departments) and among the range of important actors (i.e. urban planning, construction and utility companies, citizen groups, etc.). This emphasizes that municipal or regional public authorities are almost universally responsible for land use planning and development issues in cities, and must therefore lead by example. Yet, this can only take place once they are informed of what they can actually achieve through their own efforts. From a top-down perspective, this reflects on the importance European and global networks such as the EU Covenant of Mayors, Build up, and the Smart Cities and Communities, among others, which are crucial for promoting local green governance through information sharing, communication of best practices and logistical and technical support. Based on the above discussions, it is clear that regional and local green building action plans should be tailored to regions depending on regional specificities of planned growth and development. In addition the above perspective, one of the most crucial drivers of green building is also the most territorially explicit. Not only does it deserve special attention, but it reflects the need to move beyond traditional territorial constructs that have guided development since industrialization. From the profound importance of administrative-based territorial distinctions (between municipal, regional and national levels of planning and government) and toward regional distinction that both respond to- and promote place-based development of functional areas. The importance of planning and governance of the functional urban region – in other words, coordination and agreement among municipalities rather than strictly within municipalities – is important when planning for growth, but absolutely crucial when planning for resource efficient growth. This notion of "metropolitan governance" emphasizes the role of building a common vision among the range of institutions responsible planning an urban territory – notably, among the range of municipalities that comprise an urban region. While this requires a scaling down of territorial strategies from the national and EU levels, it also requires an up-scaling of urban land use and development planning. But the challenge is that implementing such an approach means overcoming the underlying fact that many municipalities are in reality competing against each other rather than working together. Not only does this require innovative policy and governance solutions to bring them together, but it also accentuates a shift to the way we identify regions – from largely administrative-based structures toward ones based on the

	location and movement of people, materials and resources.
Specificity for the green economy	Inclusive All elements of this factor contribute to building the right types of buildings and associated services in an integrated way. This includes buildings with appropriate resource performance.
Provable impact on the green economy spheres	Economic: neutral, positive (o) By promoting efficient investment rather that uncoordinated investment in a supply of building that is not met with appropriate demand. Perhaps the foremost examples of this was the U.S. housing crisis and, closer to home, the incredible oversupply of housing in Spain. Environmental: positive (+) By promoting cooperation over competition in terms of municipal benefits, integrated planning in metropolitan regions can take place. This allows for the environmental benefits of the aforementioned factors to be realized (i.e. building density, reduced land take, brownfield development, mixed use, retrofitting rather than new construction, etc.) Social: neutral/uncertain/unexplored/no impact Territorial: positive (o +) The entire discussion relates to the importance of local, place based, territorial governance, which considers the existing characteristic of place to develop a holistic development of the built environment.
Trade-offs: mixed +/- impacts on green economic spheres?	None
Externalities: impact on other sectors	Promotes integrated management of housing, transport, waste and water development in urban areas.
Interactions with other factors	Clear interaction with enabling compact city development and population density, as well as promoting brownfield development

	and reduced land take.
Causal level of operation (proximate/direct versus underlying/indirect factors)	Direct While not influencing green performance directly, it is crucial for integrating the potentials of green building within a marketable, desirable built environment.
Spatial level of operation (internal versus external factors)	Internal/External Local planning is de facto place based within regions, but it also requires the transfer of best practices through transnational governance networks such as the ICLEI or Covenant of mayors.
Type of market force involved	
Policy recommendations: making the link between policy and non-policy factors	Depending on such factors, the greening of existing buildings and new development opportunities can be facilitated through policies that promote: protocol for systematic audit of the energy performance of buildings. Creating official networks (green building councils, associations, etc.) at the local level to bring together key actors responsible for planning land use and construction development. This includes urban and regional administrations, local construction enterprises and those making building investments (all sorts of locally-embedded public and private sector actors, including individuals) linking green building plans in multi-sector dimension of green growth for urban regions. This especially includes consideration of mobility issues and providing incentives for existing jobs related to the development of buildings and infrastructure to be made greener providing local and regional incentives that are directly based on knowledge of the performance of the existing building stock Use public funds to increase focus on greening social and publically owned housing. Here, **¡Error! No se encuentra el origen de la referencia.** not only showed that publically owned rental housing can comprise over 20% of the residential stock in Member States, extends all of the merits of green building (increased comfort, residual effects of energy consumption behaviors, etc.) to demographic groups that otherwise may be excluded. providing local information and awareness campaigns that target the investment and consumption behaviours of building owners, including individual citizens and particularly youth.

Possible indicators	Obviously very difficult to quantify, but one option could be to correspond membership in the covenant of mayors to perceived accomplishment in terms of proactive local governance.

Annex II.7. Green research and eco-innovation sector

Economic and market drivers

Description	Rising competition over resources, higher prices and environmental depletion play a key role in driving eco-innovation. Either as direct cost reduction (savings) or as indirect cost reduction (increasing productivity), resource efficiency is fundamental for cost reduction by: • increasing energy efficiency • reducing emissions and waste • maximising material efficiency: doing more with less and wasting not • reducing vulnerability to material scarcity, changing prices, energy security, etc In addition, increasing environmental awareness of users, implies that environmental friendlier products, i.e. eco-innovative products, will capture new markets.
Specificity for the green economy	N.A.
Provable impact on the green economy spheres	**Economic: positive impact (+)** An enhanced resource efficiency at firm level represents a cost reduction and thus a positive economic impact. In addition, eco-innovative products may enable capturing new markets. **Environmental: positive impact (+)** By definition an enhanced output of eco-innovative developments will bring environmental benefits. However, attention should be paid to the "rebound-effect" **Social: positive impact (+)** Environmentally friendlier developments will be positive for the society as a whole. **Territorial: unknown (o)**
Trade-offs: mixed +/- impacts on green economic spheres?	
Externalities: impact on other sectors / case studies	

Interactions with other factors	Financial barriers and economic drivers are inter-related. However, while the first is demand-side driven, the latter is supply-side driven.
Causal level of operation (proximate/direct versus underlying/indirect factors)	
Spatial level of operation (internal versus external factors)	External Economic drivers can be labelled as an external driver, whose manifestation on specific territories might vary.
Type of market force involved	Supply-side factor
Policy recommendations: making the link between policy and non-policy factors	• Foster benchmarking, labeling, etc. • Correct pricing of resources • Raising awareness • Technical assistance programmes • Access to finance • Investment in technology breakthroughs
Possible indicators	Change in time of: • Domestic material consumption (DMC) • Raw Material Consumption (RMC) • Energy consumption • Waste generation by EWC in all sectors.

Financial barriers

Description	Economic incentives and financial barriers are two sides of the same coin affecting eco-innovation deployment. The difference between the two is that the latter is external and demand-side driven. In fact, financial factors may hinder the deployment of eco-innovative developments: - Market failures, i.e. prices do not reflect environmental costs and thus foster monopolies and hinder eco-innovation. - EHS and harmful subsidies - Lack of funds within companies and insufficient access to existing subsidies and fiscal incentives (R&D costs, lack of investment, etc.) - Uncertain demand from market, combined with long payback periods - Inadequate availability of risk capital - Barriers to trade and investment need to be reduced to facilitate diffusion and market penetration - Low returns to R&D
Specificity for the green economy	
Provable impact on the green economy spheres	**Economic: negative impact (-)** In the short term it could occur that it is less costly for companies not to invest in eco-innovation. However, in the long run they will become less productive and competitive and will have a negative economic impact. **Environmental: negative impact (-)** The hindering of investments in eco-innovation clearly has a negative impact in the environment. **Social: negative impact (-)** The lack of investment in eco-innovation hinders the growth of green jobs in the sector. **Territorial: unknown (o)**
Trade-offs: mixed +/- impacts on green economic spheres?	
Externalities: impact on other sectors / case studies	

Interactions with other factors	Financial barriers and economic drivers are inter-related. However, while the first is demand-side driven, the latter is supply-side driven.
Causal level of operation (proximate/direct versus underlying/indirect factors)	
Spatial level of operation (internal versus external factors)	External / internal Financial barriers may vary widely depending on regional assets.
Type of market force involved	Demand-side factor
Policy recommendations: making the link between policy and non-policy factors	• Improve access to finance • Reduce barriers to trade and investment • Support cradle to cradle approaches, e.g. life cycle perspective, ecodesign, etc. • Promote benchmarking and labeling to raise awareness and foster market penetration • MBIs: taxes, subsidies, etc. • R&D investment: Increased funding for the innovation chain (e.g. research, development, deployment, information-sharing) • Reform of harmful subsidies (also a policy recommendation for the regulatory framework)
Possible indicators	• Environmental Protection Expenditure. • Public investment in R&D • Private investment in R&D • Venture capital investments.

Regulatory framework drivers

Description	Compliance with environmental regulations is perceived as being a strong driver towards enhancing environmental performance of companies by eco-innovation. In addition, the current policy context in the EU is supporting eco-innovation from different angles explicitly as the Eco-AP and implicitly as the environmental performance regulations the flagship initiatives on resources, etc. Moreover, expected future regulations (e.g. the role REACH played) also drive eco-innovation. However, it should be noted that an uncertain regulatory framework would have a counter-productive effect, by hindering investments.
Specificity for the green economy	
Provable impact on the green economy spheres	**Economic: positive impact (+)** **Environmental: positive impact (+)** **Social: positive impact (+)** **Territorial: positive impact (+)** The right policy-mix has the potential for delivering positive impacts in all green economy spheres.
Trade-offs: mixed +/- impacts on green economic spheres?	
Externalities: impact on other sectors / case studies	
Interactions with other factors	It should be noted that regulatory framework can condition the rest of factors because it sets the framework.
Causal level of operation (proximate/direct versus underlying/indirect factors)	It is a flexible factor, depending on the policy measure it could direct (e.g. taxes, subsidies), or rather indirect (e.g. capacity building).
Spatial level of operation (internal versus external factors)	Internal / External Regulatory drivers may vary depending on regional assets, but also are driven by the European framework.
Type of market force involved	Demand-side

Policy recommendations: making the link between policy and non-policy factors	• Foster benchmarking, labeling, etc. • Foster voluntary agreement schemes- • Promoting investment and spending in areas that stimulate a green economy • Addressing environmental externalities and market failures • Limiting government spending in areas that deplete natural capital • Rules, regulations, standards. E.g. Improve waste separation policies Monitoring and impact assessment of policies • Enforcement incentives (e.g. adequately priced fines for noncompliance, correct pricing of resources) • Reform of harmful subsidies (also a policy recommendation for the regulatory framework) • Regulatory and control mechanisms; • Economic or market-based instruments; • Fiscal instruments and incentives; • Voluntary action, information and capacity building: technical assistance programmes, awareness rising, etc.
Possible indicators	• Existence of regional / national eco-innovation strategies. • Existence of voluntary agreement schemes. • Existence of funding schemes for eco-innovative companies, SMEs in special.

Knowledge barriers

Description	When the right networking framework is in place (e.g. clusters, associations, formal networks, etc.), knowledge spillovers occur maximising innovation widespread and outputs. However, when this is not the case, (lack of) knowledge is a prominent deterrent of green research and eco-innovation. This may take place in the following manners: • Lack of qualified personnel and technological capabilities within the enterprise • Limited access to external information and knowledge, including a lack of well-developed technology support services • Lack of collaboration with research institutes and universities • Technical and technological lock-ins (e.g. old technical infrastructures)
Specificity for the green economy	
Provable impact on the green economy spheres	**Economic: negative impact (-)** **Environmental: negative impact (-)** **Social: negative impact (-)** **Territorial: negative impact (-)** The foreseen impact of an efficient networking framework is that knowledge spillovers will take place and that synergies will be exploited, enhancing economic returns, reducing environmental depletion (by means of widespread of eco-innovations) and thus having a positive social and territorial impact.
Trade-offs: mixed +/- impacts on green economic spheres?	
Externalities: impact on other sectors / case studies	
Interactions with other factors	The knowledge barriers are mainly interrelated with the regulatory framework, because the latter may facilitate and foster the creation of networks at the regional level.

Causal level of operation (proximate/direct versus underlying/indirect factors)	Underlying / indirect Knowledge barriers are a factor hindering the widespread of eco-innovative developments but it is not a direct causality.
Spatial level of operation (internal versus external factors)	Internal Knowledge barriers are present and have an influence especially at regional level.
Type of market force involved	Supply-side factor
Policy recommendations: making the link between policy and non-policy factors	• Promote clusters. • Create knowledge exchange networks.
Possible indicators	• Existence of eco-innovation cluster.

Annex II.8. Transport sector

Energy price for transport

Description	The operating costs of vehicles for individual transport include three main elements: motor vehicle taxes and insurance cost, energy costs (including taxes on energy) and maintenance and repair costs. As oil-based energy is still the main source for cars and trucks, the development of world oil price is an important factor for the price of transport energy. The world oil price is subject to political and strategic decisions of the oil producing countries and enterprises with the consequence of frequent fluctuations of the price. However, the fluctuations of the world oil price are not directly reflected in the fuel price at the pump station; market elements are an important filter to dampen the price fluctuation. In times of oil peak and the raising consciousness that crude oil is a limited resource, it can be expected that the price for it will steadily rise in future. It has to be noted that the energy price for transport is not a clear non-policy green growth factor as energy for transport is subject to financial policies. If one decomposes the energy price, in many countries the tax component including energy and value added tax is as high or even higher than the pure energy cost component.
Specificity for the green economy	The cost of energy for all types of transport was for decades a factor that was almost neglected. The development of less dense settlement types, of urban sprawl, deurbanisation etc. was only possible because transport costs, in particular fuel costs for personal cars, did not play a major role in location decision. In the same line of arguments, the functional separation of the economy, eventually leading to globalisation, was only possible, because transport costs are a very minor part of the costs of a product. Low energy costs are therefore responsible for rising transport volumes. Rising transport energy costs would support all components of the avoid, shift and improve strategy. For personal travel, it would mean to reconsider the necessity for long-distance travel, it might shift trips to more sustainable modes of transport, i.e. it would reduce passenger km demand. However, it has been shown that the price elasticity of fuel demand is rather in-elastic if the price increases are rather moderate. It would also increase the demand for more energy-efficient cars. For goods transport, it would mean that transport costs would play a larger role in production costs. The relationship of the locations of production and markets would be reconsidered which might lead to production of goods more closely to markets. On the production side of the transport sector, rising energy prices for transport would accelerate the ongoing progress towards more energy-efficient vehicles. Technical potentials exist in the field of

	optimising existing and alternative engine systems and in the reduction of vehicle weights and the related downsizing of vehicles. It would also give a boost for innovations in collective travel.
Provable impact on the green economy spheres	**Economic: positive impact (+)** Steadily rising transport energy costs would give an impetus to the automotive industries to invest more in innovation and to develop energy-efficient vehicles and vehicles driven by alternative energy forms. **Environmental: positive impact (+)** Rising transport energy costs would have a positive impact on the environment. Decreasing transport volumes, more energy-efficient and less polluting cars would generate much less external costs of the transport system than today. **Social: neutral to negative impact (o +)** Rising transport energy prices would be at the disadvantage of less affluent population groups. It would put such groups at risk that they cannot fulfil their mobility demands. However, it can be expected that the efficiency gain of transport vehicles and the development of innovative forms of public and semi-public transport would offset such negative impacts. **Territorial: positive impact (+)** Rising transport energy prices would work in favour of more balanced and compact territorial developments. Local qualities and accessibility would matter again much more as factors for location decisions of households and firms. In addition, the external costs generated by the transport sector would be reduced which would also be of benefit for different territories.
Trade-offs: mixed +/- impacts on green economic spheres?	n/a
Externalities: impact on other sectors / case studies	There are strong impacts on other sectors of the economy. As transport is crucial for almost all economic activities, rising transport energy costs would lead to higher production costs of goods. This might have a negative impact on those sectors in the beginning, however, in the medium and long term this would lead to a reorientation of the spatial organisation of the economy and would work in favour of endogenous regional economic development.
Interactions with other factors	This factor has an impact on the factor behavioural change (see below)
Causal level of operation (proximate/direct versus underlying/indirect	Energy price is an indirect factor as its effectiveness is vial a longer and long-term impact chain

factors)	
Spatial level of operation (internal versus external factors)	The spatial level of operation is clearly external as it comes to regions from outside and can hardly be influenced there.
Type of market force involved	Rising transport energy prices is both a demand-side factor and a supply-side factor. At first, it influences transport demand, but in consequence it has a strong impact on the supply-side in the transport system.
Policy recommendations: making the link between policy and non-policy factors	As stated above, rising transport energy costs can be happen because of the world crude oil market and possible scarcity of resources (peak oil), but can also be introduced as a policy. Such a policy could be justified by the negative climate impacts of using fossil fuels. On the other hand, policies fostering R&D in the automotive sector for a more energy-efficient transport system, policies supporting alternative and innovative ways of collective transport would enhance the greening of the transport induced by the factor rising transport energy costs.
Possible indicators	Fuel price

Income and wealth growth

Description	At the micro level, the disposable income of households is a decisive for the way the household interacts with the transport system. In general, it can be said that with higher income the household tends to have more cars, to have cars with larger engine sizes and energy use, to travel longer distances and to use more often the airplane. This pattern is repeated at the macro level of society. The higher the GDP per capita in a given country the higher is for instance the motorisation rate in that country and also the freight transport volume.
Specificity for the green economy	One of the challenges for greening the transport sector is to decouple the relationship of wealth and higher transport volumes. If it would be possible to channel the income spending into clean transport, it could be one of the most important factors for the transformation towards the greening of the sector.
Provable impact on the green economy spheres	**Economic: positive impact (+)** Rising income probably leads to higher volumes spent for transport. **Environmental: negative to positive impact (- +)** If it is possible to channel the income spending into clean transport, the environmental impacts would be positive, if not, negative as in the past. **Social: positive impact (+)** Rising income and wealth levels should have a positive impact on all social groups. However, there is always the risk of social exclusion, i.e. groups of the society that take not part in such upswings. **Territorial: negative impact (-)** Rising income and wealth is often associated with sprawl of activities over the territory and increased land consumption.
Trade-offs: mixed +/- impacts on green economic spheres?	Rising income is in principle a boosting factor for the transport sector. However, if rising incomes cannot be guided into greener transport, it has negative side-effects on the environment. Negative territorial impacts in form of undesirable spatial development trends such as sprawl might happen with rising income regardless whether it leads to a greening of the transport sector or not.
Externalities: impact on other sectors / case studies	Rising income and wealth have a positive impact on most economic sectors. However, whether this is in favour of greening those sectors is subject to many other factors, in particular to the question whether behavioural change and a move towards more greener lifestyles might happen.
Interactions with	In order to safeguard the green impact of this factor, it probably has

other factors	to come along with the factor described next, the behavioural change of population. Otherwise, there is the risk that rising income would lead to a less green transport system, in particular driven by demand for stronger and less energy-efficient engines, long-distance air travel and overall rising transport volumes.
Causal level of operation (proximate/direct versus underlying/indirect factors)	Rising income and wealth works as an indirect factor.
Spatial level of operation (**internal versus external factors)**	Rising income and wealth is working from both sides, internal and external.
Type of market force involved	Rising income and wealth is a demand side factor as it enables population to increase demand.
Policy recommendations: making the link between policy and non-policy factors	Policies must be in place that guide rising income to invest in greening of the transport sector, i.e. in investing in energy-efficient vehicles, in travelling less and spend the money in the local markets etc.
Possible indicators	- Disposable income - GDP per capita (PPS)

Behavioural change

Description	The demand side of the transport sector is driven by the behaviour of the population with respect to the number of trips, the distances travelled, the transport mode used but also with respect to medium and long-term decisions such as the purchase of certain types of cars or other transport vehicles and the choice of places of activities, in particular choice of place of residence and work.
Specificity for the green economy	Behavioural change might come by a growing awareness of the society for the environment and global climate change. Behavioural change might also come from other motivations than environmental protection. There are for instance growing tendencies of urban or metropolitan lifestyles. A substantial number of that group does not care about owning a car, mobility demand is fulfilled by a variety of transport means ranging from walking via cycling to public transport or car sharing and car rent if necessary.
Provable impact on the green economy spheres	**Economic: neutral to positive impact (o +)** To assess the economic impact of behavioural change related to the transport sector is difficult. It can be expected that the effect is not too big or is depending on the magnitude of behavioural change mainly with respect to purchase of new vehicles. If it would lead to a clear shift in demand for clean cars, it might give an additional boost for the greener fraction of the automotive industry. **Environmental: positive impact (+)** The motivation of parts of the population that is changing behaviour is driven by having positive environmental impacts by doing this. **Social: neutral to positive impact (o +)** Social impacts might not exist or might be positive. **Territorial: positive impact (+)** This type of behavioural change will lead to more compact types of urban systems and less sprawl.
Trade-offs: mixed +/- impacts on green economic spheres?	n/a
Externalities: impact on other sectors / case studies	Behavioural change induced by environmental motivation will probably not be solely related to the transport sector, i.e. other sectors will see increasing demand for greener products.
Interactions with other factors	Behavioural change might be accelerated by the factor rising transport energy costs
Causal level of operation (proximate/direct versus	Behavioural change is working as a direct factor, i.e. demand for greener transport, but other effects will be more indirect through a longer impact chain, for instance via different location behaviour.

underlying/indirect factors)	
Spatial level of operation (**internal versus external factors)**	The spatial level of operation is internal as behavioural change comes from the residents of the regions.
Type of market force involved	Behavioural change is clearly a demand side factor
Policy recommendations: making the link between policy and non-policy factors	Policy has to provide the framework conditions for greening the transport sector as explained in other parts of the transport sector study so that behavioural change is possible much easier and will not only be done by a few people but will become a mass phenomenon.
Possible indicators	- Passenger km travelled - Modal split - Alternative vehicles

Annex II.9. Tourism sector

Destination planning and development strategies

Description	During the early phases of tourism, uncontrolled development of tourism facilities caused a range of impacts in for example the Mediterranean region and not all countries in Europe may yet have effective planning and development strategies and processes in place to efficiently control tourism development and/or improve problems from existing facilities. Destination planning and development strategies are described in the UNEP & UNWTO study (2012) as the first step towards the greening of tourism. In developing tourism strategies, local governments, communities and businesses need to establish mechanisms for coordinating with ministries responsible for the environment, energy, labour, agriculture, transport, health, finance, security and other relevant areas. Clear requirements are needed in such areas as zoning, protected areas, environmental rules and regulations, labour rules, agricultural standards and health requirements particularly related to energy, emissions, water, waste and sanitation. (UNEP & UNWTO, 2012).
Specificity for the green economy	Integrating sustainability measures and green initiatives into the plans and strategies of tourism development before construction can reduce consumption patterns (e.g. water, energy); impacts (e.g. waste, wastewater, GHG emissions, and prevent loss of functions (e.g. nature areas, biological diversity). Planning and development strategies are relevant at all levels from regional, local community to the individual development site.
Provable impact on the green economy spheres	Tourism destination planning and development strategies are a pre-requisite for concerted actions of green economy initiatives beyond the individual business level.
Trade-offs: mixed +/- impacts on green economic	+ impacts

spheres?	
Externalities: impact on other sectors / case studies	+ impacts, creates better coordination of initiatives across sectors
Interactions with other factors	Yes - Strategies of greening and comprehensive planning and strategies are cross-sectorial by nature
Causal level of operation (proximate/direct versus underlying/indirect factors)	Destination planning and development strategies provide a framework for initiatives of greening.
Spatial level of operation (internal versus external factors)	All - but particularly relevant at destination level
Type of market force involved	**n/a**
Policy recommendations: making the link between policy and non-policy factors	Inclusion of tourism destination planning and development strategies in the public planning systems at all levels. Including assessment of the existing conditions and setting goals of greening. The new European Tourism Indicator System for Sustainable destinations provides a toolkit to be used at destination level. Some aspects relate to the public tourism policies and strategies. However, the overall collection of the indicators is likely to be a public task.
Possible indicators	In the **European Tourism Indicator System for Sustainable destinations (DG Enterprise and Industry 2013)** almost all indicators have linkages to destination planning and development strategies. In some cases, the presence of a public policy is an indicator in itself: **A.1 Sustainable Tourism Public Policy** • A.1.1.Percentage of the destination with a sustainable tourism strategy/action plan, with agreed monitoring, development control and evaluation arrangement. (Core indicator).

	• *A1.1.1. Percentage of residents satisfied with their involvement and their influence in the planning and development of tourism (optional indicator)* • *A1.1.1. Percentage of the destination represented by a destination management organisation (optional indicator)* **C.4 Protecting and Enhancing Cultural Heritage, Local Identity and Assets** • C.4.1. Percentage of the destination covered by a policy or plan that protects cultural heritage (Core indicator).

Increasing tourism industry awareness and investments in greening of tourism

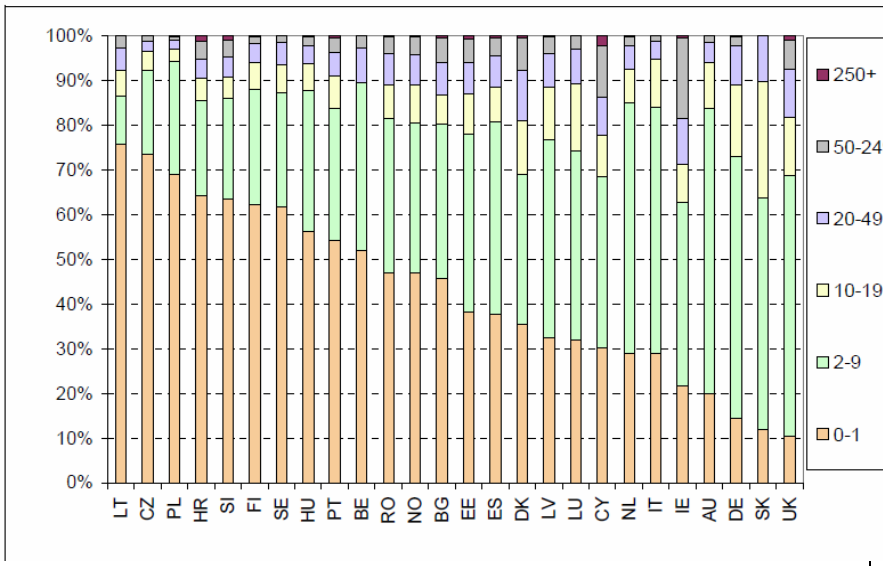
Description	The tourism sector involves a diverse range of actors. The awareness of green tourism and use of labelling and environmental management systems appears to have developed primarily in a selection of larger-scale firms (UNEP & UNWTO 2012). Possibly because they have resources to invest and obtain large savings from improved environmental performances. Tourism is however dominated by small and medium-sized enterprises (SMEs) and microenterprises, and much of the potential for greening of tourism is found here (UNEP & UNWTO 2012: viii). As seen in ***figure 1***, on average over 80% of the approx. 280.000 tourism enterprises in the EU 27 are micro-enterprises (0-9 employees) and around 40-50 % of the microenterprises are very small with only 0-1 employee. 

	Figure 1: Size (number of employees) distribution of accommodation enterprises in the EU-27, by number of Enterprises. Based on EUROSTAT 2012 - data from 2008. (Source: JRC report 2012:56)
	But often **SMEs and microenterprises lack the know-how and the skills to get information, funding and training for the greening of their business or development of new, green products**. The SMEs' and microenterprises' single greatest limiting factor for greening, however, is lack of access to capital.
	In analysing the greening of the tourism industry, UNEP and UNWTO (2012) conclude that the private sector, especially small firms, can, and must be mobilized to support green tourism. While large scale firms more often engage in greening, there is a **lower awareness among SMEs and microenterprises** so specific **mechanisms and tools to educate small and medium-sized tourism related enterprises** are critical (UNEP and UNWTO, 2012). Tools such as the use of recognized standards for sustainable tourism, such as the Global Sustainable Tourism Criteria (GSTC), can help businesses improve sustainability performance, including resource efficiency, and assist in attracting additional investment and customers. (for more tools se policy recommendation factor later in this table)
	Furthermore, it is concluded that **much of the economic potential for green tourism is found in small and medium-sized enterprises (SMEs)**, which need better access to financing for investing in green tourism. Governments and international organizations can facilitate the financial flow to these important actors with an emphasis on contributions to the local economy and poverty reduction. Public-private partnerships can spread the costs and risks of large green tourism investments. Besides reducing administrative fees and offering favorable interest rates for green tourism projects, in-kind support such as technical, marketing or business administration assistance, could also help.
	Further conclusions are that **investing in the greening of tourism can reduce the cost of energy, water and waste and enhance the value of biodiversity, ecosystems and cultural heritage.** Investment in energy efficiency has been found to generate significant returns within a short payback period. Improving waste management is expected to save money for tourism businesses, create jobs and enhance the attractiveness of destinations.
	The UNEP & UNWTO study also predict future tourism growth in different scenarios. Conclusions are that under a green economy investment scenario, tourism makes a larger contribution to GDP growth, while significant environmental benefits include reductions in water consumption (18%), energy use (44%) and CO2 emissions (52%),

	compared with the BAU (Business as Usual) scenario).
Specificity for the green economy	Greening of tourism enterprises is contributing directly to the green economy Tourism development is substantial and raising the awareness and investment in green tourism will contribute to the green economy. The UNEP & UNWTO study of greening of tourism suggest that governments can use tax concessions and subsidies to encourage private investment in green tourism. Time-bound subsidies can be given, for example, on the purchase of equipment or technology that reduces waste, encourages energy and water efficiency, the conservation of biodiversity and the strengthening of linkages with local businesses and community organisations. At the same time, resource and energy use as well as waste generation need to be correctly priced to reflect their true cost to society.)
Provable impact on the green economy spheres	Greening of tourism enterprises has great potential to positively impact the green economy. The tourism industry includes 1.8 million enterprises in the EU27 of which 280.000 enterprises are in the accommodation sector. The UNEP & UNWTO study (2012) analyses greening of the tourism sector and concludes that the business case for investing in these areas is sound and that the majority of tourism businesses primarily SMEs and microenterprises have potential to generate greater income and opportunity from green strategies. In short, greening will have both positive environmental, economic and social effects in the tourism sector.
Trade-offs: mixed +/- impacts on green economic spheres?	Only +
Externalities: impact on other sectors / case studies	Greening of tourism enterprises will affect sectors such as water, energy, waste handling and wastewater treatment as well as building constructions). The different labelling schemes for tourism facilities such as the EU Flower, Green Key, Nordic Swan and similar international schemes are in dialog with the enterprises and can indicate the effects of greening.

	Also EMAS is relevant. Case studies of relevance could be existing examples of green accommodation facilities – for example the CO2 neutral Crowne Plaza Copenhagen Towers utilising a range of technologies. Accor Hotels in the UK has experiences in water saving technologies. TUI Hotels and Resorts have experiences with different energy technologies. (More examples can be included) When the new European Tourism Indicator System Toolkit for Sustainable destinations (DG Enterprise and Industry 2013) starts to be tested/ implemented, valuable results may arise if case studies are undertaken.
Interactions with other factors	The initiatives taken in greening the tourism sector – with a focus on SMEs and microenterprises in the destinations are interrelated to several other factors: • Building and construction – a higher demand for more green construction materials and processes. • Water – lower consumption and better water management (storage facilities, water saving devices, fewer swimming pools & golf courses) • Waste – lower waste generation. • Wastewater - better treatment systems and hereby reduced discharge to the environment. • Agriculture – increased use of local and organic products in tourism. • Energy – less consumption and increased demand for environmentally friendly energy technologies. • Biodiversity – increased interest in protection.
Causal level of operation (proximate/direct versus underlying/indirect factors)	Direct
Spatial level of operation (internal versus external factors)	All levels

Type of market force involved	Tourism is a highly competitive business based on demand and the demand for green tourist products and facilities is currently only by a smaller segment. The greening of tourism is also not supply-driven to any large extent, as most small enterprises lack awareness, knowledge, time and funding to get involved. It is seen as a public governmental task to stimulate and facilitate the green economy transition of the supplier of tourism. European Union (EU) funds are available from several sources including structural funds and research projects.
Policy recommendations: making the link between policy and non-policy factors	The UN & UNWTO (2012) study points out that the high number of SMEs and microenterprises is a challenge and 'reaching out to such a wide variety of small businesses, across numerous sectors, continents and languages is a daunting task. Without **information, knowledge and tools**, greening will be nearly impossible. Nonetheless, engaging these critical actors is a necessary condition for a sustainable industry.' (UN & UNWTO 2012:56) The ITF-STD (2009) recommends that 'tourism businesses and government institutions in charge of tourism should **adopt innovative and appropriate technology** to improve the efficiency of resource use (notably energy and water), minimize emissions of greenhouse gases (GHG) and the production of waste, while protecting biodiversity, helping reduce poverty and creating growth and sustainable development conditions for local communities'. The UN & UNWTO (2012) study points to a range of **enabling conditions for engaging the industry:** 1) Tourism industry associations and wider industry platforms play an important role in **engaging tourism businesses in sustainability** as well as developing **practical tools** to respond to many common challenges. The tools mentioned include **Corporate Social Responsibility** and measures such as **triple bottom line reporting, environmental management systems** and **certification**. Furthermore, experience in many countries has shown that **concrete mechanisms and tools to educate SMEs** are critical, but are most effective when they are accompanied by concrete, actionable items. 2) That various international institutions engage in informing, educating and working collaboratively with the tourism industry to **integrate sustainability into policies and management practices**, and secure their **active participation** in developing sustainable tourism. At the national level, government and civil society engagement should be a critical part of these efforts to

	coordinate action. 3) An **increased use of industry-oriented decision support tools** would help speed the adoption of green practices. European examples include Hotel Energy Solutions, TourBench and SUTOUR. These tools provide assistance to tourism enterprises to identify potential investments and cost saving opportunities for sustainable decision making to ensure profitability and competitiveness. 4) **Bringing together disparate stakeholders in the tourism sector** in a **co-ordinated strategy to lead them towards a common goal.** Destination Management Organisations (DMOs) may expand their role from marketing and become a **strategic leader in destination development and management** and ensure a coordinated and well-directed effort in providing the widest possible range of support services to tourism SME's. 5) The promotion and widespread use of **internationally recognized standards for sustainable tourism** can provide support to monitor tourism business operations and management. The private sector tends to perform best when clear criteria, objectives and targets can be identified and incorporated into their investment plans and business operations. The **Global Sustainable Tourism Criteria (GSTC)**, from 2008 provides the most promising current platform to begin the process. Also, **standardised labels** can enhance sustainability and allow consumers to make informed choices. In addition to the mentioned awareness raising initiatives, knowledge, networking, and standardization activities a key aspect appears to be financial support. The UN & UNWTO study (2012:61) points out a number of enablers: **Enabling conditions for finance** 1) The single greatest limiting factor for SMEs in moving toward greener tourism is lack of access to capital for this type of investments. **Green investments must be seen as value-added investment** and made on their economic and financial merits, without prejudice. This will **require greater private sector awareness** of the value of green investment, and also policy coordination with Ministries of Finance and regulatory authorities. 2) **Regional funds for local tourism development** may help overcome financial barriers for green investments where investments also generate public returns (through positive externalities). Foreign direct investment (FDI), private equity, portfolio investment, and other potential funding sources

	should be also aligned with sustainable projects and strategies for the tourism industry. 3) **Mainstream sustainability into tourism development investments and financing**. In this regard, the **Sustainable Investment and Finance in Tourism (SIFT) network** is working to integrate the expectations of private investors, the leveraged strength of the financing and donor community, and the needs of developing destinations. The SIFT Network aims to establish a **common, voluntary standard to en-courage greater sustainability in tourism investments** by public, private and multilateral investors; **intensify financing of sustainable tourism projects; increase sustainable investments in the tourism sector; improve capacity of developing destinations; and leverage unique knowledge and reach others**. SIFT efforts should permeate to regional, national and local financial organizations (counterparts), and help integrate other global sustainable financial initiatives (for example UNEP-FI, Equator Principles) to support green investments in tourism. 4) **Establish partnership approaches to spread the costs and risks of funding sustainable tourism investments**. In the case of small and medium enterprises, for example, besides sliding fees and **favourable interest rates** for sustainability projects, **in-kind support** like technical, marketing or business administration assistance, could help to offset the cash requirements of firms by offering them services at low cost. In addition, loans and loan guarantees could include more favourable grace periods before the onset of payments, no personal asset guarantees, longer repayment periods, or even reduction of loan amount for prompt payments. Loans for sustainable tourism projects could be set up with guarantees from aid agencies and private businesses, lowering risk and interest rates. To become interested, the many SMEs and microenterprises need to see obvious and immediate benefits from greening and initiatives such as free consulting service on environmental improvement options neutral of business interests and simplified funding schemes that allow for immediate benefits and short payback time. Experience from successful implementation of greening at small scale outside the tourism sector may provide inspiration.
Possible indicators	Based on the European Tourism Indicator System for Sustainable destinations (DG Enterprise and Industry 2013): **A.2 Sustainable Tourism Management in Tourism Enterprises** A.2.1 Percentage of tourism enterprises/establishments in the destination using a voluntary verified certification/labelling for environmental/quality/sustainability and/or CSR measures (Core

	indicator). *A.2.1.1. Number of tourism enterprises/establishments with sustainability reports in accordance with the Global Reporting Initiative (GRI) (optional indicator)* **D.2 Climate Change** Percentage of tourism enterprises involved in climate change mitigation schemes—such as: CO2 offset, low energy systems, etc.—and "adaptation" responses and actions (core indicator) *D.2.1.1. Percentage of the destination included in climate change adaptation strategy or planning (optional indicator)* *D.2.1.2. Percentage of tourism accommodation and attraction infrastructure located in "vulnerable zones" (optional indicator)* **D.3. Solid waste management** D.3.1. Waste volume produced by destination (tonnes per resident per year or per month) (core indicator) *D.3.1.1. Percentage of tourism enterprises separating different types of waste (optional indicator).* D.3.2. Volume of waste recycled (percent or per resident per year) (core indicator) **D.4 Sewage Treatment** D.4.1. Percentage of sewage from the destination treated to at least secondary level prior to discharge (core indicator) *D.4.1.1.Percentage of commercial accommodation connected to central sewage system and/or employing tertiary sewage treatment (optional indicator)* **D.5 Water Management** D.5.1. Fresh water consumption per tourist night compared to general population water consumption per person night (core indicator). *D.5.1.1 Percentage of tourism enterprises with low-flow shower heads and taps and/or dual flush toilets/waterless urinals (optional indicator).* *D.5.1.2 Percentage of tourism enterprises using recycled water (optional indicator)* *D.5.1.2 Percentage of water use derived from recycled water in the destination (optional indicator)* **D.6 Energy Usage** D.6.1. Energy consumption per tourist night compared to general population energy consumption per person night (core indicator). *D.6.1.1 Percentage of tourism enterprises that have switched to low-energy lighting (optional indicator).* *D.6.1.1 Annual amount of energy consumed from renewable sources (Mwh) as a percentage of overall energy consumption (optional indicator).*

Government provision and investment in public goods and services

Description	Government spending on basic public goods and services such as water conservation, waste management, sanitation, public transport and renewable energy infrastructure, protected areas, and cultural assets can reduce the cost of green investments by the private sector in green tourism. The provision of these basic services is not only related to tourism but also benefits local residents and other businesses and community functions. Government investment in measures to reduces consumption and discharges to the environment may also save the cost of new infrastructure investments. Several of these public goods and services tend to be of higher standards in northern European countries (for example the treatment of wastewater) than in southern European regions. As the primary tourism flows are from the north to the south of Europe, the impact of a tourist night tends to be higher in the south (for example more discharge of wastewater BOD5 to the environment). The seasonality of tourism creates periods of high pressure on the public infrastructure and the capacities need to be dimensioned for high season use. Investment in higher level treatment technologies (e.g. tertiary treatment of wastewater can limit the discharge of pollutants into the sea and reduce the risk of algae blooms and depletion of the marine ecosystem. The sea is a key asset/resource for the tourism industry – in particular the large 'sea, sand, and sun segment'. Deterioration of the water quality can have severe economic consequences for the tourism industry. Public investments in highly efficient wastewater facilities would not only benefit tourism but the whole community, biodiversity, etc. Altogether, the provision of and investments in high quality public goods and services is important to the tourism industry and the community in general and may greatly reduce the environmental pressure in many popular tourist regions.

	This reduces the green investment needs in tourism business which can then allocate resources to further green investments at the facility level (e.g. water saving devices, photo voltaic energy …. And other investments more suitable to improve the greening of individual tourism facilities.
Specificity for the green economy	Government provision and investment in public goods and services are likely to be supportive of the green economy – both directly when developing new facilities and indirectly by providing a supportive green community frame which lets the enterprises focus on greening of their own facilities.
Provable impact on the green economy spheres	Improving and upgrading public infrastructure, goods and services will involve a greening in itself, but also sets the frame for enterprises not to have to address these individually (e.g. if the community energy supply is already from renewables, they do not need to establish their own system and can focus on reducing consumption). The UNEP & UNWTO study (2008) concludes that the investment requirement in conservation and restoration is small relative to the value of different nature areas incl. coastal zones, which provide ecosystem services essential for the foundation of economic activities and for human survival; the value of ecosystems for tourists remains undervalued in many cases. Investment in cultural heritage – the largest single component of consumer demand for sustainable tourism – is among the most significant and usually profitable investments.
Trade-offs: mixed +/- impacts on green economic spheres?	Only +
Externalities: impact on other sectors / case studies	Impact is cross-sectorial by providing a better framework for a number of greening processes.
Interactions with other factors	Improvements of the public infrastructure, goods and services provide a better framework that can reduce the cost of green investments for several factors (depending on the type of improvements).

Causal level of operation (proximate/direct versus underlying/indirect factors)	Underlying/ indirect
Spatial level of operation (internal versus external factors)	
Type of market force involved	Public investments
Policy recommendations: making the link between policy and non-policy factors	Public investments in high standard infrastructure, goods and services that provide a supportive collective frame for greening of tourism and other sectors. Hereby individual enterprises can focus on internal greening.
Possible indicators	Based on the European Tourism Indicator System for Sustainable destinations (DG Enterprise and Industry 2013): **D.1 Reducing Transport Impact** D.1.1.1. Percentage of visitors using local/soft mobility/public transport services to get around the destination (optional indicator) **D.2 Climate Change** D.2.1. Percentage of tourism enterprises involved in climate change mitigation schemes—such as: CO2 offset, low energy systems, etc.—and "adaptation" responses and actions (core indicator) *D.2.1.1. Percentage of the destination included in climate change adaptation strategy or planning (optional indicator)* *D.2.1.2. Percentage of tourism accommodation and attraction infrastructure located in "vulnerable zones" (optional indicator)* **D.3. Solid waste management** D.3.1. Waste volume produced by destination (tonnes per resident per year or per month) (core indicator) *D.3.1.1. Percentage of tourism enterprises separating different types of waste (optional indicator).* D.3.2. Volume of waste recycled (percent or per resident per year) (core indicator)

	D.4 Sewage Treatment D.4.1. Percentage of sewage from the destination treated to at least secondary level prior to discharge (core indicator) *D.4.1.1.Percentage of commercial accommodation connected to central sewage system and/or employing tertiary sewage treatment (optional indicator)* **D.5 Water Management** D.5.1. Fresh water consumption per tourist night compared to general population water consumption per person night (core indicator). *D.5.1.1 Percentage of tourism enterprises with low-flow shower heads and taps and/or dual flush toilets/waterless urinals (optional indicator).* *D.5.1.2 Percentage of tourism enterprises using recycled water (optional indicator)* *D.5.1.2 Percentage of water use derived from recycled water in the destination (optional indicator)* **D.6 Energy Usage** D.6.1. Energy consumption per tourist night compared to general population energy consumption per person night (core indicator). *D.6.1.1 Percentage of tourism enterprises that have switched to low-energy lighting (optional indicator).* *D.6.1.1 Annual amount of energy consumed from renewable sources (Mwh) as a percentage of overall energy consumption (optional indicator).* **D.7 Landscape and Biodiversity Protection** D.7.1. Percentage of destination (area in km2) that is designated for protection (core indicator) *D.7.1.1. Percentage of local enterprises in the tourism sector actively supporting protection, conservation, and management of local biodiversity and landscapes (optional indicator).* *D.7.1.2. Percentage of destination covered by a biodiversity management and monitoring plan (optional indicator).* **D.8 Light and Noise Management** D.8.1. The destination has policies in place that require tourism enterprises to minimise light and noise pollution (core indicator). *D.8.1.1. Percentage of the destination and percentage of population covered by local strategy and/or plans to reduce noise and light pollution (optional indicator).* **D.9 Bathing Water Quality** D.9.1. Level of contamination per 100 ml (faecal coliforms, campylobacter) (core indicator). *D.9.1.1. Number of days beach/shore closed due to contamination (optional indicator).*

Consumer awareness and changing demands

Description	Tourism is demand driven and the UNEP & UNWTO study (2012: viii) concludes that 'tourists are demanding the greening of tourism. More than a third of travellers are found to favor environmentally-friendly tourism and be willing to pay between 2 and 40% more for this experience. Traditional mass tourism has reached a stage of steady growth. In contrast, ecotourism, nature, heritage, cultural and "soft adventure" tourism are taking the lead and are predicted to grow rapidly over the next two decades. It is estimated that global spending on ecotourism is increasing at a higher rate than the industry-wide average growth.' Although the demand for more environmentally friendly products such as ecotourism is growing, these are niche products in a very large market. The average consumers tend not to be very aware of the impacts caused by tourism. Among the consumers, going on a holiday is often associated with a break from the daily routines and engaging in more care-free behaviours and excess consumptions. Increasing the consumer awareness and changing demand toward more green/environmentally sound types of tourism will require substantial efforts and greening is not specifically consumer-driven. Also, awareness does not necessarily turn into actions. An overall push for greening of the bulk of the tourism industry is likely to have to come from the public sector (EU, national governments etc.) as also the tourism enterprises have a limited awareness and problems with funding of greening initiatives.
Specificity for the green economy	Raising consumer awareness also of tourists is highly relevant in relation to the green economy. Particularly changing demands of transport towards greener modes is relevant.
Provable impact on the green economy spheres	Consumer awareness of greening (all sectors) is highly relevant as it may lead to changes in demand for more green products and services. For tourism sector, this is particularly linked to more environmentally friendly transport and to the use of greener accommodation and services in the destination.

Trade-offs: mixed +/- impacts on green economic spheres?	+ Positive
Externalities: impact on other sectors / case studies	+ Positive
Interactions with other factors	Increasing consumer awareness in tourism and associated changes in demand is linked to transport, energy, water, waste, wastewater, building, biodiversity and agriculture.
Causal level of operation (proximate/direct versus underlying/indirect factors)	Increased consumer awareness and related changes in demand for more green products and services among tourists is likely to have a direct impact.
Spatial level of operation (**internal versus external factors)**	All levels – particularly related to destinations
Type of market force involved	Awareness raising is a voluntary process not directly associated with marked forces. But market forces may influence the transformation of awareness into changes in demand (e.g. if the greener travel alternatives are prized much higher).
Policy recommendations: making the link between policy and non-policy factors	Stimulate the inclusion of 'greening of tourism' in national, regional and local tourism policies. Awareness campaigns towards tourists and stimulating the tourism industry to provide more green tourism products to consumers. Promote the use of the European Tourism Indicator System for Sustainable destinations, establish data collection procedures (for example of key greening factors along with the Tourism Satellite Account reporting already in place), benchmarking destinations and eventually making the results available to tourists, so they can evaluate the green performance of the destinations.

	(see transport theme for policies that can change increase consumer awareness and associated transport patterns – particularly reduce aviation (e.g. convert short flights to rail/coach), increase consumer interest in greener cars. Initiatives to raise awareness of the highly polluting cruise ships and the impacts of flight/cruise combinations.
Possible indicators	Based on the European Tourism Indicator System for Sustainable destinations (DG Enterprise and Industry 2013): **A.4 Information and Communication** A.4.1 The percentage of visitors who note that they are aware of destination sustainability efforts (Core indicator) *A.4.1.1.The percentage of businesses that communicate their sustainability efforts to visitors in their products, marketing, or branding (optional indicator).* **D.1 Reducing Transport Impact** D.1.1. Percentage of tourists and same day visitors using different modes of transport to arrive at the destination (public/private and type) (core indicator) *D.1.1.1. Percentage of visitors using local/soft mobility/public transport services to get around the destination (optional indicator).* D.1.2. Average travel (km) by tourists to and from home or average travel (km) from the previous destination to the current destination (core indicator) *D. 1.2.1. Average travel (km) by same day visitors from and to destination (optional indicator).*

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