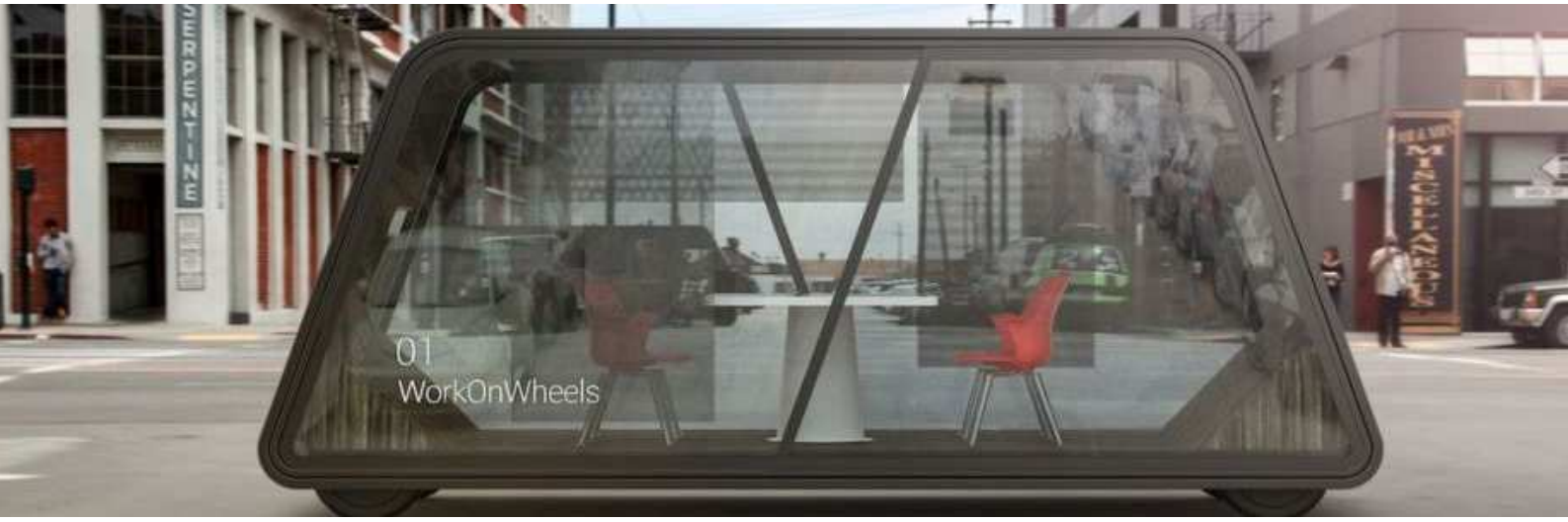
ESPON
EUROPEAN UNION
Co-financed by the European Regional Development Fund

POSSIBLE EUROPEAN TERRITORIAL FUTURES

2nd Expert consultation on Key Foresight Topics

Synthesis of Results



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"POSSIBLE EUROPEAN TERRITORIAL FUTURES" project coordinated by Spatial Foresight. Financed by ESPON 2020 Programme.
Barcelona, February 2017

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1 Introduction

1.1 Aim & Scope

This is the second expert consultation brought forward by the **ESPON 2020 Possible European Territorial Futures** project.

Previously, another consultation was performed between November 7th and November 22nd. A full report with results of the 1st consultation is available at http://project.espon.eu/esponfutures/.

The current consultation has further developped the three foresight topics already proposed in the 1st survey, this time developping each on of them in a separated survey.

- a place based economic organisation as part of a circular economy
- a 100% renewable energy production and consumption
- a collapse of European property markets

Participants were requested to express their own opinion in relation to the implications of the proposed 2030 thematic Visions, based on selected indicators and for particular types of territories.

The survey remained open for input from participants between January 23th and February 6th. During this period 160 experts participated. It was mostly disseminated to the European planning institution and scientific community.

Respondents of the three surveys were mainly researchers and accademics (47%), but also consultants (27%), civil servants (11%), policy makers (8%) and industry members (6%).

In relation to the scope of the expert's professional work, 38% stated to be professionaly engaged at local or regional level (38%), 16% worked at the level of Member States, 33% at European level and 13% at Global level.

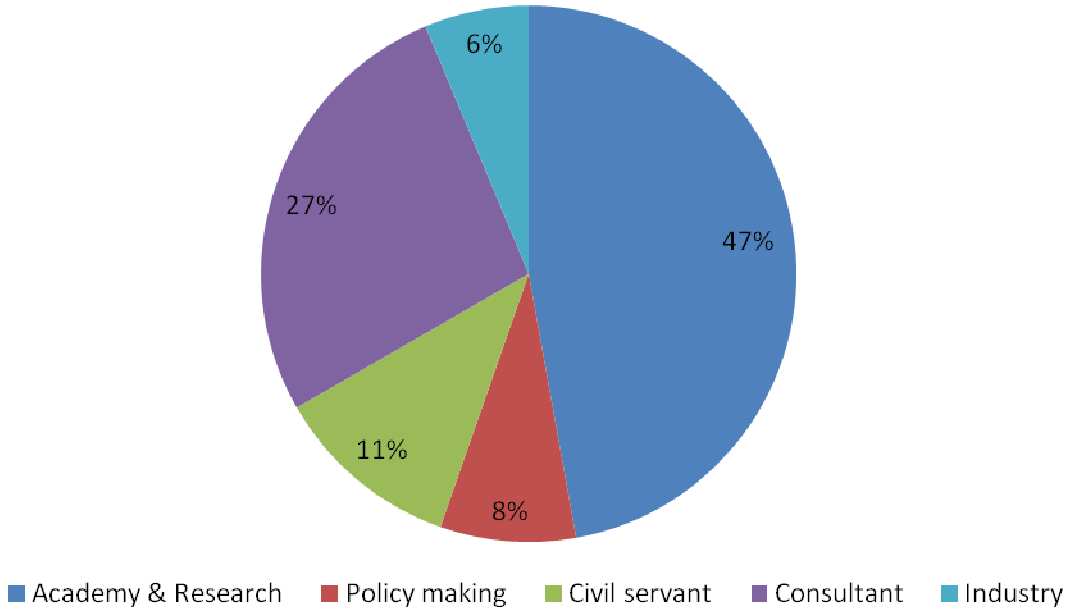


Figure 1. Professional background of participants

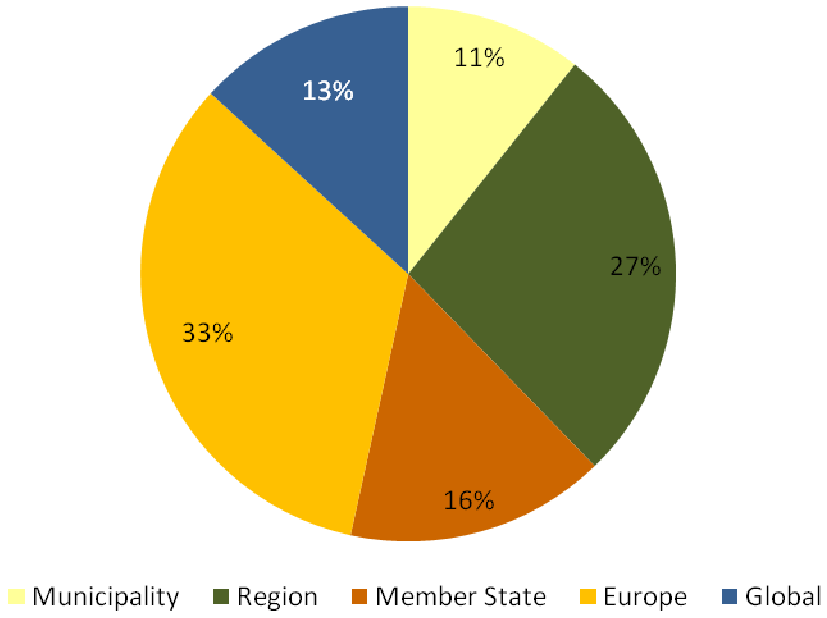


Figure 2. Territorial scope of expert's professional work

The consultation participants have mainly been from Europe. United Kingdom, Italy, Germany, Netherlands, Belgium, Poland, Spain or Austria are the countries where more members of institutions participited. These participants are from cities like London, Milan, Brussels, Barcelona, Wien, Copenhagen, Stockholm, Bratislava o Bucharest.

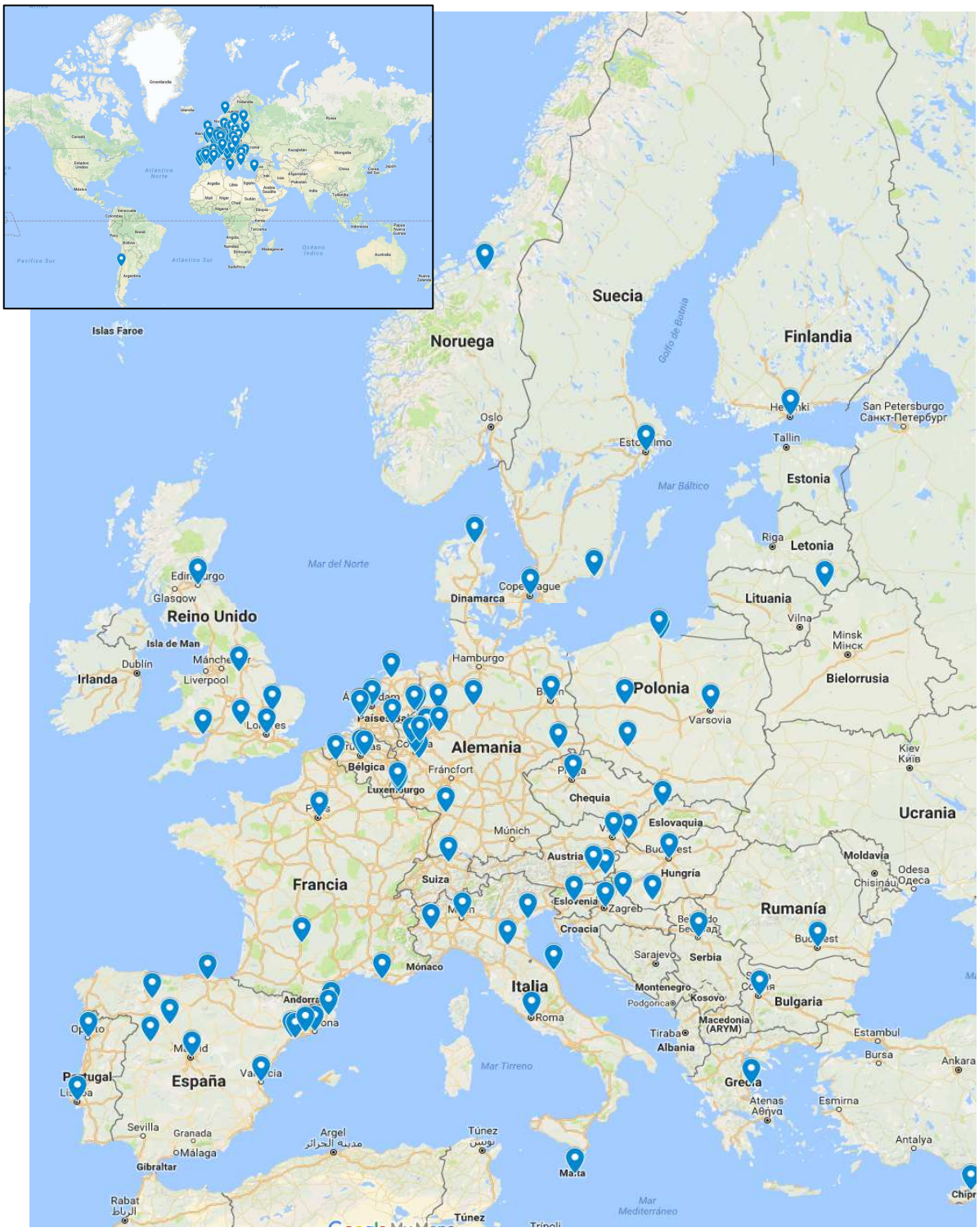


Figure 3. Geographic location of participants of the ESPON 2020 Possible Territorial Futures expert consultation

1.2 List of Participants

160 experts participated from 122 insititutions in the Possible European Territorial Futures on three foresight topics selected. The participants represented the following institutions.

Institution
Aalborg University
Abertis Infraestructuras Barcelona
Adam Mickiewicz University, Poznań
AEBR - Association of European Border Regions, Gronau
Agenzia delle Entrate, Roma
Ajuntament de Vilafranca del Penedès
AKI, Budapest
Applied Economics, Copenhagen
ARC Consulting, Kraków
Aridos Hermanos Curanta S.A., Girona
ARL, Hannover
ARPAE Emilia-Romagna
Association of Civil Engineers, Barcelona
ATM Camp de Tarragona
Austrian Academy of Sciences
Barcelona Chamber of Commerce
Basque Centre for Cliamte Change
BLAPPU, Barcelona
Boverket, Karlskrona
Cardiff University
Centre for Urban and Territorial Development, Bucharest
CETRA - Centre fro Transport Research, University of Zilina
Circle Economy, Amsterdam
City of Bratislava
City of Ljubljaan
Crowdsourced-transport, Vienna
Dep. of Logistics, Faculty of Economics, Univ. of Gdansk, Poland
Department of Human Geography, Stockholm
Department of Town Planning and Housing, Ministry of Interior, Nicosia
Diputació de Barcelona
Ecologie Industrielle Conseil, Paris
EPI - Economic Policy Institut, Sofia
ESPON EGTC, Luxembourg
ETH, Zürich
Ethica Ltd, Helsinki
EVG, Berlin
Faculty of Architecture CTU, Prague
Federal Institute for Less-Favoured and Mountainous Areas (BABF), Vienna
Federal Institute for Research on Building, Urban Affairs and Spatial Development (BBSR), Bonn
Ferrocarrils de la Generalitat de Catalunya
FIRA BARCELONA

Institution
Főmterv Zrt, Budapest
Future Impacts, Cologne
Futures Platform Ltd, Helsinki
GENERA - Consens per al Desenvolupament Responsable, Barcelona
Generalitat de Catalunya
Géphyres, Roubaix
Gmp - Enfoque Patrimonialista, Madrid
GWS mbH, Osnabrück
I2cat, Barcelona
IAUS - Institute of Architecture and Urban&Spatial Planning of Serbia, Belgrade
ICM-CSIC, Valladolid
IGOT, Lisboa
ILS, Dortmund
Imperial College - Centre for Transport Studies, London
Institute for Spatial Planning of the Koprivnica-Križevci county, Koprivnica
International Union of Tenants (IUT), Brussels
ISMERI EUROPA, Roma
IVL - Swedish Environmental Insitute Ltd, Stockholm
JOANNEUM RESEARCH, Graz
Karlsruhe Institute of Technology (KIT), Karlsruhe
Latvian Academy of Agricultural and Forestry Sciences, Daugavpils
Leibniz Institute of Ecological Urban and Regional Development, Dresden
Lisbon City Council
Lombardy Region, Milan
Loop Connections, Edinburgh
MCR SA, Barcelona
MCRIT, Barcelona
MDDI, Luxembourg
Moving mood, Barcelona
MZKZG Gdansk, Gdansk
National Scientific Research Institute for Labor and Social Protection - INCSMPS, Bucharest
Norte Portugal Coordination and Development Commission, Porto
Nortern Netherlands - Province of Friesland, Leeuwarden
ÖAR Regionalberatung GmbH, Fehring
Office of the Government of SR, Bratislava
OIR GmbH, Vienna
Politecnico di Milano
Politecnico di Torino
Pontificia Universidad Catolica de Chile
Radboud University, Nijmegen
Ramon Hereter, Barcelona
Region Emilia-Romagna, Bologna
Regione Lombardia, Milan
Salto con Red, Barcelona
Sderty, Gdansk

Institution
SINTEF, Trondheim
Som energia, Girona
Spatial Development Department Flanders, Brussels
Spatial Foresight, Heisdorf
Spiekermann & Wegener Urban and Regional Research, Dortmund
Stockholm County Council - Regional planning administration, Stockholm
Stockholm University
Swedish Agency for Economic and Regional Gorwth, Stockholm
t33, Ancona
Technopolis Group, Paris
TNO, The Hague
TU Delft
TU Wien
Universidad de Valladolid
Universitat Politècnica de Catalunya, Barcelona
University of Amsterdam
University of Cambridge
University of Greenwich, London
University of León
University of Malta, Zejtun
University of Pécs, Pécs
University of Salamanca
University of Sheffield
University of Thessaly
University of Twente
University of Valencia
University Politehnica of Bucharest - Faculty of Transport
Univsersity of Zagreb - Faculty of Science
URBAN- INCERC, Bucharest
VELTHA ivzw, Tervuren
Vienna University of Economics and Business
Vogelij, Soest
Warsaw School of Economics, Warsaw
Wrocław University of Science and Technology, Wroclaw
Wuppertal Institut, Wuppertal,
Z_punkt GmbH, Berlin

1.3 Design of the expert survey

The consultation was composed by three surveys on circular economy, 100% renewable energy and property markets respectively.

A general 2030 Vision was first introduced for each topic. Then a number of specific statements related to the future implications of this Vision on different societal dimensions was proposed. For each dimension, possible impacts where presented for two different kinds of territories.

Participants were requested to express their impressions in relation to these territories, with predefined options. Additionally, participants were allowed to provide qualitative insights.

Next figure shows an example page of the survey.

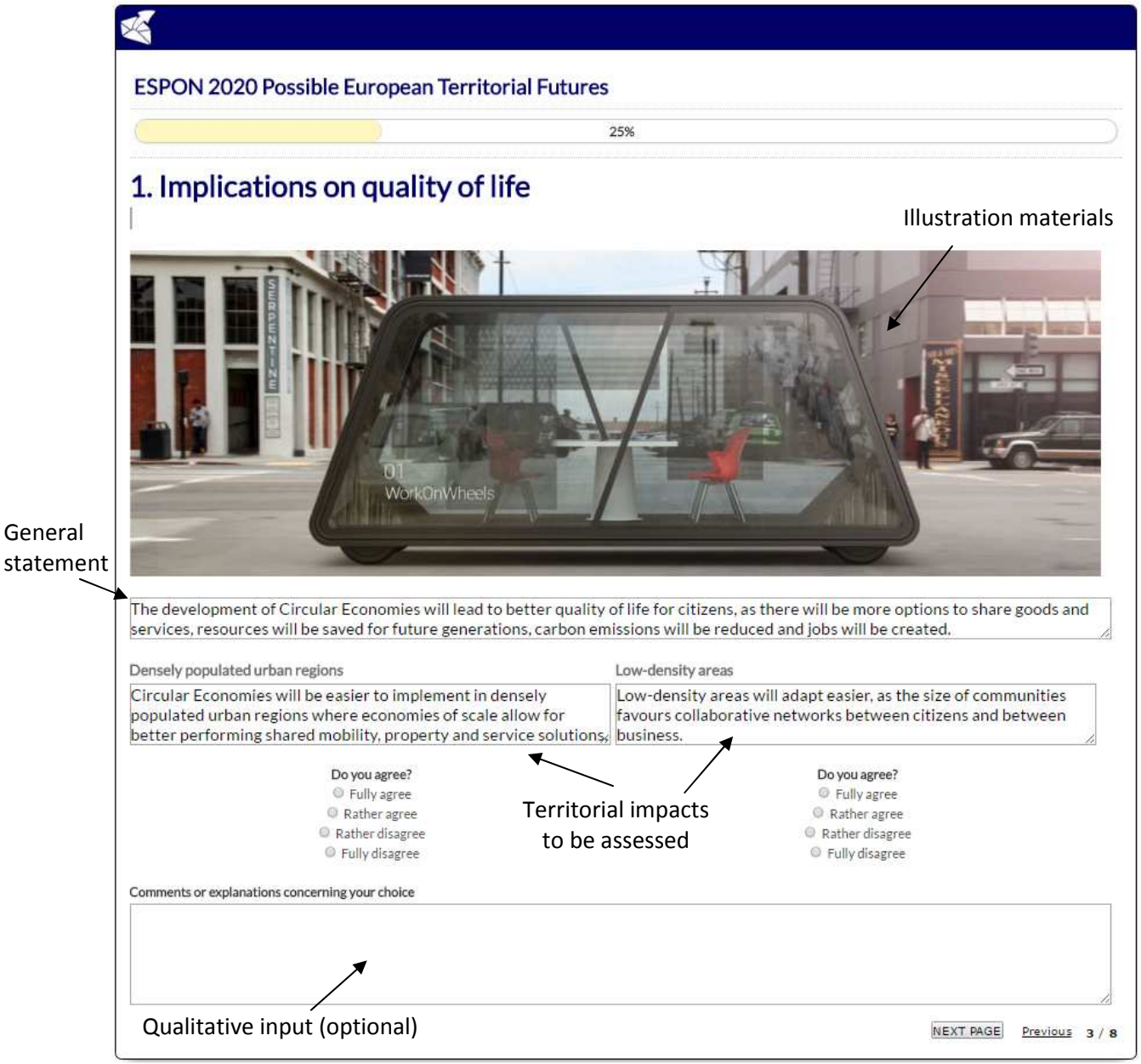


Figure 4. Example of a question of the ESPON 2020 Possible Territorial Futures expert consultation

2 Synthesis of Results

Next, the main results of the consultation are presented in graphs, one for each foresight topic. They show up the territorial areas that may be more impacted from each of the proposed 2030 Visions.

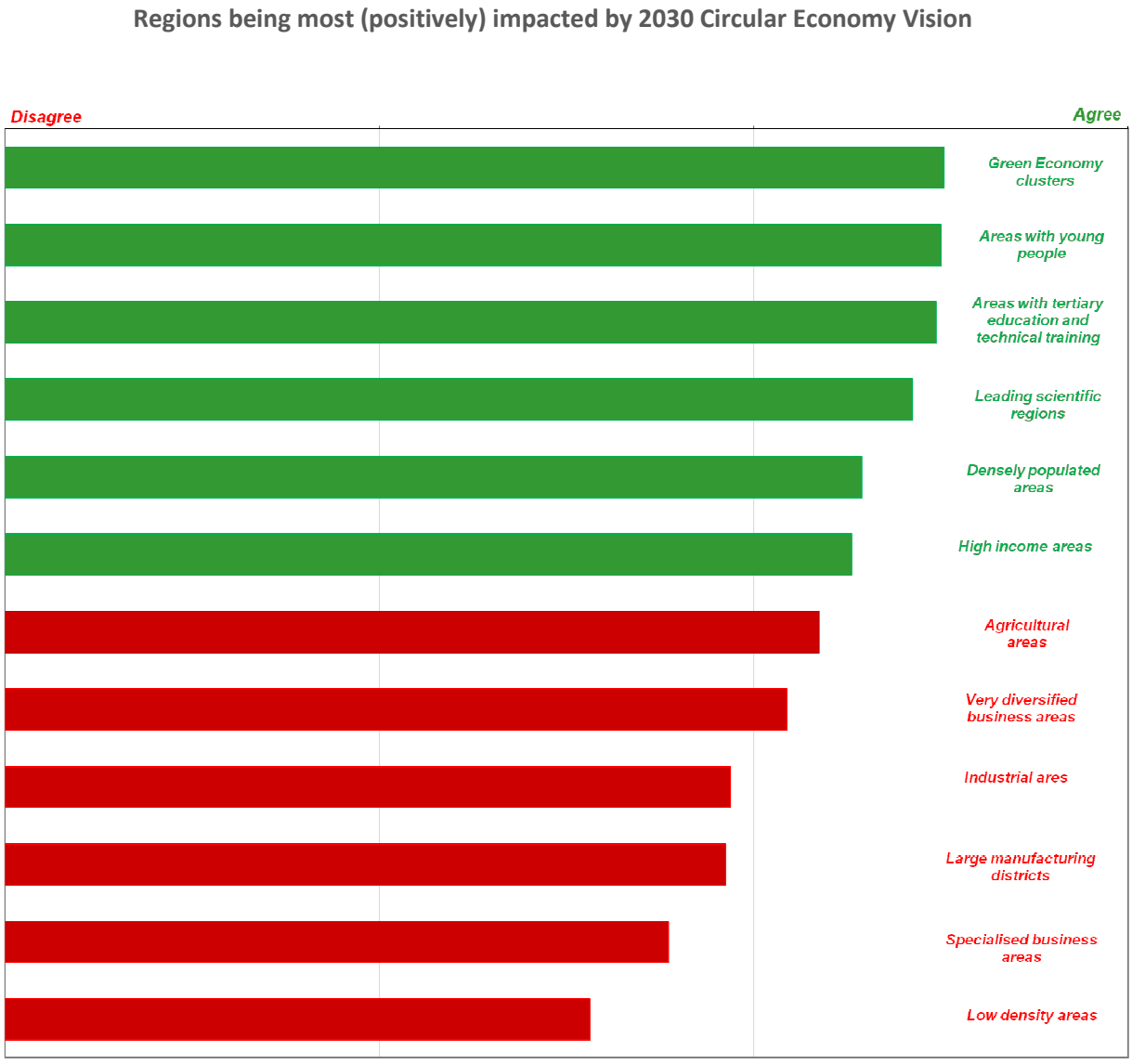


Figure 5. Synthesis of participants perception in relation to Circular Economy impacts on different kinds of territories

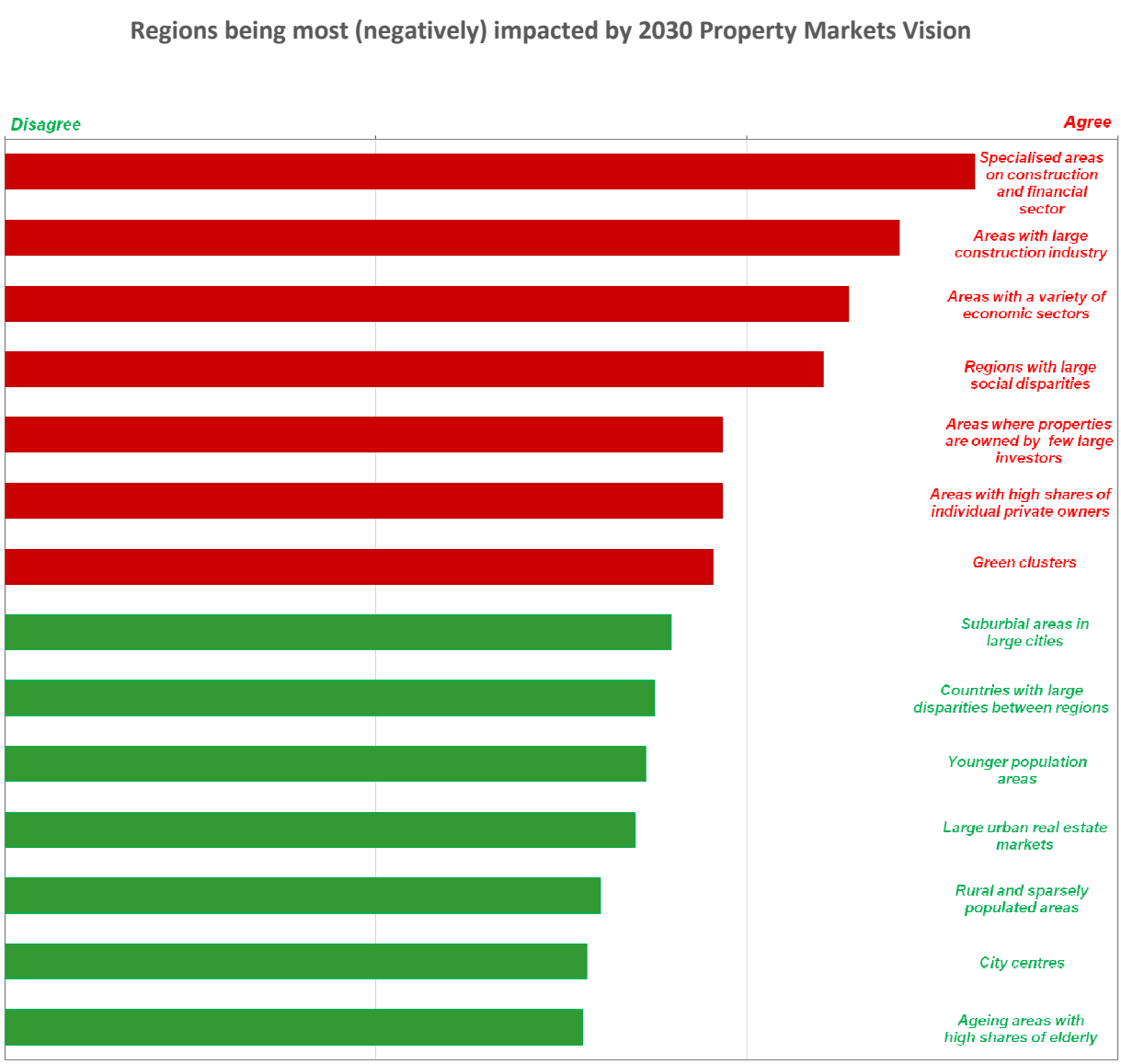


Figure 6. Synthesis of participants perception in relation to Property Market collapse impacts on different kinds of territories

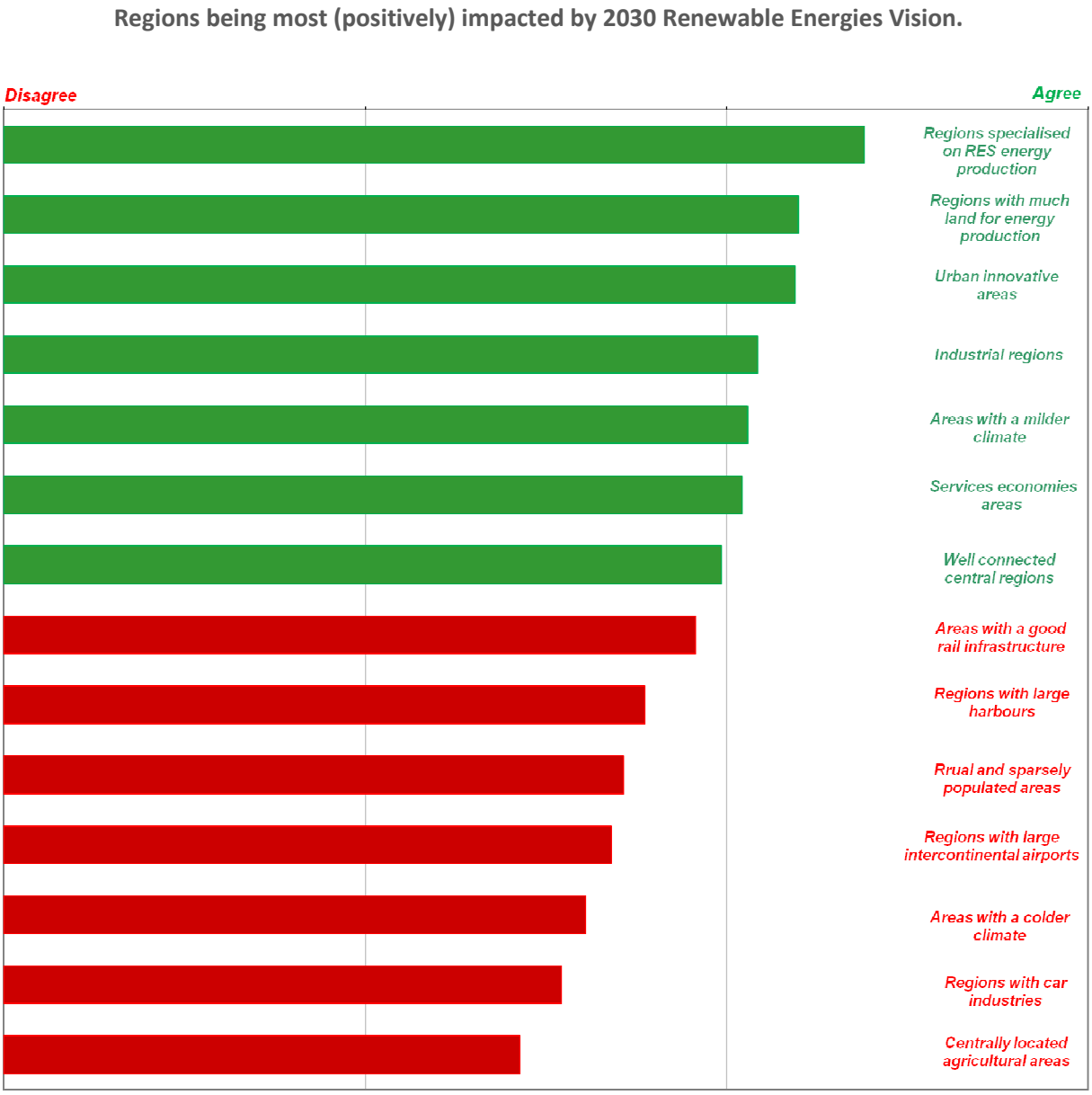


Figure 7. Synthesis of participants perception in relation to 100% Renewable Energy consumption impacts on different kinds of territories

Possible European Territorial Futures

Second Expert consultation on Key Foresight Topics

Circular Economy consultation - analysis of results

3 Circular Economy results

3.1 Participants profile

Respondents of the survey were many researchers and accademics (51%), but also consultants (26%), policy makers (10%), civil servants and industry members (6%).

In relation to the scope of the expert's professional work, 30% were professionaly engaged at local or regional level, 15% works at the level of Member States, and 39% at European level and 16% at Global level.

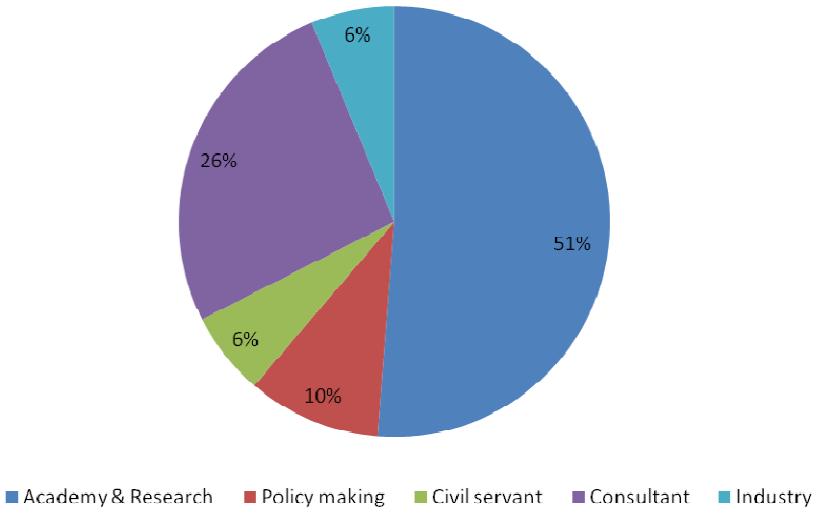


Figure 8. Professional background of participants of Circular Economy consultation

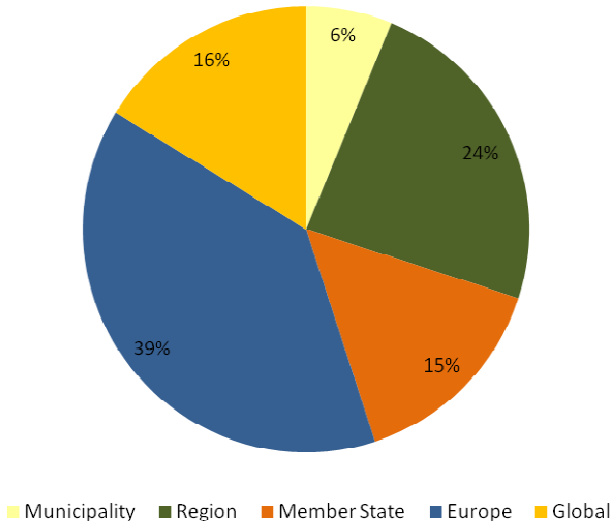
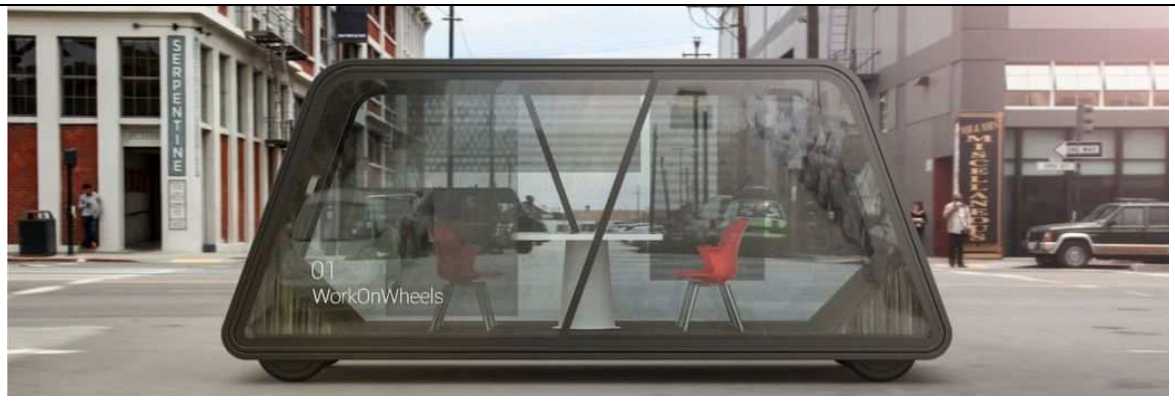


Figure 9. Territorial scope of expert's professional work of participants of Circular Economy consultation

3.2 Survey questions

The next figures present the 6 questions asked to experts about the vision for Circular Economy in Europe in 2030:

Q1. Implications on quality of life



The development of Circular Economies will lead to better quality of life for citizens, as there will be more options to share goods and services, resources will be saved for future generations, carbon emissions will be reduced and jobs will be created.

Densely populated urban regions	Low-density areas
Circular Economies will be easier to implement in densely populated urban regions where economies of scale allow for better performing shared mobility, property and service solutions.	Low-density areas will adapt easier, as the size of communities favours collaborative networks between citizens and between business.

Q2. Implications on local and proximity consumption

In setting up resource-efficient circular economy loops, consumption and production patterns will increasingly go local.

Industrial areas	Agricultural areas
Areas with strong industrial tradition will strongly benefit from "glocal" demand: global design but local production.	Areas with natural resources or arable land will benefit as suppliers for consumption.

Q3. Implications on consumption on goods

In circular economies products will be designed to last much longer or to be made out of recycling.

Green economy clusters	Large manufacturing districts
Areas that invested in the bioeconomy, green patents, recycling and durable products have an economic strategic advantage.	Large manufacturing districts (automotive, furniture...) will address to new challenges derived from self-production and peer-to-peer sharing.

Q4. Implications on virtualisation and immaterial goods

Circular economies will foster the development of all markets related to immaterial digital goods and virtual services.

Areas with young population	High income areas
Areas with young populations will better adapt as virtualisation fits naturally in the mind-sets of younger generations.	High income areas will increase the added value for their economies as virtualisation increases demand for advanced services.

Q5. Implications on reuse patterns: turning waste into a resource

Industrial symbiosis will increase, with clusters of companies where waste from one industry becomes a resource to another.

Diversified industrial areas	Specialised industrial clusters
Highly diversified industrial areas will benefit more, because companies will have more chances to find suitable industrial partners.	Highly specialised clusters will benefit more, because closing loops is easier between companies of the same sector (chemical, automobile).

Q6. Implications on education

Circular economies will require stronger focus on technology development, research and innovation, and human capital formation.

Leading scientific regions	Areas with tertiary education and technical training
Scientific regions will have a competitive advantage as technology and research will be fundamental to the transition towards Circular Economy.	Areas with a good tertiary education and technical training schools will benefit because a diversification of jobs and skills is key to achieve closing production loops.

3.3 Synthesis of results

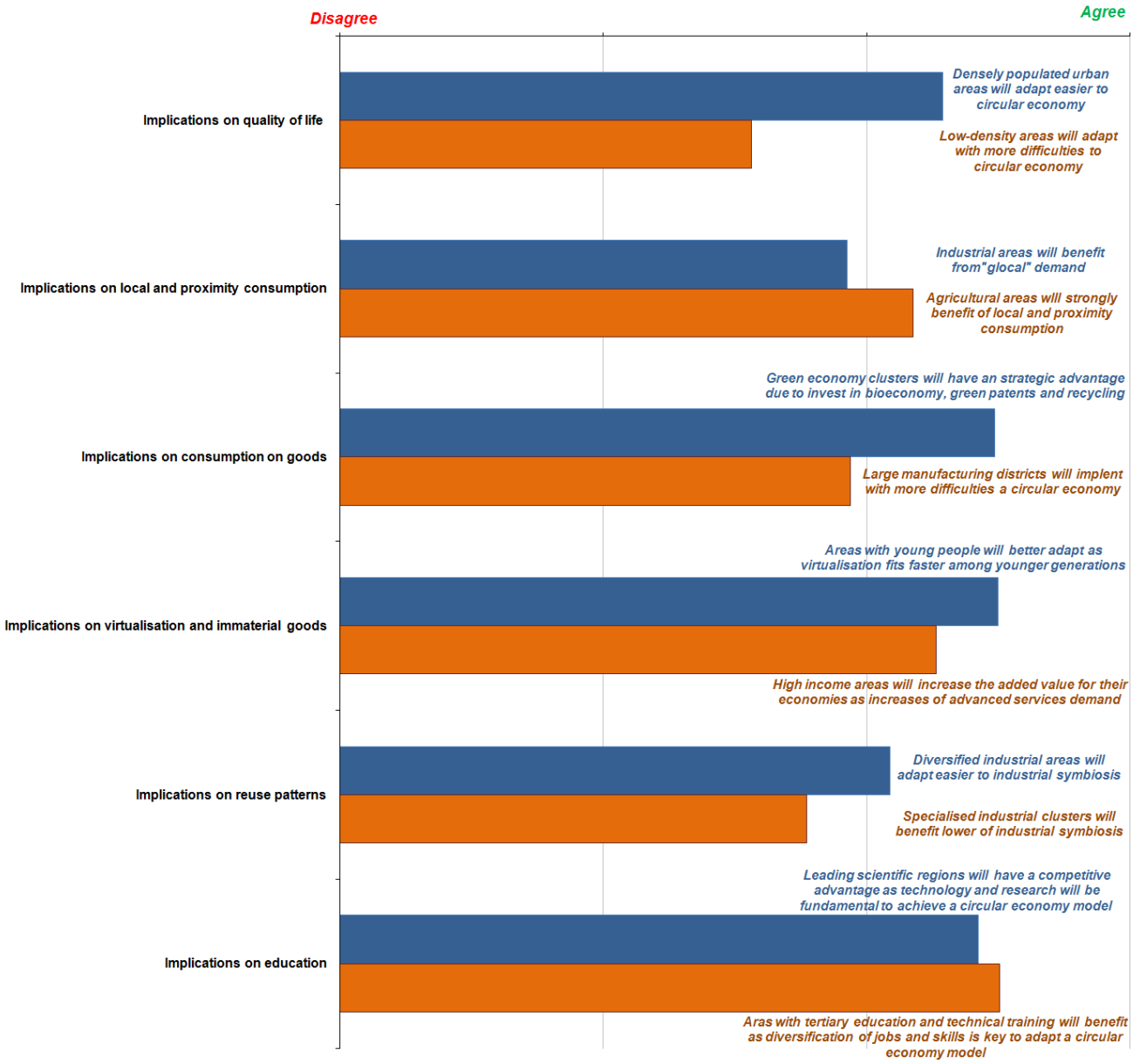
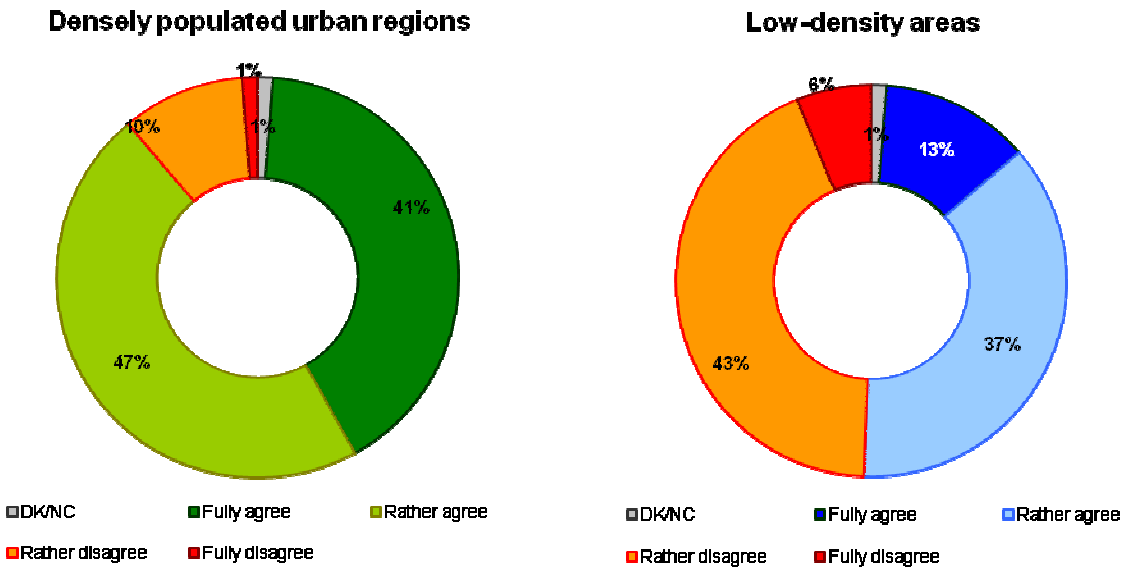


Figure 10. Participants perceptions related to the Circular Economy Vision

3.4 Detailed Answers to Circular Economy Survey, question by question

3.4.1 Implications on quality of life



Detailed comments

- Population density is of a key importance for socioeconomic well being, culture and lifestyle of citizens, decent and affordable housing, smart mobility and service solutions. Highly dense populated urban regions may have a negative impact on air quality, the environment (natural and built), native species and public health and may influence the urban heat island effect, but may also have a positive impact on employment as they favor a more more competitive market structure and facilitate the flow of ideas that generate innovation and growth.

- Transaction cost of implementing Circular Economies friendly solutions are rather high, effects also need minimal scale.

- It depends on what is being shared. Car sharing is more promising in urban areas where you need the car only once in a while. A barter economy in which you offer your good / service in exchange of another good/service is more promising in rural areas. I see peri-urban areas as the biggest problem (low density, but also no sense of community).

- Until now, experience shows that most of the elements of a circular economy ecosystems are located close to each other. It might be an urban area or other.

- Densely populated urban regions are not well defined: London, Randstad or Ruhr area differ from e.g. Naples or Athens. It will be difficult to find uniform or similar solutions for all of

them.

- "Rather agree" is for both, densely populated and low-desity. Why? I think the regional approach ic crucial, so the city (and network of cities inside the region) and at the same time low dense, agricultural areas in the hinterland. Even more, I think we have to develop further the Circular Economies into the "Circular Regional Economies", or "Regional Circular Economies".

- I dont think it is a matter of urban vs rural, but rather that different communities and sized settlements need to adopt different strategies.

- Generalisations are difficult but low density areas generally do not have the the level of new investments to adapt to radical changes except in very special circumstances.

- There are specific advantages of densely populated areas and likewise specific advantages of low-density areas, ideas and models need to be tailored to the specific local situation and context.

- Too congested environments, specially those non-planned, decrease productivity.

- Cities are good for circular based business models as there is a good critical mass of consumers. Rural areas are perhaps less favourable for service oriented (circular/sharing) businesses. Not sure collaborative networks in rural areas are that plentiful for CE businesses as in urban areas. But indeed there are opportunities for CE in rural areas focusing on recycling, repair, symbiotic activities, servitisation e.g. in agriculture.

- New business models for waste management, energy production, recycling and reuse as well as automated mobility will have a greater chance of successful trial and diffusion in high density areas with already established networks and links between key stakeholders.

- There has to be a downsizing of markets. One way is nationalist protectionism (Trumponomics), another way is to increase the cost of distributing wasteful products (qualitative barriers according to social and environmental standards). If those things are instituted, rural-urban connections can be revived within regional dimensions; to the benefit of both sides.

- I am not sure that the hypothesis behind these options, ie density is key determimant, applies to whole of circular economy argument. It will for some where distance is a cost factor, but if you consider food production etc then multiple scale/densities are possible.

- Taking into account our mediterranean mentality, the implementation process will be longer than others.

- The question is formulated as "easier". Easier than what? But both types have their (different) potentials for successful circular economy. Also in rather high density urban areas village-like communities develop sometimes with collaborative networks. A question is how

low the density is: in a full rural area possibilities for circular economy (or cradle to cradle) might be larger than in suburbia.

- I don't think this is the right approach to oppose populated urban regions and low-density ones; they all should adapt to circular economy, and sometimes this is their complementarities that should be used to encourage a more circular economy approach in general.

- Pilots may occur in cities due to issues of cost-effectiveness, but community empowerment and the capacity to adapt are complex processes in both urban and low-density areas.

- Low-density areas are characterised by long distances and a trend to depopulate.

- If you are building ecosystems (which a circular economy is) then it operates better at the functional region whether high or low density. But within that if the functional urban area is dense (and therefore larger) it will be able to operate more efficient / complete options within its areas.

- In densely populated areas you might implement these easier top-down thanks to proximity of services and existence of critical mass. In rural areas you might also implement this easily as people are already more familiar with circular economies.

- Availability of diversity of businesses, facilities and communities is a working ingredient. This gives a higher chance on a circular economy of scale in densly populated areas. And the means of transport might be dense too. But the transport difficulties might be larger in dense populated areas and diversity of communities might rather make hindering seperations where connections between nodes in de value chains are necessary.

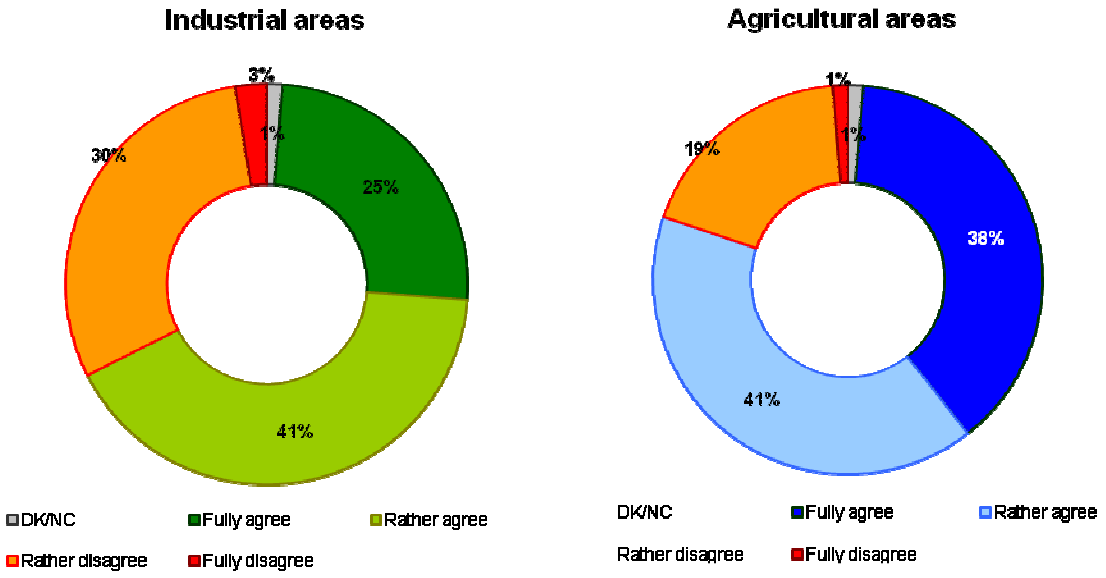
- In low density areas people are mostly forming single communities, more likely to find each other, find common goals and work together. The solving capacity might be higher in low density areas since there is less specialisation.

- Sharing of some resources will be needed in the densely populated areas ahead of the less dense areas, but for most new circular economies progress will be made faster in smaller communities.

- Rural areas generally more traditional, core urban areas and corresponding lifestyles more likely to be early adopters.

- I find the potential of circular econ a real one but it will be based on local circumstances (terrior, if oyu wish) not on general recepies/policy measures. I do not think that it is the urban/rural divide that determines these local circumstances.

3.4.2 Implications on local and proximity consumption



Detailed comments

- Although it is not possible to say it pays for all areas, mostly it can be the case.
- Dependent from composition of branches of industry, agriculture, and territorial structures etc.
- Closing the loop locally is clearly an asset. However, depending on the transport cost (in terms of both money and carbon footprint) of the natural resources or agricultural waste/byproducts , it may result still convenient to have an "enlarged loop".
- I think consumers will also have demand for commodities outside what can be found loacally.
- The supply networks are too large to see much of an impact at the regional scale.
- Institutional settings in many rurar areas are too weak to take full advantage of circular economy.
- Existing industrial areas can be adapted more easily to more regional circular economies, in which repair and remanufacturing can replace current or old manufacturing activities. This will create new jobs requiring new skills. Arable land will continue to be a supplier of food and other biobased resources. As custodians of our soil, farmers will need to placed back in the centre of our livelihoods and value chains. Giving the right value to the nutrients we need for our food system - excluding the ones that we mine because this practice will not

last - we can create new jobs in these areas.

- Well, I have to say the agricultural areas products are somehow easier to involve into a "local and proximity consumption". On the other side industrial zones (e.g. enterprise zones, technology parks, bussiness accelerators ...) are much more connected to continental and/or global demand and managemant as well! Using the phrase "glocal" i think that we can also use as: local design and global production (in Africal for example).

- I think the power of 'path dependency' in innovation and changing economic structures is often overlooked in this current development, the issue of having local acceptance for changes related to circular economy strategizing will increase if these strategies build on traditions and processes that are already established locally (e.g. multi-storey housing in wood in Nordic countries where wood is a traditional building material). Regarding natural resources I think the issue at hand is transportation of those resources in a sustainable way. Arable land will not do much good if you can't transport the produce to the consumers.

- CE will offer more opportunities for local service activities (e.g services, repair, sharing, recycling). The local manufacturing industries, if adapted their business models (product -> product-service systems) can also benefit. But overall sale of long-lasting products (cars, electronic, furniture) might decline, which is unfavorable for producers.
  It is not likely that there will be a decreased intensity of agricultural land use. perhaps opposite, demand for local food products might increase. But the methods of land use might become more sustainable. As for the local natural resources use, CE assumes decrease of use of raw materials in general, this local suppliers will shrink their supplies.

- The benefits of agriculrural will be reduced by long trips.

- Industrial areas will depend on markets, distribution networks and physical transportation - services that will depend on successful new solutions in energy provision and fuel availability. A successful regional circular economy will need to reconfigure the use of arable lands and methods of production and consumption that favour 'less miles' on products.

- Concerning industries, most will depend on the taxation differences. Industry is footloose.

- Historical and current trend suggest terms of trade in favour of industrialised societies.

- "Strong industrial tradition" might also imply a regional culture, which is focussed on old fashioned production, very different from circular thinking. The factor time might be decisive. After a long time of decline and poverty a creative generation might develop. Probably the age of the population is more important, forerunners will consist of non-traditionalist responsible youngsters, who like to share and are less connected to ownership of goods. Innovative lifestyles are not limited to industrial areas or agricultural areas.

- Both questions (if I properly understand them) are based on flawed concepts -both agricultural and industrial areas are not a single entity - they are diverse and some are highly dysfunctional (e.g. rust belt and depopulating rural areas) whereas neither has a built

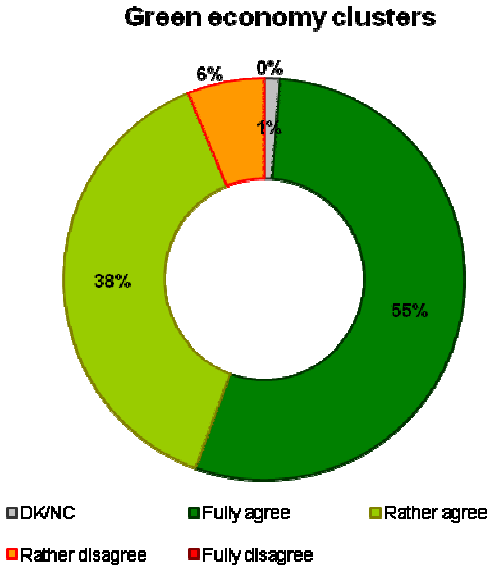
predisposition to be more or less globally oriented

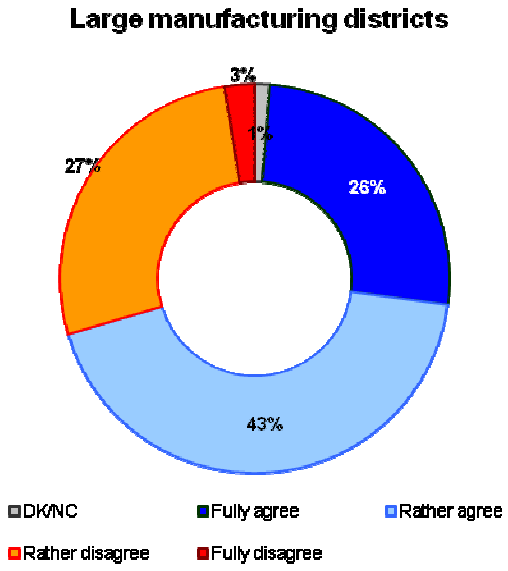
- I believe that both areas will lose from their current status, as industrial areas will produce even less (unless they design only) and agri areas will produce even less food as their target customers will reduce to a narrower area.

- Industrial areas mostly have a rather specialised profile where not all means are present to flexibly shift to integral production of a full range of local needs. Rural areas can benefit as suppliers of food and materials base but only if the arable production is highly sustainable not wearing out the land.

- The areas with a strong industrial tradition will benefit most from the new business ecosystem cleaning up area but achieving these benefits may be harder than for the arable areas.

3.4.3 Implications on consumption goods





Detailed comments

- The first assumption can be correct in long term, the second assumption is completely wrong. As the experience from the central European automotive cluster shows, the manufacturing clusters are in many cases far away from R&D and decision making centres of the mother firms and with it not addressing new challenges directly (experience from Slovakia the world-wide larger producer of cars per capita)

- Large manufacturers would certainly be faced with new challenges unless they actively change their ways of operating and seek new opportunities from the new circular consumption models (suh as sharing). Many big corporations have realized the massive market transformation driven by circular economy and start adapting their strategies. Having all the resources and assets they have, they could have advantage as well.

- I don't understand the second statement. Yes, they will try to address these new challenges, but the question is who will be able to transit successfully and who will disappear.

- Marketing trends tends to over-price this kind of labels.

- Green economy clusters may be too dependent on external financial sources, subsidies etc.

- Green economy clusters: they have an advantage as they can make more money with the same resources being higher situated in the 'biobased pyramid'. We should not forget however that for a healthy and sustainable food production system, we need nutrients to go back to the soils they originate from. Optimising biobased routes at the end of chain is not by

definition the right answer to this need. Large manufacturing will indeed have to rethink their business models. With a growing demand for 'access' rather than 'ownership' - see eg www.circle-economy.com/thecircularcar - manufacturers have to consider service models based on circular strategies related to design, use and end-of-use.

- I do agree on "green economy clusters" as a (EU ?!) policy. Regarding large manufacturing districts I have to say that we have to take into account also "old industries": automotive, furniture, chemical, pharmaceutical ... Bussines is bussiness ...

- Without constraints on movement of goods there will be little incentives for produces and consumers to produce or buy circular economy goods.

- These two are assumptions rather than strategies so it is difficult at this stage to assess and comment upon. Of course green economy clusters will need to be considered but their ecosystem will be very contextual and dependent on local parameters. Large manufacturing districts will need to be reconfigured into more efficient 'communities' as production systems will still depend on the workforce and consumption markets they will cater for.

- How do we manage to reduce growth in every respect? Individuals have to reduce their needs, to withstand the marketing powers (active choice) > means less demand of products of any kind (first and foremost hopefully those which are completely useless - which ones are completely useless?) > less production > less work > less money in individual pockets > less purchasing power of individuals (forced choice)

- Industry 4.0 will reshape industrial patterns. Potentially their production is compatible with a decentralised distribution of power in a polycentric world, but in how far this takes place will depend on political games. And political power is intrinsically interwoven with global financial capital. All in all, the whole scenario will only be possible if the concentration of power will be dispersed by global regulation of financial capital. This is extremely difficult and extremely important at the same time. And this is out of sight for the time being.

- For large manufacturing district other business models should be implemented. One example is 'comfort as a service'. Consumers are focused on the service rather than ownership of products.

- Clusters will work if they exhibit and produce productivity gains - this is not inevitable.

- Can the "large manufacturing district" not have invested in green patents, recycling and durability? They may be a bit later than small scale initiatives, but have to adapt sooner or later.

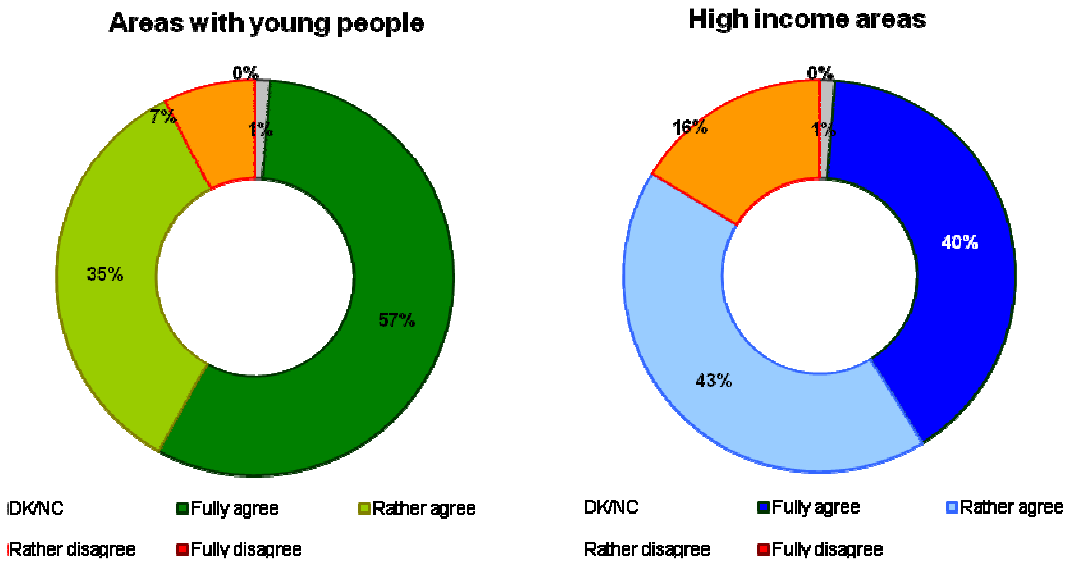
- This issue has still to be policy driven before becoming a 'normal' pattern of homo economicus...

- The question on green economies implies that they have relative competitive advantage - if this is what is meant it is tooo open a statement - the answer is 'it all depends!; on a vast

range of other factors. The same applies to large manufacturing districts

- Conversion of industry and more and more smart factoring will be vital for industrial areas. The speed and impact of this conversion depends highly on the future readiness of the current industrial powers. The old highly optimized vested industries are likely to lose the battle.

3.4.4 Implications on virtualisation and immaterial goods



Detailed comments

- Virtualisation will sure make life better - however, we remain humans ad that means that our senses are still important - we will still want to experience our world through our 5 senses.
- Although it can be agreed with the assumptions, the first sentence is not true. The development of immaterial digital goods is not causally bound on circular economies development.
- Digital services make access easier also for basic services and lower value products. Lower income areas may be more accustomed for sharing models, and usage of services rather than ownership based models.
- The same pattern of proliferation as with Internet, will be observed.
- virtual services may be nice but their contribution to a better life is overestimated.
- The problem is not to be young and rich or not but to be smart. I am 60 and I use Uber, virtual bank tools, etc., as soon as they are well designed. African people whiche are rated very low in your marketing scale are eager for virtualisation (mobile banking).
- There is a strong need to incorporate digital solutions that facilitate the circular economy, when it comes to tracking & tracing products and materials, their performance and the need

to repair, reuse, reman, recycle etc them.

- High income areas are not the condition - use of a ITT tools and goods are not very expensive.

- I object to the term "mind-sets". I would rather call it training, because younger generations have had more training regarding virtualization and digitalization from early years compared to a population aged 50+.

- Virtualisation and digital goods will rather increase the ordering goods and servives from far-away places.

- Younger populations and consumption/use of more digital/intangible services does not necessary correlate. Some of the countries with younger populations have shown so far that they can have low educational levels and face employment issues. High income would on the other hand relate more to higher levels of education, adaptation to new technologies, buying power for latest advances in technological solutions and higher levels of usage of advanced virtual services.

- What means virtualization with regards to growth and consumption? Raw materials, rare earthes, resources of any kind, peak oil - is virtualization really one of the means towards circular economy?

- It's not just the age of people. It's their access to knowledge resources and education.

- Age and income are not the only determinants of the uptake of virtualisation - basic infrastructure, culture and democratic control are also important.

- Access to ITC as well as ITC literacy is more a limiting factor than age.

- This is not just a question of computer literacy but also of access to the high speed. Broadband and virtulisation is just one way to accelarate the process, but one among others

- Generation and income gaps related to digital services (too smart or too expensive) must be policy driven.

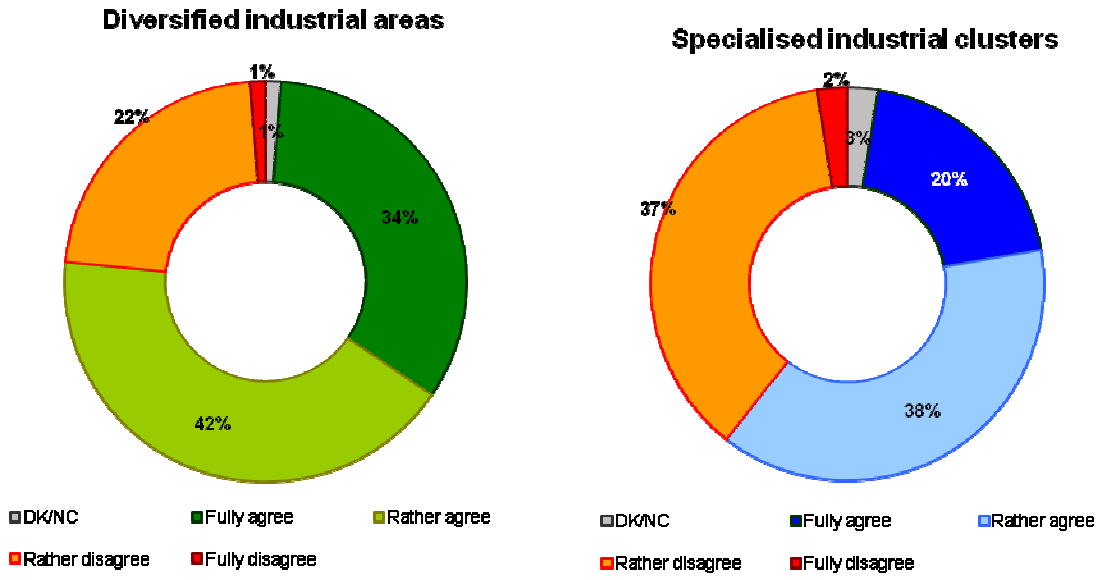
- Re young people this is too simplistic a statement in every respect to be useful and able to be answered meaningfully - it is based on a mantra which has a half truth in it - but for example none of the CEOs / founders of the major IT companies are young aznymore

- On the high income scenario: I disagree - this depends hugely on the economic activities of these areas.

- Research shows that young people are more eager and easier using virtualisation and digital services but are heavily under using their practical applications diminishing the added value. High income areas are not by rule of thumb the areas where the best added value practical

applications are coming from. They tend to produce more volatile and less functional digital solutions.

3.4.5 Implications on reuse patterns: turning waste into a resource



Detailed comments

- The clusters are not about direct cooperation between productive industry.
- Circular business ecosystems require cross-sectoral collaboration.
- Clearly the loops in each own Sector are easier to be closed within the same sector, but tha value chain must be taken into account as a Whole so it is important also to evaluate the possible synergies among different sectors (eg. one sector can feed another).
- I am the project manager of the H2020 SCREEN (Synergic CirculaR Economy across European regioNs - www.screen-lab.eu) and even if the project is just started , we are experiecing the possibility of new cross-regional value chains including diversified industrial areas. On the other hand, similar sector usually generate similar specific "waste", almost impossible to be re-used as secondary raw material in the same field of activities.
- It is the problem which will be never settle over time : efficiency by diversity vs efficiency by massification. If optimisation should be relevant in such sectors highly mature and very competitive, it would have been already done. The problem is the competition and the balance of forces between clients and suppliers within the value-chains within a sector.
- Clusters may benefit from already existed organizational links.
- It depends on what materials you're talking about. For eg water, carbon dioxide, heat, calcium etc, cross overs are imaginable between a variety of industries. When it comes to specific materials, like solvents, plastics, construction materials etc the cross links are to be found in similar industries only. It is good to keep in mind that cascading is not necessarily

the right answer. High value reuse of recyling, that prevents downcycling (!), is the key priority. In case of nutrients, we should always remember that they need to go back to the land and soils they come from - to ensure endless production cycles.

- In Europe we urgently need both, diversified and special industrial clusters & areas; (probaly along the new silk road, maritime one and continental one).

- Industrial areas will need to be diverse if a circular economy is to be supported. However, symbiosis will depend on the capability to adapt and achieve efficiency between industrial partners - achieving a balance in needs from each other will not occur naturally. Specialised clusters will probably stand a better chance as they will be created purposefully.

- Both options may take place. However in the long run the diversification card takes.

- To an extent this might be determined by the extent to which intermediary or bridging sectors develop - compare role of business and professional services now. So sector profile not so important?

- As long a prices do not speak ecological truth incentives are to low for industrial symbiosis beyond niches.

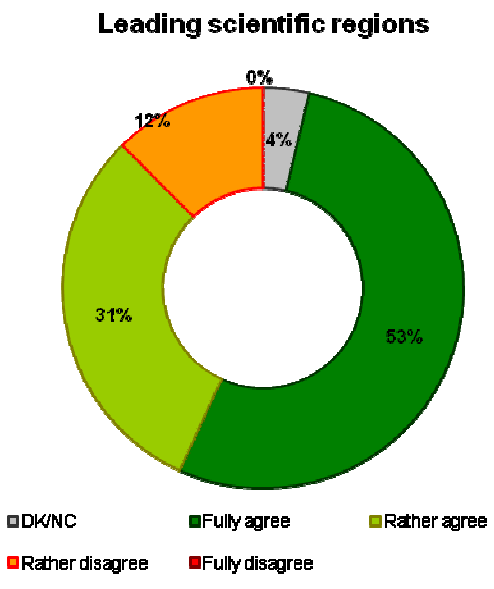
- Here the point is again the simplification of the question. If an industrial area is extremely diversified, it is possible that the available waste does not fit with a demand in the area, so clustering around side products and waste must become a deliberate policy of co-operating companies. At highly specialized clusters the type of production is decisive: in automotive clusters the products of supplying industry are resources for the final assemblage. But in chemical production the one factory may have waste heat, which is necessary for the production process of the other. Within that (large) specialized chemical clusters closing loops is a general existing praxis.

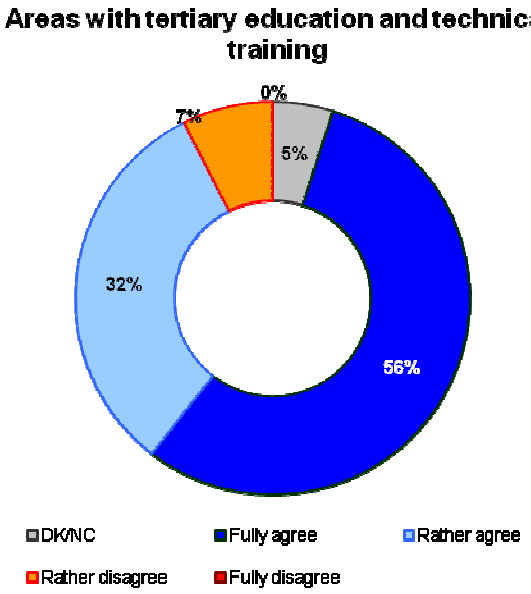
- again, why oppposing the two types of clusters? the idea of circular economy is that it should benefit to all types of industries.

- Highly specialised areas will have the biggest conversion challenge to overcome. But the number of possible working and profitable value chains is much less than in diversified areas. It might take generations to find the right track. A solution can be to diversify first before building value chains.

- Answers here are highly dependent on how the regulation of the new markets governs trading rights and responsibilities.

3.4.6 Implications on education





Detailed comments

- Both are needed, science and research as well as technical skills. However, I believe that scientific regions have competitive advantage, because transition to circular economy requires systems level thinking, innovative visions and cross-sectoral collaboration, which are more common in scientific regions.
- Both elements are important as a precondition to implement successfully Circular Economy.
- "Technical training schools" cannot give, nowadays, enough skills to face the transition towards the circular economy. Such a statement could be probably be valid in the last phase of transition but not in the near future.
- It depends much on country, plocies, instruments, focus etc I think. Both can be possible if it is organized and focused on.
- Now, the basic technology can be followed remotely. The point is the implication of the production sector and their belief in circular economy.
- Technological development alone, or priority on it, will not solve the problem and achieve circular economies.
- At this stage innovative technologies are crucial, tertiary education is the next step.

- Knowledge and the education is very fundamental, very important and very urgent.

- I think the circular economy discussion focuses overly much on technical training and development. Social sciences and the humanities will be equally important to innovation and human capital formation, and the understanding of transitions towards circular economies and this should also be reflected in available research funding etc.

- Knowledge can very easily travel and spread these days. Therefore, leading regions may remain leaders but will spread the knowledge into other regions with political, social or private sector support.

- I think it was difficult not to agree to most questions, indicating that they might be somehow too generallook

- Relatively straightforward points to agree with as they relate to previous comments. However, the focus on areas and specifying the type of education gives notions of separate worlds and communities rather than a blend and a symbiosis.

- We do need a sound and broad fundamental education (school & profession, science & practice) of the most accessable share of the population as possible.

- Its all about the capacity to apply to valorize, which is more present in areas with strong vocational education.

Possible European Territorial Futures

Second Expert consultation on Key Foresight Topics

Property markets consultation - analysis of results

4 Property market results

4.1 Participants profile

Respondents of the Property Market survey were mainly researchers and accademics (36%) and consultants (31%). Also respondents were policy makers (18%) and civil servants (13%) and few industry members (2%).

In relation to the scope of the expert's professional work, 42% were professionaly engaged at local or regional level, 18% works at the level of Member States, and 27% at European level and 13% at Global level.

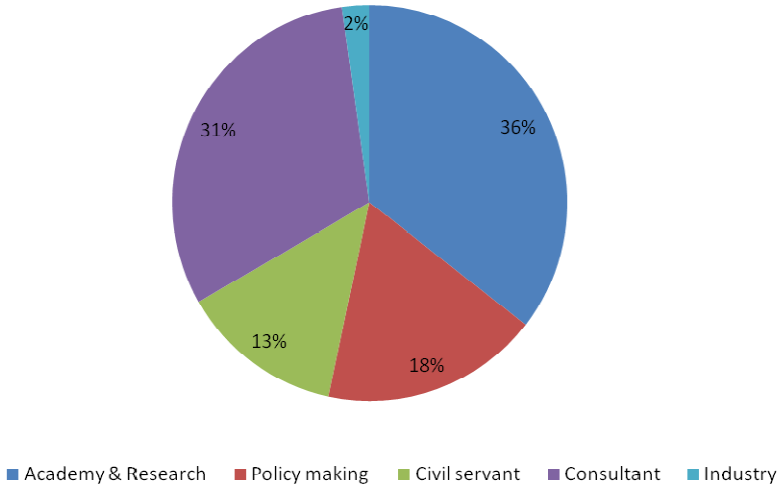


Figure 11. Professional background of participants of property market survey

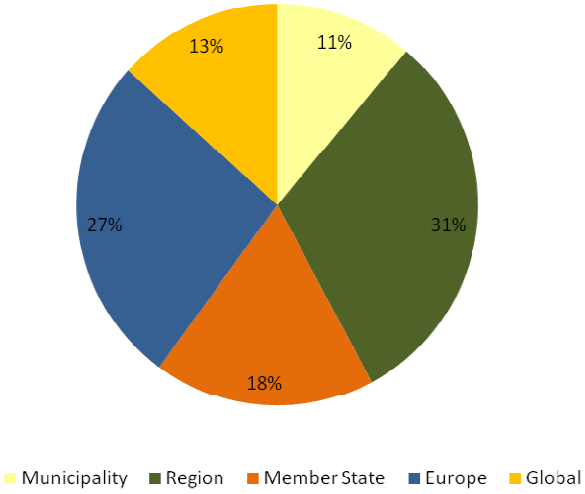


Figure 12. Territorial scope of expert's professional work of participants of property market survey

4.2 Survey questions

The next figures present the 7 questions asked to experts about the future vision for Property Markets in Europe in 2030:

Q1. Implications on ownership profile

A collapse of the European property markets will affect the value of houses. The ratio between the value of a property and the debt on that property will be increasingly imbalanced. People might need to sell properties below the amount needed to recover debts.

Areas with high shares of private owners	Areas where properties are owned by investors
Areas with high shares of private owners struggle more as the collapse will hit citizens directly: homeowners may no longer be able to guarantee debt and may be forced to sell.	Areas with high shares of rental homes owned by investors will suffer from the fact these investors may discard maintenance or withdraw from the market.

Q2. Implications on size of the market

The size of the property markets determines the vulnerability to shocks disturbing the market balance.

Rural and sparsely populated areas	Urban areas
Small markets, typically in rural and sparsely populated areas, will have a higher vulnerability to collapses, as less players can and are willing to invest.	Larger market, typically in metropolitan areas may be more exposed to the collapse of the property markets, as many large investors will easily change between markets and withdraw from the worst performing or collapsing markets.

Q3. Implications on land use

Due to the property markets collapse, new constructions and speculation on land prices will be stalled.

Areas in closely proximity to city centres	Urban areas
Areas in the vicinity of a city, like suburbs, will see lower land pressure and consumption because new developments are postponed or stopped. This will be an opportunity to plan more recreational, agricultural or natural space.	Highly urbanised areas, like city centres, will see social trouble and gentrification. With a stagnated constructon market, more pressures will develop on properties available in most attractive areas of cities.

Q4. Implications on age structure

The impact of collapsing housing markets depends on the age structure of a region, indicating where most people are within their housing carriers.

Younger population areas	Elderly population areas
Areas with larger shares of young population will be largely impacted by crisis because people in their early stage of their “housing career” are more likely to move somewhere else.	In areas with older population the elderly will no longer be able to move on to smaller houses for reducing housing costs or beefing up their pensions.

Q5. Implications on construction sector

The construction and real estate sectors will be particularly hit. Economies highly relying on the construction sector will have to undergo structural changes.

Areas with large construction sectors	Green clusters
Areas with relatively large construction sector will particularly be hit, and the collapse of the property markets will quickly spill-over resulting in job losses and growing unemployment.	Areas having invested green economy will benefit more as construction will focus sustainable housing, reuse and recycle of construction waste, climate change adaptation, smart domotics).

Q6. Implications on the economy

The spill-over effects of a collapse of the property markets will largely depend on the diversification of the economy.

Highly specialised areas	Areas with a variety of economic sectors
Areas which rely largely on a few economic sectors, especially finance and construction, will be more severely affected by the collapse of property markets, as it translates more quickly into job losses and declining economic activities.	Areas with a diversified economic profile will be less affected by a collapse of property markets, as the changes of spill-over effects to other sectors are limited or take more time.

Q7. Implications on real estate

With property values falling in Europe, investors may capitalise the opportunities of declining markets.

Disparities between regions	Disparities within regions
Disparities between regions may increase, as investors based in wealthier economies with access to financing will capture opportunities to invest in declining regions.	Intraregional disparities will increase, especially in regions with already large social and economic disparities, as citizens with higher income capitalise on opportunities in the market, while others are pushed out of the market.

4.3 Synthesis of results

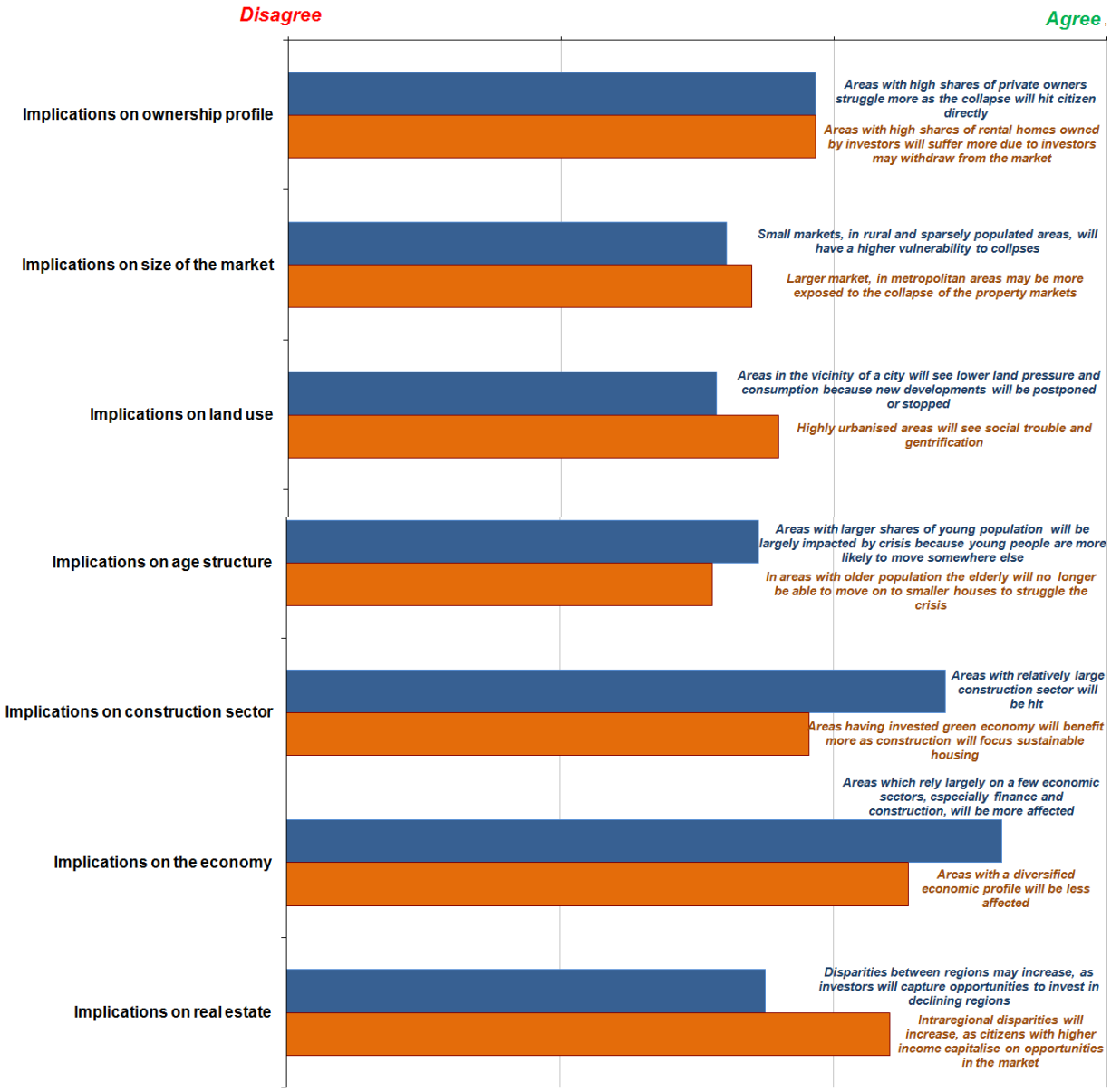
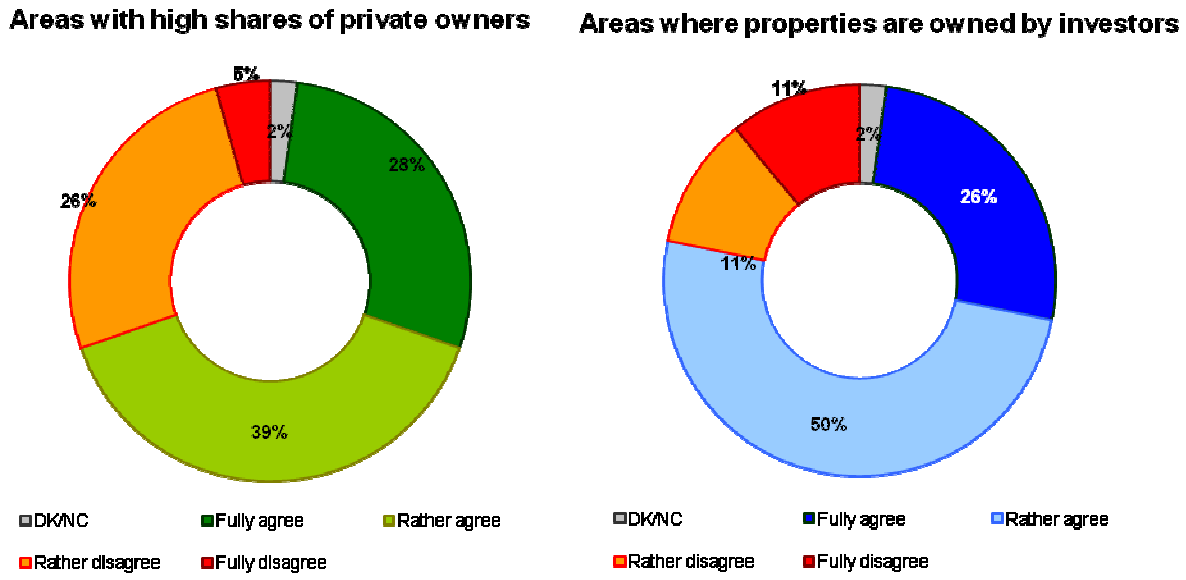


Figure 13. Participants perceptions related to the Property Markets Vision

4.4 Detailed Answers to Property Market Survey, question by question

4.4.1 Implications on ownership profile



Detailed comments

- In many countries people do not see their houses/apartments in terms of market good, rather they see it as an asset... Therefore scenario should also put in the perspective lower mobility of people "imprisoned" in their properties rather than only not being able to get profit on it. The other thing is that in the massive problem of the debts due - where would be market for this? I think this question still sits in the logic of the "economy of today' while in some 20 years the logic might be completely different. This is why I feel that the questions are not really relevant to the future situation which actually must be and will be completely different.

- The precondition defined are fully out of reality in Europe. Europe is not only about selected countries in Western Europe, but much more diverse. The situation at the property markets is diverse and will be heavily influenced by migration

- There is rather conservative mortgage bank policy with became even more tight this year in the Czech Republic. Property market crises of 2008 did cause major debts recovery problems. There is very limited market of investors owning rental homes to infulence the city areas.

- The question is whether governments are introducing new regulations and/or subsidies for the real estate markets

- Very often the reduction in real estate prices not warrant even coverage of debt agreements

with banks. The lesser availability of capital and working helps the market rentals.

- In Italy over 70% of population have got a private house, so that rental market is not very cheap and not so widespread. A lot of houses are vacant, owned by financial institutions or societies that evaluate them only as a balance sheet item.

- There are many other factors influencing property market (such as increase/decrease in population, migration rate, economic performance, feeling of safety, state policies and regulations etc.)

- in Italy people tend to own the house they are living in , and also to still see the real estate market as a an investment opportunity. The taxes load on property is increasing and tends to impact on this attitude

- If collapse of the property market means lower property prices, this will benefit home buyers.

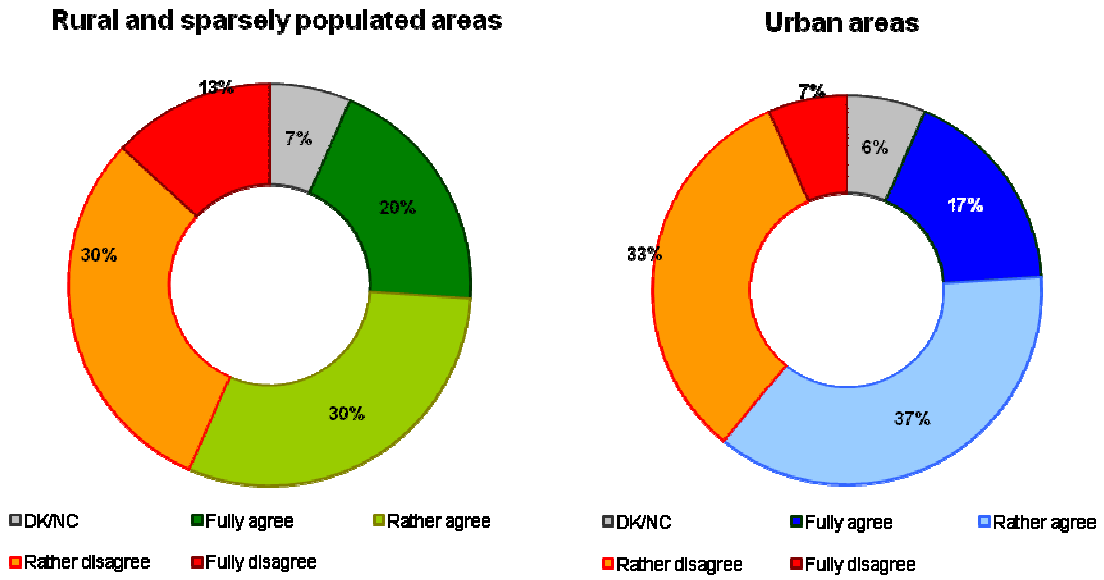
- The questions assume that there is some '4an property market'. There are many property markets, even within one 3. What happens in London does not apply to the north of England. Also, the scenario you paint of 'imbalance' is already the situation in some places.

- For private owners, not only guaranteeing debt, but formost, there is a lot of employment related to property markets. As employment goers down, owners cannot afford to pay installements on their mortgage, but selling the home does not result in fubnds to recover the debt. Rental homes provide still direct income to investors, which is so relatively attractive. Investments will only relate to short term direct income needs not to future indirect proceeds of value increases. Based on lowering credit rates they will primarily use rents to improve their solvability.

- Home ownership is more guided by psicologic facts rather than econòmic ("rational") ones. This forces people to retain their properties, also in case that its (economic) value goes down.

- This is completely inconsistent with the evidence of the current elevated start of the urban property markets in Japan, NW Europe, etc (locations whose populations are already rapidly ageing)

4.4.2 Implications on size of the market



Detailed comments

- My agreement about the rural markets is not linked to the property market but simply to the population living there. Today already majority of people live in the cities and this situation would not totally reverse in only 20 years... The value of the agricultural land might be also out of the market control if we think in terms of energy, climate change, risk management, mitigation policies... As far as the metropolitan market are concerned it might actually happen that there will be different composition of actors... Large investors might already not exist in big numbers until then. The model of global economy is at the moment in transition, therefore using the measures of today again might not fit to the picture.

- The size of the market is not decision making, but the composition of the market players and the role of public sector at the market

- Small markets suffer of very low investment for decades but still do exist. In urban areas investors may withdraw quickly, Czech Republic experienced this in 2010 - 2012 in office and industrial sector dramatically.

- Vulnerability may mean different things to different markets.

- Concentration and activities of the specialized work helps their location in most areas and services provided by infrastructure. Although the great cities are each other areas remain in competition favorite investment compared to the surrounding area

- In sparsely populated areas, a lot of private house are for holiday. Increased taxation on

property has obliged many owners to sell.

- Since trends show that people will increase concentration within cities, this type of problems will become much less important within cities

- In some peripheral areas there is a big relevance of houses used for tourism while in periurban areas there still is a significant demand for housing.

- It is far more complex than this - rural areas and metro areas contain very diverse conditions within their category so you cannot generalise

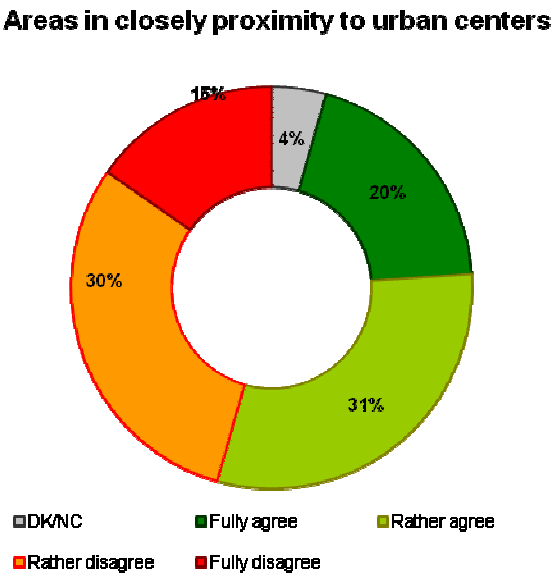
- I think the size of the market is not so relevant. It is much more about expected relationship between supply and demand and the way the current market is financed. If in the small market, properties are financed from equity and in the large marekt with debt, there will be no financial issues (of not being able to repay the debt) for the owners. Typically, but not necessarily, the bubble will be in the larger market.

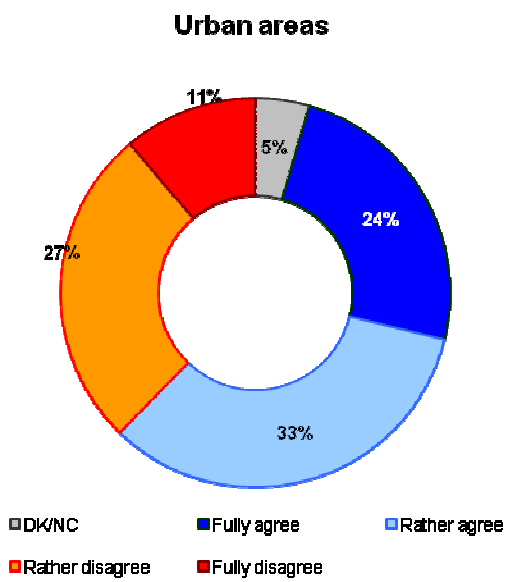
- I think property markets are more dependent on the stability of the internal or external demand than on the size of the market. Some examples: small but high-income market like Sitges (Barcelona, SP) has suffered less the last real estate crisis than larger cities next to its boundaries, like Vilafranca del Penedès (Barcelona, SP). The reason is that Sitges has a bigger demand with no-bugget límit, rather than Vilafranca case, where the market is limited to internal low&mid-income demand. The same happens in larger cities like Barcelona vs. Tarragona (SP): Barcelona is now a bullish market, fueled by International demand, while Tarragona relies only on its internal demand.

- A property market price collapse normally results in lower turnover, which will affect rural areas less as people move less often. Urban areas may be more popular with investors, but liquidation is not always simple, especially with sitting tenants.

- Vulnerability mostly depens to exposure to global markets -tourism, finances... there are rural areas very much exposed as well as urban areas not exposed.

4.4.3 Implications on land use





Detailed comments

- Market collapse would probably be complemented by other effects of crisis thus decreasing state budget available for recreational, agricultural or natural space (land use heavily dependent on state suport, especially natural protection sites).

- Land use of urban areas might actually develop into direction which would be result of the policies promoting compact city and retrofitting. In this case less attractive areas might be given an opportunity to (re)develop.

- Completely wrong premises led to not correct implications, the interdependences in the land market are working differently

- Will be developped public - private parnership. The usage property attribute will be more important but will be developed economic mechanism that will reserve the property right. Any way somebody will got the property and there fore the responsibility accordingly.

- The opportunity to plan (and develop) alternative land uses highly depends on the overall economic situation. A decine in property markets could cause overall economic stagnation - an unfavourable situation for planning (and investing) in other kinds of land uses.

- For peripheral areas not need more open spaces but more balanced than those central units in terms of access to services and markets. Gentrification is not only based on the construction market because a no balanced real estate tax may encourage it

- In Lombardy, before economic crisis, local authorities had made optimistic planning forecasts expecting growth, new buildings and therefore new soil use. In the middle of crisis, a regional law has prescribed to reduce land use so that local authorities have to rethink their planning. Economic crisis is an important occation to rethink our cities and our way of planning. In Milan there are some examples of gentrification, in particular "quartiere Isola" which was a popular neighbourhood has been riqualified thanks to recent urban renewal with design buildings like "Bosco verticale".

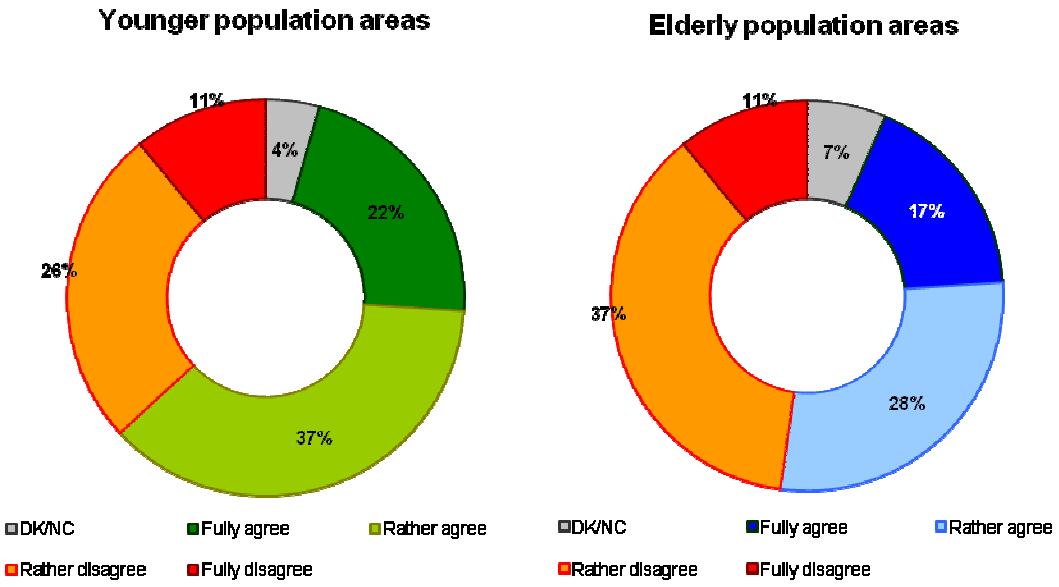
- Do you mean that in existing urban areas there will be less pressure to convert open land to housing? If so, then the answer is that it may make no difference. It depends who owns the land and its existing 'planning status'. Land owners will wait for prices to rise. Also, in order to realise 'managed' recreation and 'natural' spaces development is needed. So a fall in development activity will not generally lead to a growth in other sorts of land transformation. In most countries there is no 'planning' of agricutural or natural spaces, but rather protection from development pressures. It is difficult to see why 'social trouble' and 'gentrificaiton' are put together. Social problems are concentrated in poorer areas of course. When markets decline it may be the highest value places that lose most value.

- The Spanish case shows a lot of 'Zombie subdivisions'. These areas do not automatically become available for other uses as owners still hope for improvement. Agriculture is a way to get at least some income from land. Recreational uses will often be part of the collapse. Genrification involves extra investment, which is much more likley is neglect. These pressures will not be economically (does not fit with market collapse; it may happen in the recovery phase). Overcrowding, young people staying to live with their parents (or even returing back to them) is more likely.

- Spanish recent economic and real estate crisis (2007-?) shows exactly this. But the opportunity to re-think new urban plans in this context has not been applied.

- This depends on your definition of 'opportunity'. Theoretically possibly but lower property prices will have a huge knock on effect on the economy limiting budgets both private and public. Social trouble normally reduces with gentrification. Lower prices are more likely to result in less upkeep. This also depends on your definition of 'attractive'. Physically, possibly. Financial attraction, definitely.

4.4.4 Implications on age structure



Detailed comments

- At least in my country (and to my knowledge other post-socialist countries) it is not common for eldery to move on to smaller houses.
- Look at the papers of Francesco Billiari. We cannot actually say anything certain about demography, Our censuses apparently are asking wrong questions - we do not know much about migrations, dynamic lifestyles, etc. My "full diagrement" with both statements means - it will be completely different.
- This is not the causal interdependence, in reality the behaviour of young population is predominantly influenced by other factors not the housing market situation, e.g by situation at the labour market
- Young population in case of moving will likley look for cheaper options for housing in the same area. Eldery population will face higher problems.
- Depends of course from offer of employment and the level of wages. Only in the city that does not have a sufficient level of application of single rooms rentals
- The "housing career" of young population depends primarily on employment possibilities.
- Eg in Milano most young people leave the city for the sorrounding municipalities due to the housing costs.

- Again, if housing becomes less expensive, wouldn't that be great for home buyers? Without information on why housing markets collapse, these questions cannot be answered.

- It is far more complex than this - old people are not a single category for example, so you cannot generalise.

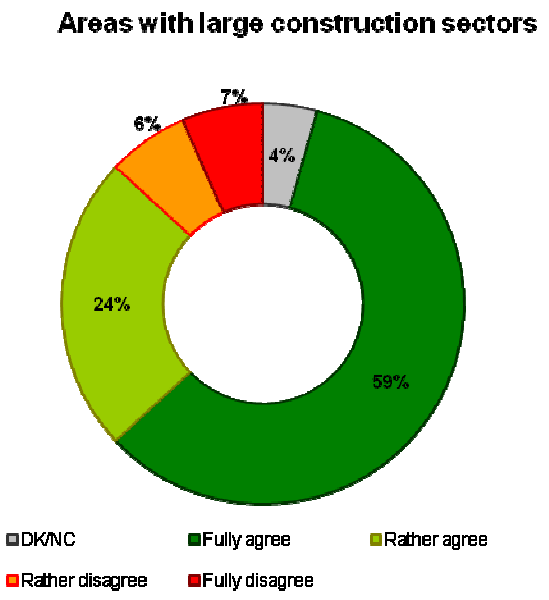
- It is difficult to follow this statement because of other relationships between housing markets and demographics, e.g. an area may fall into a cycle of decline associated with outmigration of those who can afford to move (including young people). 'Stage of life' is better than 'career'. I need another category of answer - 'do not understand'.

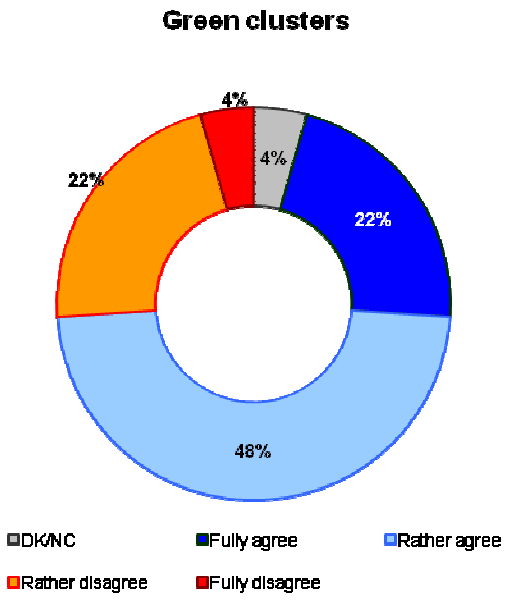
- I fully agree that areas with a larger share of the population will be more impacted. However, I do not think it is about moving, but about that young people still have a high mortgage. Only later in their housing carriier debt is lower. If older people aim to move to smaller housing ist is no problem to find one (their is a lot of supply, but they are not able to sell their existing house). However, older people do not have to move to smaller housing, their kids are coming back to their parents' home to live with them.

- I think population mobility is more complex than a single-fact: it depends on personal economic resources (i.e.: retired british moving to south-spanish coastal areas), living standards and professional requeriments.

- You assume a negative impact on an area. If prices are lower this is an opportunity for 'first time buyers' or new renters. It will depend on the impact of the price collapse on the jobs market. For the elderly the reason to move is the price difference between big and smaller properties. This difference will vary between areas.

4.4.5 Implications on construction sector





Detailed comments

- Construction sector is sensitive for market changes and employment level may vary quickly. Green Cluster sector creates rather small portion of the construction business to change the situation in the construction and real estate sector in the Czech Republic.

- I am doubtful whether problems on the property market support green concepts, since repair, reuse etc. not to speak of smart domotics all need investments.

- In particular where there is no law that can still demolition and rebuilding entirely allowing an adjustment to the most advanced technologies and architecture. Although a collective consciousness more sensitive to environmental problems can promote growth green economy, this may not be sufficient to support the construction market if there is also an effective policy planning

- Economic crisis is giving a push on one hand to reduce soil use, and on the other one to invest in urban regeneration: better energy efficiency, better materials, ecc

- in Lombardy the building Sector is adapting to this situation, investing in remodeling and adapting existing buildings to the new energy efficiency and functional standards

- Again, if residential land becomes less expensive, the housing construction industry should benefit.

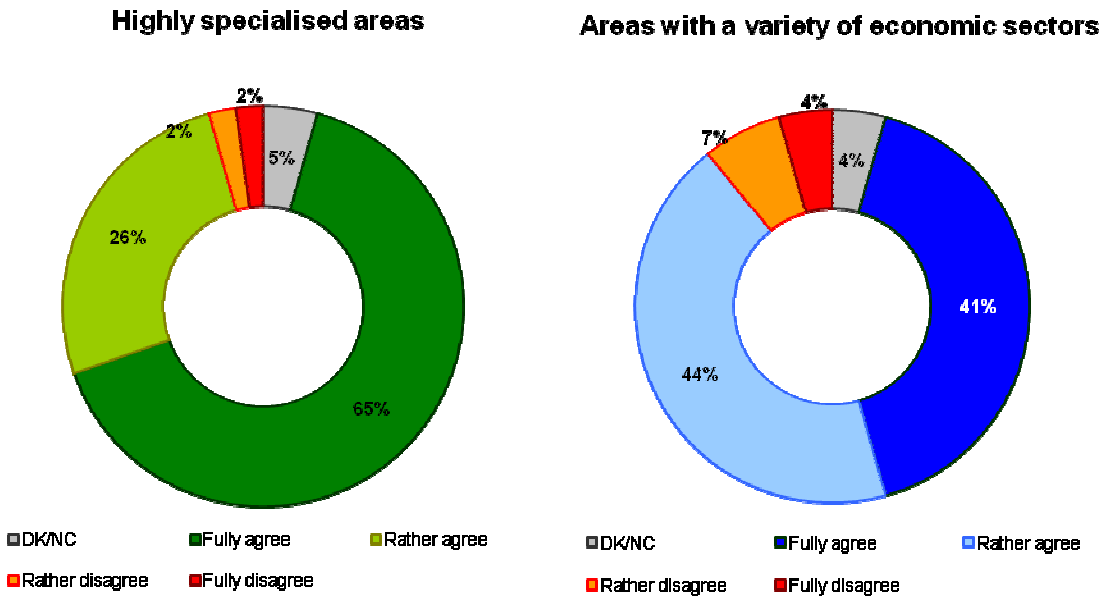
- Spain was a classic example with 40% in construction prior to the 2008 fall.

- A property market collpase will affect mainstream and green construction. So, construction will not focus on sustainable housing, etc. a big collapse means hardly any construction.

- Spanish recent economic and real estate crisis (2007-?) shows exactly this. Construction sector is now recovering thanks to refurbishment works (=green economy).

- By benefit more, you mean suffer less? Only as far as the green economy impacts the property market.

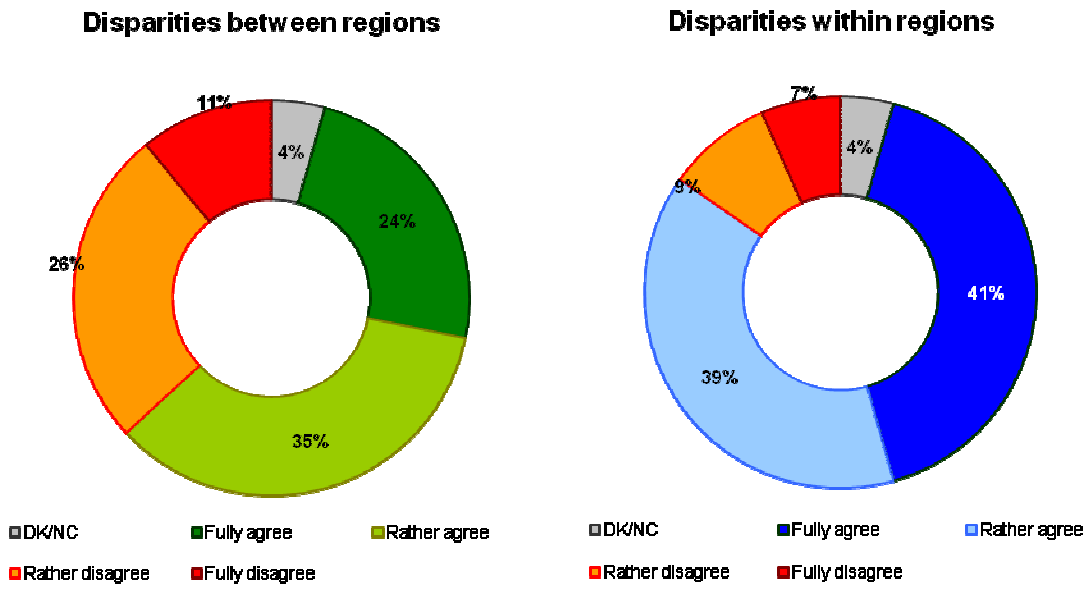
4.4.6 Implications on the economy



Detailed comments

- The economy is in the constant state of flux. It is not likely that the economy will be waiting for the "catastrophe" coming, they will be evolving anyway. This could give them an impact for bigger diversification before the decline would actually happen.
- Areas which are more industrial developed will be more resilient, as well as regions where are better (innovative and flexible) regulation.
- Especially where there is no state legislative update in the field of construction and town planning.
- This is a well known regularity - diversification means a better adaptability.
- If an area has more property related economic activity, the impact will be larger than in areas where this is not the case. A diversified economic structure is more robust.

4.4.7 Implications on real estate



Detailed comments

- Again my "full disagreement" means only that the this will be different as the logic of the market will be different. Therefore it is not possible to use "measures of today".
- The development of disparities is not influenced by investor in the field of real estate markets
- I'm thinking that it´s important to implement the direct change of products/ services. More and more people must be independent of the Financial System!
- The property market of weaker regions is not large and strong enough to ensure reasonable profits as soon as recession is over.
- The investors are more likely to invest in new promising markets than in old declining markets; only in high quality and cost housing a new market can be foreseen
- Both answers seem to be correct, but again as long as the causes of the property market collaps is not explained, they remain speculations.
- Investors will step-out of the market. So they will not invest in property in 4. So they will invest in other assets or in property outside 4. As prices are so low citizens are not pushed out the market based on higher prices. They do not have the possibility to afford to stay (unemployment, etc) or to buy themselves in (they will not get a mortgage). This will indeed result in larger differences between haves and have nots. However, some people that used

to be on the right side of this boundary will end up in poverty.

- Present recovery of spanish real estate markets illustrate this: Barcelona market is growing - fueled by International buyers, while its metropolitan area languishes.

- Disparities of what? Of wealth perhaps not, since rural areas may suffer less as turnover is lower. Investors in declining regions reduce disparities. Impact will depend more on income and non-property assets. But lower property prices would be a major opportunity for lower earners to invest. Unless lenders change collateral and other requirements. This view is very simplistic.

Possible European Territorial Futures

Second Expert consultation on Key Foresight Topics

100% Renewable Energy consultation - analysis of results

5 100% renewable energy results

5.1 Participants profile

Respondents of the survey were mainly researchers and accademics (44%), but also consultants (26%), civil servants (16%), policy makers (9%) and industry members (6%).

In relation to the scope of the expert's professional work, 46% of participants were professionaly engaged at local and regional level, 17% works at the level of Member States, 26% works at European level and 11% has a global territorial scope.

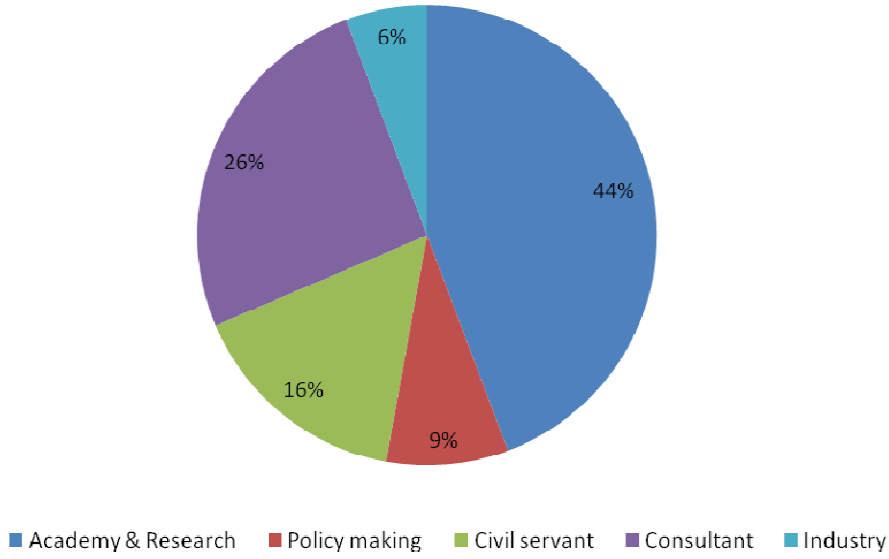


Figure 14. Professional background of participants of 100% Renewable Energy survey

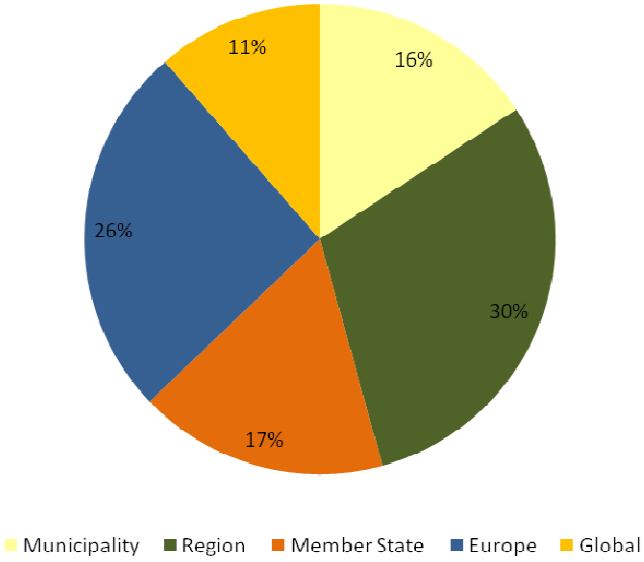


Figure 15. Territorial scope of expert's professional work of participants of 100% Renewable Energy survey

5.2 Survey questions

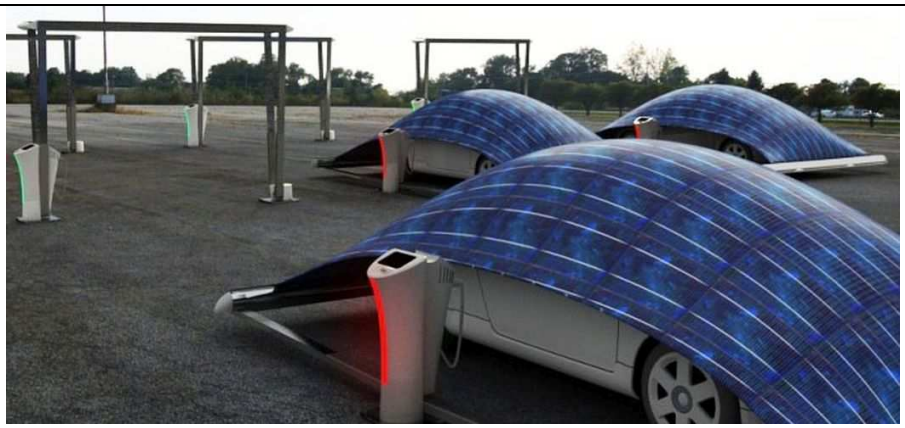
The next figures present the 7 questions asked to experts about the future vision for Renewable Energy in Europe in 2030:

Q1. Implications for regions with renewable energy production

Fossils fuels will no longer be consumed in Europe. The energy market will be completely based on renewable sources.

Regions specialised on RES energy production	Regions with much land for energy production
Regions with high renewable energy production will become much more competitive than today; areas dependent on fossil fuels will suffer structural challenges.	Areas with large renewable energy potential will have to address land-use competition conflicts and face increasing environmental issues and social contestation.

Q2. Implications on the electric infrastructure



The European electric grid has to be highly interconnected to cope with the intermittence of renewable energy production. In the near future Electrical Energy Storage (EES) will become indispensable to allow renewable energy markets to emerge.

Well connected central regions	Areas with suitable energy storage
European central locations have an advantage over peripheral rural regions, as they are better connected to existing main energy infrastructures.	Urban areas and innovative regions will have clear advantage as they have the capacity to support new forms of energy storage and charging systems (e.g. having large plug-in electric vehicle fleets).

Q3. Implications for the economy

Industrial regions will get organised in circular energy loops that facilitate reusing spare energy and recycling waste (heat, water...).

Industrial economies	Service economies
Industrial regions will develop symbiotic clusters where industries will collaborate with each other to reuse by-products of one industry as resources for the next one.	Service economies will get organised in sustainable eco neighborhoods optimising all waste and energy processes in an integrated way.

Q4. Implications on buildings

Buildings will be adapted to a fully decentralised energy system, consuming and also producing renewable energy connected to smart grids.

Areas with a colder climate	Areas with a milder climate
Areas with a colder climate will adapt easier thanks to geothermal and wind energy in buildings, and better insulation.	Areas in the south of Europe will adapt better by implementing solar infrastructure on buildings, green roofs and bioclimatic architecture.

Q5. Implications on bioeconomy

Renewable energy consumption will lead a new agricultural revolution linked to biomass energy and biofuels.

Centrally located agricultural areas	Rural and sparsely populated areas
Central areas with a surplus of agricultural production may benefit strongly from agricultural R&D to develop biofuels, mainly because of proximity to markets.	Rural and sparsely populated areas will benefit more as having plenty of vacant land and become suppliers of primary resources for biomass and biofuels.

Q6. Implications on regional mobility

Transport will be fully powered by renewable energy sources (electricity, biofuels, hidrogen).

Areas with a good rail infrastructure	Regions with car industries
Areas with good rail infrastructure will have an advantage because rail will be the main way forward towards sustainability.	Regions with car industries will boost, as electrification of road transport will successfully provide for flexible and clean transport.

Q7. Implications on global transport

Challenges for electrifying air and maritime transport are very important. Main action in the next decades will be centred on limiting the environmental impacts of ships and airplanes in areas close cities, ports and airports.

Regions with large harbours	Regions with largest intercontinental airports
Regions with large harbours will have an advantage as they have greater capacity to undertake the needed investments for fully electrifying and automating their port infrastructure. Smaller ports may fail to adjust.	Regions with large intercontinental airports will struggle with aviation costs increasing due to difficulties in the electrification of airplanes. This will hit especially long-distance travel.

5.3 Synthesis of results

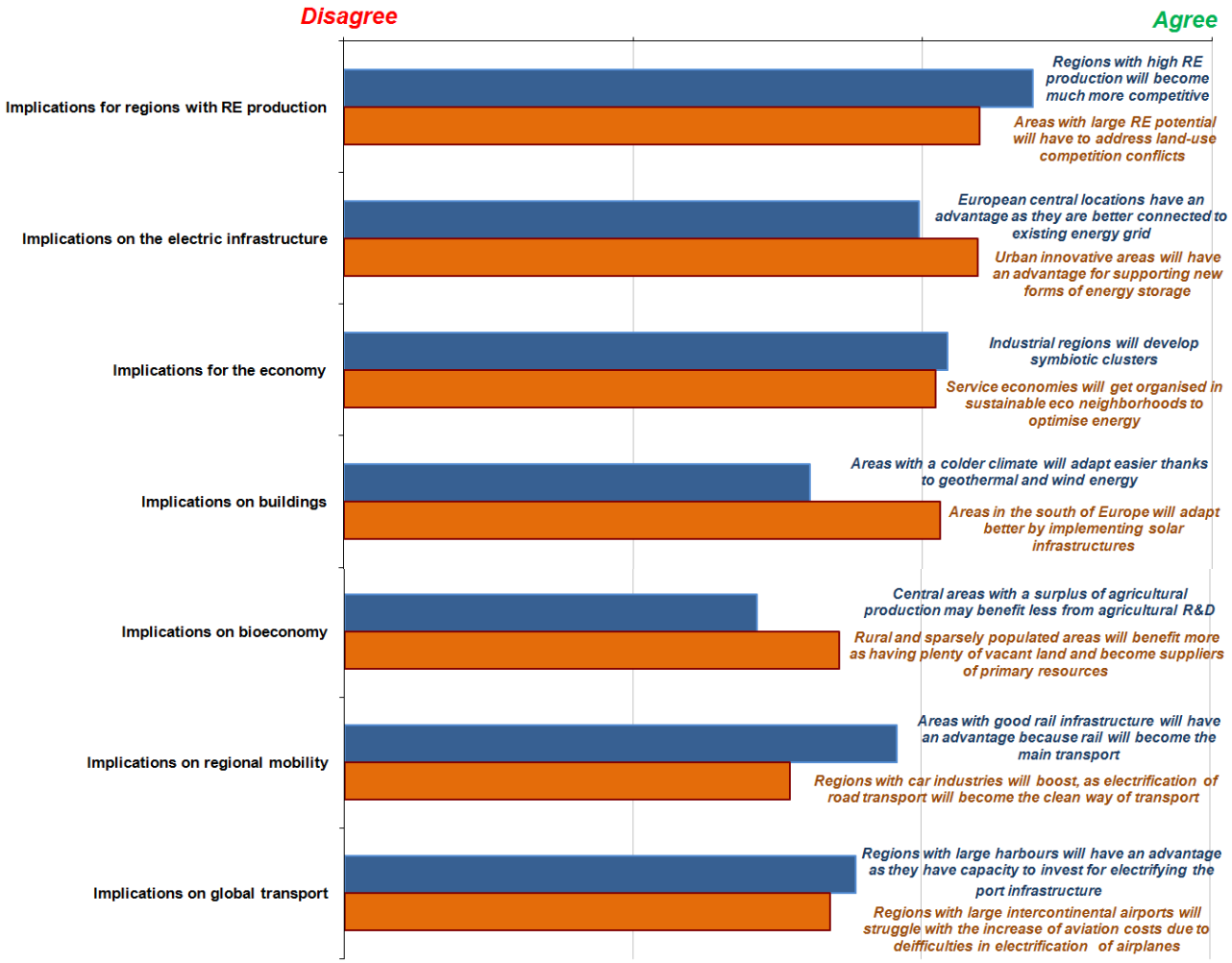
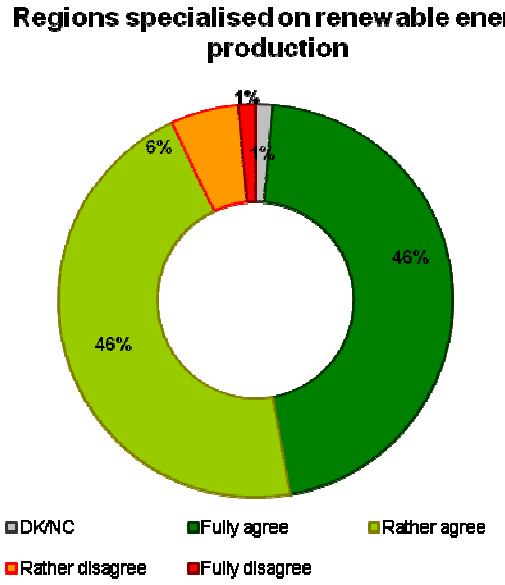
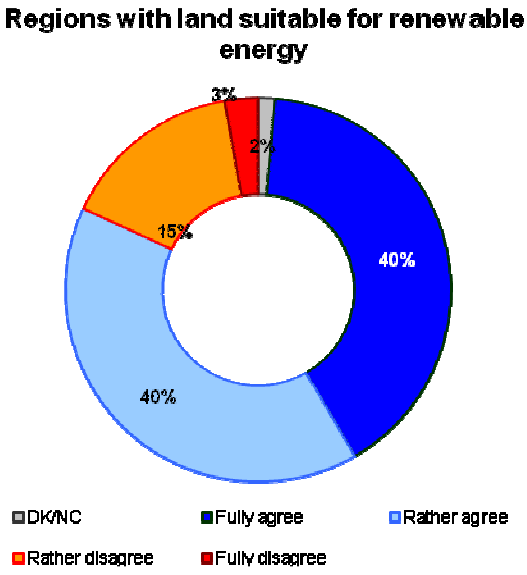


Figure 16. Participants perceptions related to the 100% Renewable Energy Vision

5.4 Detailed Answers to 100% Renewable Energy Survey, question by question

5.4.1 Implications for regions with renewable energy production





Detailed comments

- The transferability of most kinds of industrially (large scale) produced energy, according to my expectations, will probably not benefit specifically the regions with high renewable energy production. The areas dependent on the production of fossil fuels and their use for energz production are already suffering and certainly will suffer deep structural challenges.

- Conflicts are caused mostly by energy from biomass. Only the use of biomass-waste is socially compatible. Environmental issues (resource consumption) limits the potential of solar energy.

- This depends on the degree of trade within the EU and with the rest of the world (of energy but also other products dependent on land such as food).

- Regions with high renewable energy production will be more competitive, provided alternative energy will be cheaper than traditional one - based on coal.

- If consider fossils fuels as stock energy than it is logic that will evolve not only the renewable energy production but also the energy conservation in stocks - therefore I estimate a possible solution to produce artificial fossils fuels. Diversification versus specialisation will be core public debate topic inside a complex decision process made in assimetry of knowldege conditions. In each situation is a trade off. All regions will suffer structural challenges.

- The issue is the time development and the speed of change. 2030 is quite near in an infrastructural sense

- Competitiveness of the economy is not fully dependent on the location of the energy production due to transmission lines - energy production is itself a value driver. Land consumption of RES is important issue, gaining acceptance is crucial.

- Energy transferability will mitigate the advantages of locally producing renewable energy

- Production of renewable energy does not need to consume large land areas and can be placed on waste land, urban and residential land, etc.

- Provided that renewable energy will mainly be based on solar and wind Energie and not of agrofuel, I think that land-use conflicts with respect to renewable energy will not be very severe. In most member states, regions depending on fossil fuel economies (coal mining etc.) have already undergone structural challenges. The severeness of Problems will depend on the extent to which the governments will understand regional development as their own responsibility instead of leaving the Problem to market economics.

- Zones with natural energy resources will have improved their economy. With good planification might get intelligent cities. Zones actually dependent on fossil resources will have the opportunity to transform themselves and improve there economies.

- Competitiveness is ruled by energy generation and transportation prices, so that will depend on how cheap energy is produced and distributed. But this should be the trend, renewable energy decreasing production costs an fuel energy will at least be mantained. Older structures based on fossil fuels will have to adapt so structural challenges will occur. Creating regions from scratch with RE should be easier. The use of landscape should not be a problem, but it has to be well addressed from the beggining.

- In Italy the transition to renewable energy is a must, since we are strongly dependet from foreign fossil sorurces. In Lombardy hydroelectric power provides 70% of the electric uses, but is 4-5 % of total energy consumption, but around 90% of the potential is already exploited. The wind potential is very low. The solar potential could be exploited, but there is a strong conflict on land use with agriculture, therefore our law promote installations on existing building. Biomass is an important resource, also related to livestocks and biogas production from manure, but needs a strong regulation to avoid significant impacts on air quality

- I assume that energy producing regions will be able to economically profit from supplying energy and exporting it to metropolitan areas but it does not automatically lead to higher competitiveness in a general sense. Many more locational factors and sectoral developments are influential to being a competitive region/City; I'm now imagining a metropolitan area - where should be the huge parcels of land for installing wind power. Renewables will be provided from remote areas such as mountainous (water power) or sparsley populated agricultural peripheries (bio). The highest competitive (and highest energy consuming) areas of 4 in 21st Century are metropolitan areas. Secondly, I assume that those peripheral

producing areas will specialise in certain renewables according to their morphology and so might become fairly mono-industrial and vulnerable in economic sense, creating stress for land use and regional development.

- We have already seen how major coal producing regions such as Wallonia have suffered economically with the decline of coal consumption and it is very difficult to develop new sectors of the economy in compensation. Similarly, there is extensive literature on the conflicting demands on land for food and fuel production.

- The level and focus of contestation will depend on technological choices (wind is more controversial than solar), and action taken on energy efficiency (which tends to be more socially progressive).

- The competitiveness of regions with high renewable energy productions depends also on the possibility to distribute this energy to other regions or abroad. For that much more powerful and interconnected power lines are needed. At the moment planning of new or upgrading of existing transmission network is very difficult. Beside challenges mentioned, exploiting RES potential in the regions will change landscape images to a great deal, which will have strong impacts also on tourism potential, cultural heritage (among them UNESCO sites) and agricultural land.

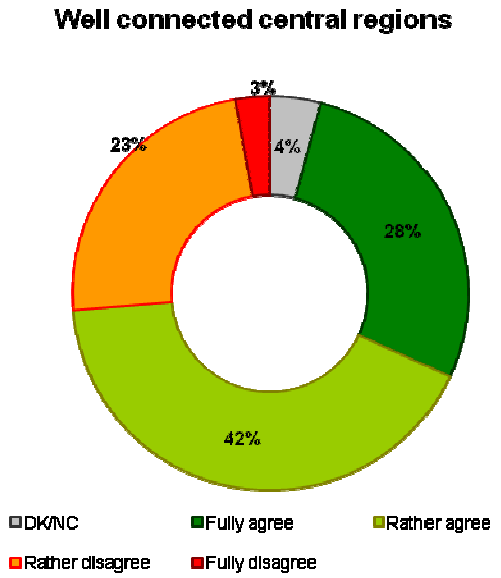
- The switch to RES incl own regional/local production (to a certain meaningful extend in a wider system perspective!) means also a rethinking of our technical systems and the way how households, public services and companies are acting and using energy. Prosumers will be rather the rule than an exception in areas outside of urban settlements. Land use will intensified by the installation of more wind and solar power production sites. Industrial and forest waste products are used for producing bio fuels in a much bigger scale.

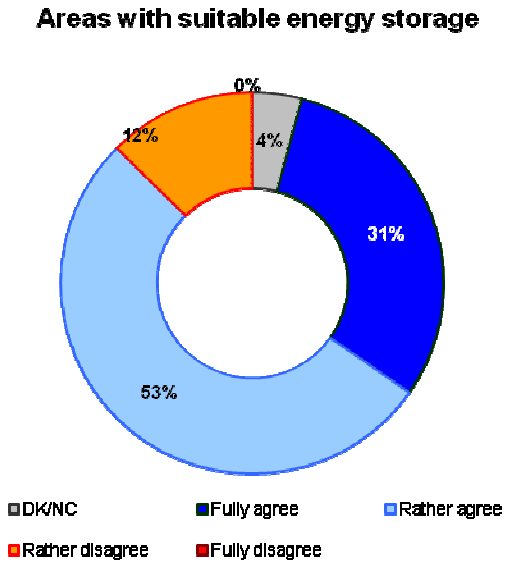
- The regions who administrate a large quantity of energy (renewable energy) become more powerful comparative with other regions. Like before in history, access grant to resources causes conflicts and disputes.

- Will very much depend on the country. For Spain, with excellent wind and solar resources, using roughly 2% of agricultural land will be enough to supply all energy. On the islands, with limited space and high touristic interest, the situation will be more difficult.

- Potential for renewable energy is also dependent on already existing land use, so wether or not you take this existing land use into consideration also influences the future conflict. For instance the potential for wind turbines in highly urbanised areas is limited, because of this land use.

5.4.2 Implications on the electric infrastructure





Detailed comments

- Decentralised production is a main advantage of renewable energies The need for cars in urban areas is significantly less then the current ownership and use. It is greater in rural areas.

- What does it means "innovative regions", I hope you do not mean only technology, but innovation friendly governance as well

- It seems realistic to assume that the vast costs associated to new grid infraestructures will give priority to areas where more population lives. This is exactly what happen when the first grids where built 150 years ago.

- Indisputable advantage of innovative regions in supporting alternative energy is better access to qualified staff and well equipped laboratories and technology centers.

- I don't fully agree with the first statement as I think that central locations also have a higher load (much more people) and are often further away from the centres of production. I think there will be decentralised grids in rural, peripheral areas. I disagree with the second statement as I think that technology diffusion will be fast due to the need to transit to a renewable energy system in such a short time.

- The development of a large scale of Technologies to produce renewables energy implies also the autonomous and independent solution - solution outside the grid. I find more important the acces to an efficient energy source based on a specific technologies.

- These answers depend on the energy and grid system. Urban areas with its industry are consuming such high amounts of energy, which needs huge infrastructure systems. Small rural areas can have microgrids / island grids with smart energy management that are much less complex and so much easier to install.

- Local power generation may rise and rural areas may offer more possibilities for power generation

- Production of renewable energy can be quite decentralized.

- It will be relatively easy for peripheral rural regions to cope with their energy needs using renewable sources within their own Region or neighbourhood. Central Locations will face the Problem of getting electricity from peripheral Areas.

- Peripherical zones will have better a self power supply based on local alternative resources, while centralized zones might take profit of the exceeding power from the network.

- The future is focused on distributed production, so location should not be an issue anymore concerning energy, the problem is rural areas are being deployed from human capital, people is emigrating to the cities.

- the present advantage for the central and urban areas is expected to be overcome by the quick technological progress, regardind the increasing storage capacity of electric vehicles and the diffusion of recharge services. In Lombardy peripheral territories are mainly the mountain areas, where a large part of electric power is produced, so they do not suffer marginality effects. the situation is different for heating servces

- The bigger challenge of connectivity will not be the one between central locations but between renewables producing (often peripheral) regions to central regions.

- This seems plainly obvious, and is also the case with numerous other services such as high-speed broadband.

- I tend to agree, though the politics of change may be stronger in marginal areas (where more people agree that present energy systems cannot stand) than in metropolitan areas, where the status quo ex ante seems to work fine.

- Central - peripheral divide will be quite obvious in this respect, although urban areas could face some additional problems, i.e. where to place big energy storage and charging system.

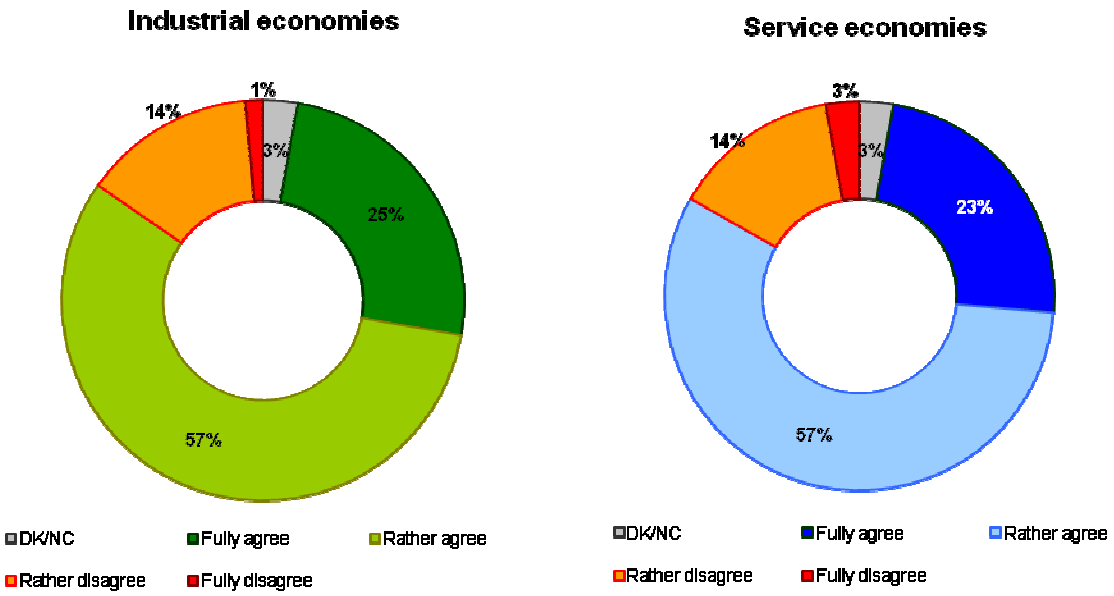
- Rural areas can have advantage as they can build up self-supplying local systems and are not in any cases dependent on bigger grids. Urban areas on the other hand can allocate more capital for storage and charging systems.

- Currently peripheral regions might become production centres for renewable energy and

thus become central regions form the energy point of view.

- I don't think centralisation will be easy given the lack in trust for experts and politics (e.g., Brexit). I think many cities have a problem with innovation, they talk about it, but it's hard to implement really new ideas in practice.

5.4.3 Implications for the economy



Detailed comments

- This may be a long term goal. A mix of functions including production and service facilities should be aimed at.
- The assumptions show deformed understanding what are industrial clusters and what is difference between spatial networks and clusters. Before formulating the questions pls. clarify correctly the basic terms
- Both suggestions are heavily dependent on the organisational capacity and individual willingness to exploit such synergies/opportunities.
- Symbiotic clusters sounds like a good idea, provided collaboration between industries will be profitable and economically viable for both parties.
- These developments are consequences of the local positive externalities agglomerations and covered by the Circular Economy policies.
- This is the positive vision to reduce resource consumption. However, it is hard to realize. Service intermediators are needed to lower the burden of industry and households to facilitate reusing.
- There are some legislative barriers especially about classification of wastes. Materials classified as waste cannot be reused .

- I might agree to the Statements if the time horizon was around 2050/2070. During the next 15 years, the changes will not be so strong. Energy shortages will remain when everything comes from renewables but during the transformation process their might be the impression that electricity may have unlimited sources. Therefore, the problem of energy consuming transport will not be adressed very much which means that the economy will still depend on many long distance transports.

- Still more simbiotic industrial clusters and sustainable eco-neigbourhoods might be the basis for really intelligent cities when capable to melange and coexist.

- The opportunity for this development is good, but there is the need to remove some 4an legislative barriers, such as the waste classification.

- All this will happen only if there are strong positive incentives and/or stong constraints on energy waste.

- This sounds promising, that short distance networks can be created between producers, users and re-users of renewables. Also, indirectly that could delimit unneccessary transportation efforts. Today, transportation costs nearly nothing, presumably, prioritises renewables and goes energy-efficient ways, transportation should be avoided where possible. It wouldn't be a very new Thing. Example from my home town Ebensee in the salt producing region Salzkammergut: the salt factory Saline produced lots of "waste" that could be directly used for the (washing-) soda factory Solvay just 5km away. When Solvay closed down, Saline had to start deposit and cart away the "waste" for high costs.

- Industrial economies: For industrial areas which will be build new or when companies will change their ubication of places of productions this will be true, but for the existing plants it will depend on the type of energy. Generally Networks will be a solution. Concerning heat and cold this will have a Limit of distance! So a distinction between a) existing and newly buildt plants/ production places/ places of high energy consumption and re-use of residual material has toi be made and b) by the type of energy and the distance limts. As a lot of discussion showed, the questions where to invest and where to build, for a lot of industries does not depend on the energy price. Other costs are more relevant.

- While this would seem logical and sensible, 'political' and many other considerations may discourage these processes.

- There is no inevitability about this - who collaborates with whom around what depends on the issue in question, the institutional arrangements, the extent to which traditional 'disposal/end of the pipe' solutions get more difficult.

- From the economies' view point this is plausible future, but how will this impact organisation of life in cities, urban areas?

- Industries, as mostly private actors, have difficulties to combine their own systems with other private firms due to legal and organisatorial as well as safety concerns.

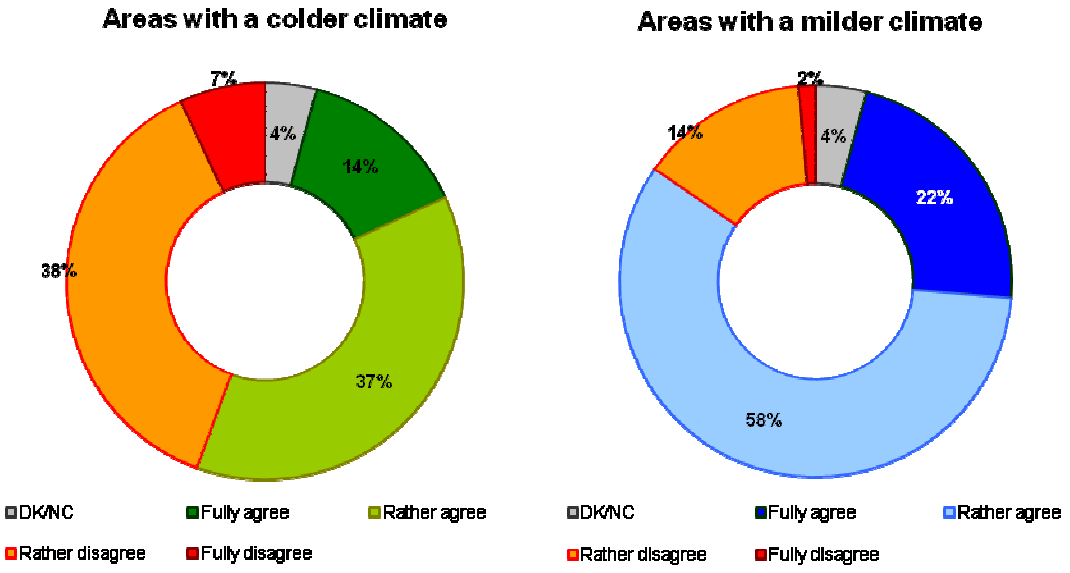
- It is a normal industrial chain. The development for a industrial sector induce a simultaneous for all industrial sector connected.

- It will be necessary that the public administration organize correctly in the energy market in order to not give comparative disadvantages situations between industries, and even between regions.

- I think it's hard for private organisations to collaborate because of competition fears. Also, it's easy for companies to focus on their own and not think about working together even if it's for mutual gain because this adds complexity to the process. Funny, I worked at an integrated steel mill in the 1970s ... these plants were totally symbiotic ... they recycled everything because they could make / save real money that way.

- You have to be carefull becoming dependent on residual flows (either energy, waste, materials, etc). What happens if the supplying industry disappears or wants to optimise its production proces?

5.4.4 Implications on buildings



Detailed comments

- I believe, that the adaptation will be based more on the technological preparedness, national policies and economical pressure than on the colder climate or North/South location of the areas

- Regarding the first question, yes this is what we observe so far and this might take a long time to balance. Regarding the second question, due to my knowledge there are also potentials in the north and the question is rather of willingness to apply costly technologies.

- We shouldn't generalize. Not every area with a colder climate has a good geothermal and wind energy potential.

- If looking at the climate change it will be relative this classification. Also there is a high probability for increasing the dezastre impact. Buildings will need to be equipped with a diversified sets of technologies.

- The adaptation of buildings - with about 70 or 80% of the buildings in 2050 are already build - is a complex process of refurbishments. This lowers the margin for action for adaptation to more energy efficient buildings. It needs good support systems to push the owners to invest in these issues.

- It implies also recovering building tipologies that are traditionally rooted on landscape, with more efficient materials.

- These are the ways to improve buildings, and build new ones, but it is not economically sustainable nowadays, price of installations and renewable equipment should decrease. Also laws in Southern policies must change (Spain does not allow that from a economical point of view for instance)

- the key point for buildings is to reduce consumptio, not only through a better insulation, but alsi in many different areas and ways, starting form the architectural projects to the use of different materials, to residents behaviuor

- Areas in southern countries will have to spend more energy on air conditioning.

- For both :a) mostly we are talking about a built Environment. So the change is not as easy as for buildings and Areas which will be build. Changing the necessary infrastructure in built-up Areas is even more dificult and expensive. b) as the development of the last showed. The influence of political descisions is very important, e.g. Spain and the entities own use of solar energy , eg. Germany the chance of the financing System (EEG).

- Geothermal and wind will not necessary prove to be adequate sources of energy to support the necessary transition in areas with a colder climate while, although areas in the south of 4 would seem to be well placed to achieve transition, organisational weaknesses frequently observed in major civil engineering projects may well impede progress.

- Not sure the question makes sense. It also assumes that ease of adaptation is a matter of technological availability rather than social and economic conditions - not so.

- As described, it could be true for new buildings, but not for the existing or historic building stock which followed guidelines which did not give so much accent to RES. We have a lot of settlement patterns, especially in rural areas that followed the logic of avoiding good quality agricultural soils in order to preserve it for food production. Many of these settlements have unsuitable placement in terms of insulation (depending on micro-relief). Geothermal energy is not available everywhere in areas with colder climate.

- Cold regions' building stocks need a lot of energy for warming up (still necessary even if there are better standards in the future) the living or working areas. There is large housing stock with bad energy performance still to be refurbished...

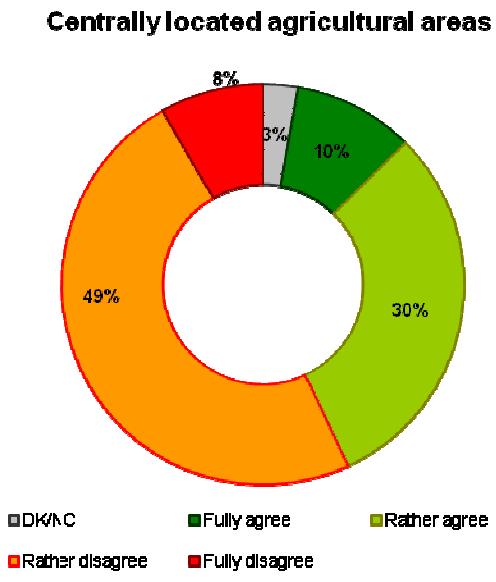
- Natural resources like geothermal or wind energy are not viable in all regions with colder climate. This regions must find another resources to produce energy.

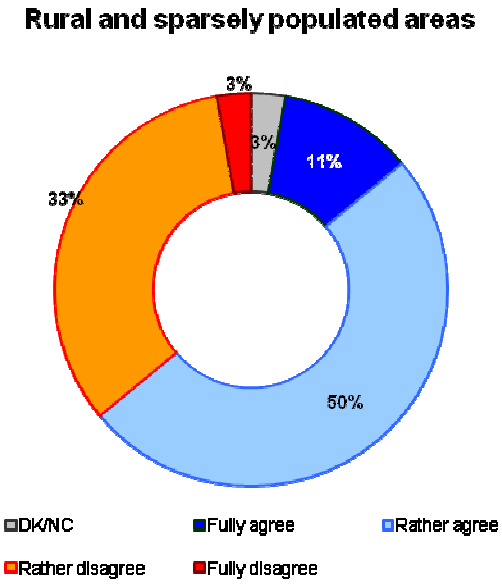
- I think both areas - northern and southern - have (different) opportunities and chances but also challenges. I'm not sure, if one of them will adapt better/easier than the other .... but differently for sure

- Changing buildings is hard work ... really making a difference will require good subsidy and tax policy.

- Why adapt easier in colder climate? They have an extra challenge of coping with heat demand. You also have to be carefull not to create 'energy islands' where only the people being able to afford energy investments can profit.

5.4.5 Implications on bioeconomy





Detailed comments

- Both assumption are deformed, such interdependence does not exist. The rural areas do not benefit from change in the agriculture motivated by production of resources for bioenergy, in opposite, it caused the lost of labours in the agriculture.

- I do not think that it is mainly a question of central or peripheral, it is the overall question of how the industry agricultural production market is organised and the local capacity and willingness for priotising biomass energy and biofuels over other alternatives.

- Given the low density of biofuels, EU could nor produce a relevant amount of them in relation to the current consumption of liquids (if we want to continue producing our food). There is no "plenty of vacant land" in EU.

- The aliment safety is another strategic priority. Supporting the organic agriculture implies the decrease o productivity, also the scarce water resources coupled with desertification processes already diminish more and more the agricultural areas. Other significant factors are the expanding of constructed areas or for reads by changing the of land using. Here lies important conflicts and trade offs. One important conflict is between genetic caracteristics of the alimentary crops versus biomass crops.

- Central areas could mean many things. But basically the pressure on these lands is much larger than in more peripheral areas. Thus the central areas have stronger functional competition and will be less apt for bulk bio generation for energy purposes

- Biofuels and others are a complex issue due to competition with food production, but also with the danger of nitrification of the soil from the waste of the process. The way that works

is 2nd generation biofuels from biomass waste and maybe 3rd gen. biofuels from algae (but not until 2030).

- Mind the trend to use land for energy and not for food if they are not balanced in term of revenue : business is greedy.

- Large areas will be the 98% producers, with 2% population for the other 98% living in cities. The second cuestión will depend on where the biofuel is processed. Here we have a distribution problem again and Biofuels are more expensive than electrical generation.

- These are areas of interest, that need a very good regulation, to avoid possible negative effects due to market distortions. So far as neglected and vacant land is valorised, and closed loop economy are supported, we espect poistive impacts. If higly productive agricultural areas are diverted from food production to other uses, we espect negative impacts, both on sustainability, environment quality and long term markets

- Biofuel production will be in conflict with agricultural food production.

- Again, I assume that there are many more factors that exert pressure on green/unbuilt land in close-by locations to metropolises. It's difficult to imagine that in future you'd get more value for a close-by-a-city land by creating super large agricultural sites instead of (sprawled, suburban) built-up areas for housing and commerce. Land value is so dramatically less in peripheries (both on national - e.g. NUTS 113 Südburgendland - and on continental level - e.g. rural Romania).

- Centrally located agricultural Areas: I agree fully, even if it is a Surplus. If not, otehr implications will be very high. Rural and sparsely populated Areas: Maybe this will depend on the Country. E.g. in Germany does not exist plenty of vacant land. Furthermore the German discussion showed the high impact of monocultures for energy production. ON the other hand there are ways of a better energy-agriculture, like a BBSR-Studie from the end of the 2000s showed. Uckert, G.; Schuler, J.; Matzdorf, B.; Lorenz, J.; Hucke, I. & Hildebrand, S.: Grünes Gold im Osten?! : Flächenansprüche von Biomassepfaden durch klimabedingte Ausbauziele und Handlungsoptionen für die Raumordnung. Endbericht. - Müncheberg 2007

- Rural and sparsely populated areas do not necessarily have plenty of vacant land that would be suitable for biofuel production, and the cost of transportation to energy production centres may prove to be prohibitive.

- Biofuels isn't my field but there may be powerful economic reasons why industrial scale biofuel production (especially for transport fuels) is located well awy from 4an countries, to areas where land and regulation are both cheaper. Biofuels are diverse.

- This could happen, but promoting RES may not contradict other aspects, such as using short food value chains in rural and urban areas. We should not put food production in competition with production of biofuels or biomass energy.

- Sparse areas can be developed if new business models are found and work. But there is still a

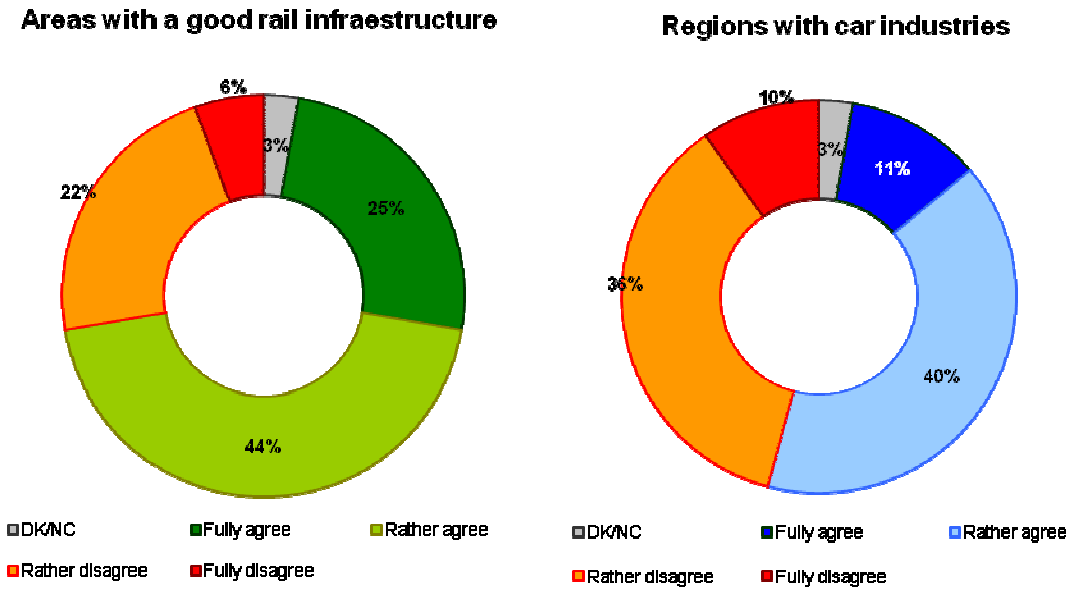
high need of looking in LCA-perspectives when producing biofuels/RES in general!

- The biofuels have some compatibility issues with the agricultural system. This strategy may have a ceiling of development.

- I think the energy return on biofuels is way too low compared to solar and wind. I don´t see a big future for them.

- You have to be carefull when focussing on biomass: it is not a sustainable source when used in large scale installations: it competes with food-production and when transported form far away (canada or sparsely populated areas in Europe) the transport of this biomass asks for large amounts of energy.

5.4.6 Implications on regional mobility



Detailed comments

- The change of the prevailing transport mode of goods (freight) back to rail is not materializing and remains still to be seen, despite the EU forecasts... It remains still to be seen, whether the electrification of the road transport will not finish as an episode, as well as whether the biofuels and hydrogen cells become economically and ecologically competitive to the fossil fuels... rail infrastructure is only one alternative for the transformation of modal split

- These answers are due to the current power hierarchy between rail and road. This will be difficult to change - also since politics seem to favour the potentials of electric cars....so individualized transport modes are priotised over collective ones. The recent hype on autonomous driving is just another example.

- As electric transport may be described as “clean” in the local context, sometimes its eco-friendliness may be controversial in the regional or global context. In Poland 85% of electricity is produced of coal. We’ve got trolleybus networks in 3 polish cities, where local residents benefit from clean air. But industrial areas on the south must face increased CO2 emission.

- Digitisation and local development will diminish the transport importance. Another trend will be the optimum size of urban areas designing in view to apply the principles of Circular

Economy. Energy Efficiency, etc....in short of sustainable development principles

- RAIL: difficult to fully see the percentage of rail success over other tp versions. YES definitely for distance transports, but not necessarily for all geographic structures and needs REGIONS: it is not the production of the cars that matter (they can be perchased from anywhere). But it is economy and spatial socio-economic planning that matters

- Rail is since decades be a major driver of electric mobility. In the future new propulsion train technologies will come into play for individual transport that allows for flexibility and the last mile transport. Freight transport and ships will not be electric. Today car industry tends to suffer strongly from the much less complex e-cars that can be build by companies without big expertise in automotive.

- Rail is not the main way towards sustainability, in particular with the new typology of road vehicles and cooperative economy.

- This has to be analysed in terms of industrial ecology (from cradle to grave even if several loops between these two ends) and not at one stage of consumption. Mobility matters, which are only means, can address production and consumptions matters.

- Public transportation is key

- Although cities were self sufficient transportation will be yet necessary by public and private ways. A network of lineal cities, open to the landscape, will be possible taking profit of adavantages of cheaper public transportation.

- Building railway infrastructures implies a big investment, having them already in place is a good advantage. As for the car market, there can be for a short while an acceleration on the car park turn over, but in the long run the number of people having a car isn't influenced by the technology

- Here I don't get it completely. First, railways, okay, importance of this mode of transport will have increased in a renewable energy future, especially with regards to goods and freight transport. But second, I see no connection whether car industry regions will experience more flexible and clean transport. Cars are bought everywhere outside the producing regions as well. So why should just the city region of e.g. Wolfsburg get cleaner transport? When it comes to cars (and to person transport), I see rather a challenge from social perspective - electric cars should be affordable to also low income households. It could be an unfair cut-back in mobility options for poor people, if fuel cars become completely restricted but e-cars are comparably super expensive because of new technologies.

- Areas with good rail infrastructure: Here the challenge is that we have to Change/ improve an existing System. Even the Dutch-German railway from Rotterdam to the Rhine-Valley Shows that not only technique is challenge. People and politicians are a big challenge, too. On the regional level the ruhr area / rhine area show that it may take 15 - 20 years to adapted the existing infrastructure only for todays demand. Areas with good rail infrastructure: The car won't be such an important element any longer. Improved inter-

mobility and a change of values, moral concepts, ideas (by the people) will Change the inmportance of owning a car. It doesn't matter if fuel based or electrified

- As much as I would like to see rail benefit from the move to energy self-sufficiency, it seems inevitable that cars, or some other form of individual mobility, will dominate.

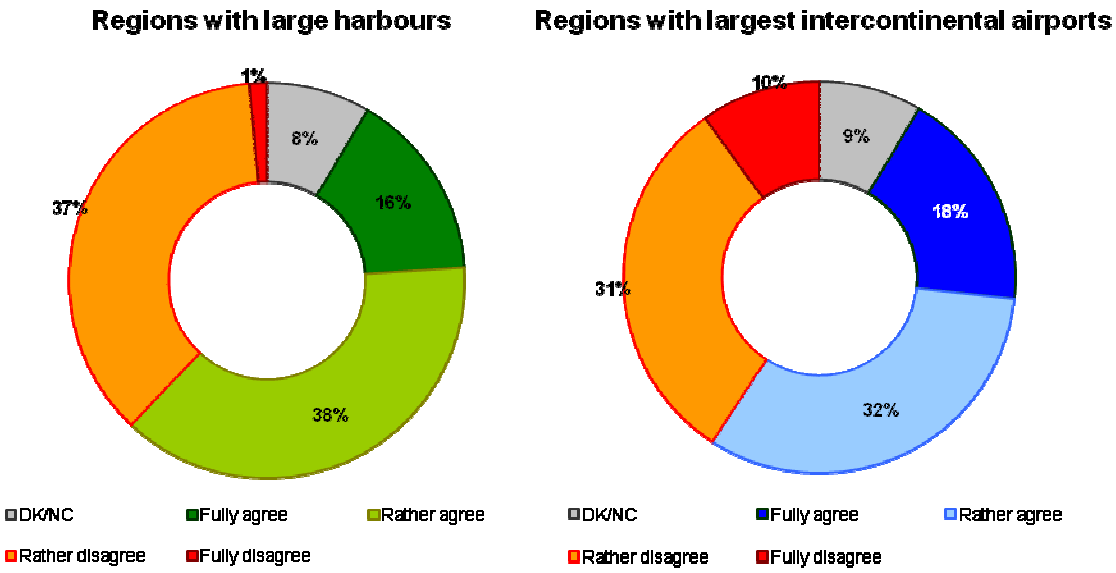
- The problem will be with the regions that do not have appropriate rail infrastructure and relief or scarcity of population will not bi financially sustainable. Similar is with electric mobility in mountainous or poor regions - electric mobility in such regions will maybe not be an advantage.

- Mobility service will hopefully replace mobility (as a presumption to have a right upon). Sustainable regional development and planning in the future means that new settlements should only be allowed in combination with good connection to public transport.

- Both, rail and car are important for transport sector. First have a large capacity and speed, second have a good accessibility. In future this two kind of transport mode must be complemnetary.

- Rail transport will be important for some specific segments of mobility, but the bulk of transportation will depend on private vehicles.

5.4.7 Implications on global transport



Detailed comments

- Flights are generally too cheap and do not meet the costs. Is a great number of flights ecologically desirable ?
- Not really sure about question one. Maybe smaller harbors are faster and more flexible to adapt - less investments needed due to their limited size (maybe).
- Maritim transport requires much lower energy per tonne/passenger transported than planes.
- AIRPORTS: there are many factors going in different directions. Very short air line distances may have less development potential in comparisons with fast trains. Long distance air travel is still very needed, but the pressure will be on costs and environmental conditions.
- You should distinguish between maritime transport and port infrastructure. Maritime transport may become less damaging to the environment, but essentially through fuel cell engines. Once in the harbour ships may be connected to the electric grid and reduce urban pollution, but this only avoids a small part of total emissions. For adaptation investments possible the biggest harbours have advantages. Electrification of airplanes will probably happen well beyond 2030. In any case, little impact on actual air travel, even if some environmental taxes increase tariffs.
- Small harbours will also have a lot of opportunities for electrifying their infrastructure. The question is whether maritime transport itself can be electrified. Otherwise, a lot of Transport

will be transferred to rail Transport (including overseas). Air-borne transport will struggle in general. Even if fuel for planes would be produced, reducing renewable energy, that will be quite expensive, and intra-continental air Transport will be shifted to rail and trans-continental air transport will be reduced in general, shifted to rail or replaced by journey to destinations which can be reached by rail or ship.

- Intermodality for best profit of time will be more necessary then ever, but yes, for long trips it's necessary a more sustainable tranportation than airplanes.

- Smaller ports smaller investments but this have to be calculated. They may adapt, a gate to the sea is always important, even it is smaller. Electrification of airplanes will be slower just because the technology we have at this point. It may occur at the same time of tele transportation .

- Both large harbours and large airports will become less prosperous as long-distance mobility and transport will be more constrained.

- Regions with large harbours : I rather agree not because of the electrification, but because of the size of ships and the need for a good /effi. handling of goods and brining them their final destionation (intermobility)
  intercontinental Airports: Maybe I don't understand the sentence, but why should large intercontinental Airports only have problems because of increasing costs? Maybe it is more a question of techological development concering storage for Long distance flys?

- Large harbours have specific advantages of achieving critical mass, while smaller can me more adjustable to specific conditions, especially because not only electrification and automating the port infrastructure will be needed but also improved connection to hinterland areas with different types of transport. So, maybe in the first phase such port will may have advantages. There is a electric technology development also in the field of aircraft, although at the moment not very reliable.

- If IMO and IAO can find feasible ways to electrify their transports there might be no advantage or disadvantage that is related to a certain location or size (of an airport or harbour).

- Electrification of air transport ... or use of biofuels? Regions with airports will probably struggle due to loss of jobs if flights become much more expensive again leading to less flight transport.

- Funny, small ports were the first to embrace containerisation ... see Port of Oakland versus Port of San Francisco ... so maybe large is not best ... large are conservative organisations. Large intercontinental airports will not have a problem because they serve very long distance trips ... they will be linked with better rail service to surrounding cities ... it will be the airports in these cities that have problems ... although this all depends on some regulations or tax policy that increases aviation fuel costs, I am not confident that this will happen.