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100 Social Sciences and Humanities priority research questions for transport and mobility in Horizon Europe

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Publication date:
2020

Document Version
Publisher's PDF, also known as Version of record

[Link to publication from Aalborg University](#)

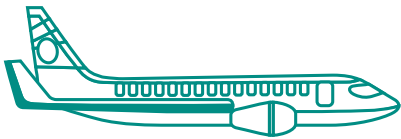
Citation for published version (APA):

Ryghaug, M., Subotički, I., von Wirth, T., Smeds, E., Scherrer, A., Foulds, C., Bertolini, L., Beyazit Ince, E., Brand, R., Cohen-Blankshtain, G., Dijk, M., Freudendal-Pedersen, M., Gössling, S., Guzik, R., Kivimaa, P., Klöckner, C., Lazarova Nikolova, C., Lis, A., Marquet, O., ... Wentland, A. (2020). *100 Social Sciences and Humanities priority research questions for transport and mobility in Horizon Europe*. https://energy-shifts.eu/wp-content/uploads/2020/12/D2.3_WG4_transport.pdf

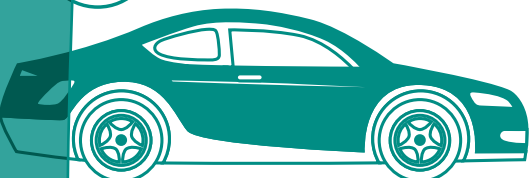
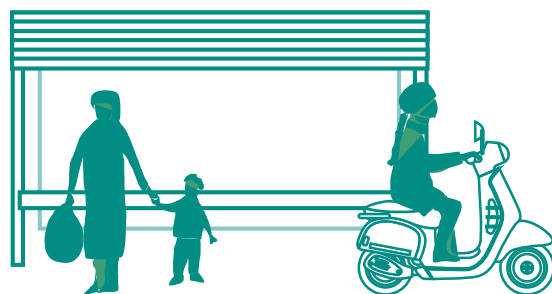
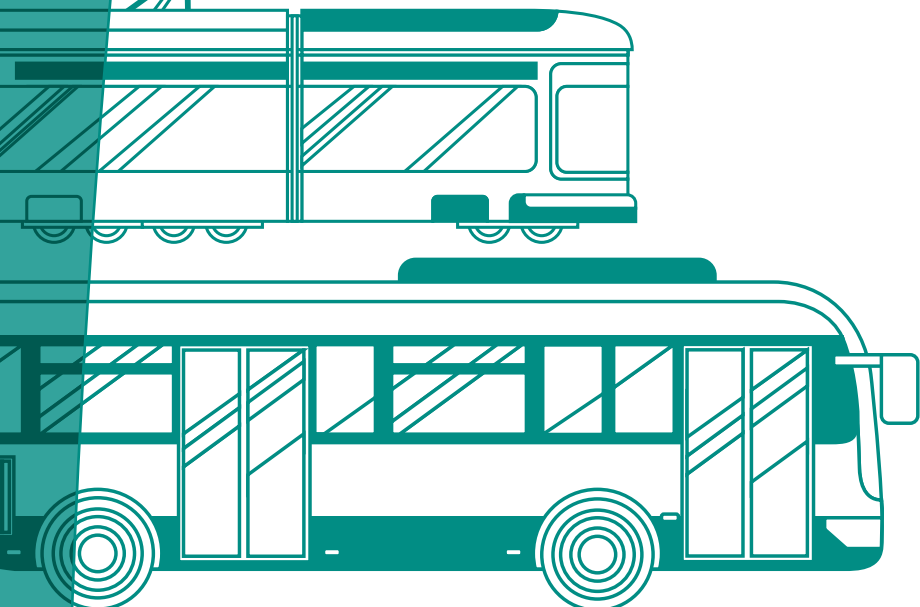
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This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 826025.



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INNOVATION
FORUM
TARGETING THE
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100 Social Sciences and Humanities priority research questions for transport and mobility in Horizon Europe

November 2020

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Suggested citation

Ryghaug, M., Subotički, I., von Wirth, T., Smeds, E., Scherrer, A., Foulds, C., Bertolini, L., Ince, E.B., Brand, R., Cohen-Blankshtain, G., Dijk, M., Freudendal-Pedersen, M., Gössling, S., Guzik, R., Kivimaa, P., Klöckner, C., Nikolova, H. L., Lis, A., Marquet, O., Milakis, D., Mladenović, M., Mom, G., Mullen, C., Ortar, N., Pucci, P., Oliveira, C.S., Schwanen, T., Seidenglanz, D., Tuvikene, T. and Wentland, A., 2020. *100 Social Sciences and Humanities priority research questions for transport and mobility in Horizon Europe*. Cambridge: Energy-SHIFTS.



Executive summary

The launch of the European Union's (EU) Horizon Europe programme provides exciting opportunities for Social Sciences and Humanities (SSH) research to contribute to the fulfilment of the EU's ambitious policy goals on energy and climate change. This report presents 100 questions that have been identified by experts as key priorities for SSH research on transport and mobility, in order to inform and support these goals. Specifically, these questions aim:

To promote SSH research in the transition towards a carbon-neutral and socially just European transport system by 2050, which caters for human well-being, while acknowledging planetary boundaries and the need for climate change mitigation.

The 100 priority questions are grouped into eight themes, as follows:

1. **Co-producing knowledge and professional practices.**

Questions focus on how to better facilitate learning across different professional practices such as research, policy and planning.

2. **Scenarios, futures, visions and transition pathways**

Questions focus on how a sustainable transport and mobility system should look like in the future and possible transition pathways to arrive at such visions.

3. **Dominant mobility regimes and car dependency**

Questions focus on what stabilises, as well as ways to change or disrupt lock-ins created by the dominant (auto)mobility regime, where the car usually takes centre-stage.

4. **Governance, policies and incentives**

Questions focus on the role of governance, policies and incentives in shaping current transport and mobility systems, and their effect on the development and implementation of different technologies and modes of transport.

5. **Participation and citizen engagement**

Questions focus on public participation and different methods to engage citizens in transport and mobility systems planning and realizations.

6. **Mobility practices and mobility needs**

Questions focus everyday experiences with and needs for mobility.

7. **Risks, disruptions and negative or unanticipated consequences**

Questions focus on disruptive events such as natural disasters or global pandemics and associated drawbacks and risks related to low-carbon, autonomous or connected transport technologies.

8. **Social justice and inclusion**

Questions focus on how sustainable transport and mobility transitions can be socially just and inclusive.

To identify the 100 questions, we undertook a Horizon Scanning exercise over August 2019 – October 2020. This involved a Working Group of 24 energy-SSH experts from across Europe, encompassing diverse SSH disciplines, interdisciplinary experiences, genders, geographies, research interests and career stages. A Horizon Scan survey of this group and their wider contacts (86 respondents in total) generated a list of 299 possible questions. After an initial editing process, 274 revised questions were presented to the Working Group to be ranked according to their priority, using a second survey. The results of this survey fed into two virtual workshops with Working Group members, where questions were discussed and revised. This deliberative process resulted in a final list of 100 priority questions for SSH research on transport and mobility.

This list is not intended to be exhaustive but aims to serve as a stimulus or starting point for discussions between policymakers, funders and researchers on how SSH evidence on transport and mobility and related issues can best support policy goals on energy and climate change.



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1. Introduction

1.1. Background: the start of Horizon Europe

The end of 2020 sees the start of the handover between European Union (EU) Framework Programmes (FP). Specifically, Horizon 2020 (FP8), which ran principally over 2014–2020, is coming to an end, and Horizon Europe (FP9) will soon release its first funding calls for 2021–2022. As such, the outcomes of the European Commission's (EC) recent strategic planning exercises for European research and innovation over the period 2021–2027 are now being made clear. As part of this handover, the European Commission has maintained its commitment both to mainstreaming Social Sciences and Humanities (SSH) across all of its funded research (which is likely to be predominantly technical and natural science-led research), as well as to creating opportunities for dedicated SSH-led research where needed.

It is these contexts – of strategic change in European research and innovation, and renewed commitments to SSH (without exact clarity on what forms this may take) – that provide the foundations for this report on research priorities. Indeed, there is an opportunity for truly cutting-edge programmes of research and innovation to be funded, and this is a key moment for SSH communities to constructively develop and communicate their own priorities. Such opportunities must be urgently grasped, not least in energy-related research and innovation, where the vast majority of funding has gone to the natural and technical sciences (c.f. Overland and Sovacool, 2020) and efforts towards interdisciplinarity have had limited effect (Baum and Bartkowski, 2020). Moreover, there is clear evidence indicating the funding of energy-related SSH in Horizon 2020 to be minimal, disciplinarily-narrow, overly-instrumental and lacking critical perspectives (Genus et al., 2018; Kania et al., 2019; Foulds and Christensen, 2016; Robison and Foulds, 2019). Much still needs to be done for the EC to get the most out of energy-SSH.

1.2. Aims and hopes for the use of this report to support the European Commission

The aim of this report is to present priority SSH research questions for the EC to consider funding in Horizon Europe, specifically in relation to transport and mobility. This is one of four reports detailing the 100 priority SSH research questions for key topics associated with the EU Energy Union: renewables; smart consumption; energy efficiency; and transport and mobility. These topics were set to align with existing EC research and innovation funding priorities, as part of contributing to EU energy policy commitments. Indeed, we understand that transport and mobility will be a core funding priority in Horizon Europe's Cluster 5 on 'Climate, energy, mobility' (EC, 2019c: Annex 5), given its consistently-core position in the Strategic Energy Technology Plan (EC, 2015), Clean Energy for All Europeans Package (EC, 2019a), long-term vision for A Clean Planet for All (EC, 2018), and European Green Deal (EC, 2019b). Given this, we set ourselves the challenge of identifying what an SSH-led research agenda could look like, with transport and mobility as the starting point¹.

Our hope is therefore that this report provides the EC with resources to support reflection on alternative possibilities of energy-SSH, as it begins writing more funding calls around transport and mobility in Cluster 5. Whilst we recognise that this cluster will have its own working structure, and that member state interests will also need to actively help construct these calls, we certainly hope that the below priorities from the SSH communities themselves are useful. Indeed, a concern of SSH researchers has long been that their own research agendas have been overtly directed by

.....
 1 We take a holistic approach to defining transport and mobility, including transport technologies, different energy sources, and various mobility practices. Whilst 'transport' puts the focus on various transport technologies and infrastructures, 'mobility' focuses on a broad spectrum of actors and processes connected to movement that embodies e.g. experiences, issues of access and justice, and movement of both human and non-human actors. For further details, please see the Terms of Reference for this exercise (Ryghaug et al., 2019).



non-SSH specialists, who may have different expectations on what SSH can do in supporting policy ambitions – both conceptually and practically, sometimes leading to misunderstandings and poor outcomes.

1.3. Using Horizon Scanning methods

In identifying our 100 priority SSH research questions, we undertook a Horizon Scanning exercise over August 2019 – October 2020. Horizon Scanning methods are “used to gain foresight about emerging opportunities and risks, identify knowledge gaps at the frontiers of fast-evolving phenomena, and set strategic priorities for decision-makers or researchers” (Foulds et al., 2019, p.10). Over the last 10-20 years, Horizon Scanning has become relatively well-established in policy circles, with policy actors keen to better anticipate problems and novel solutions.

Within the range of Horizon Scanning methods on offer, there have been numerous ‘question selection’ exercises (e.g. Ingram et al., 2013; Pretty et al., 2010; Sutherland et al., 2019). These exercises have tended to create research agendas “by better aligning research questions with policy needs... [so as to be] more relevant to policy makers and thus increase its real-world salience” (Rudd, 2010, p.861). It is exactly this intent and approach that inspired the Horizon Scanning exercises that sits behind our 100 priority SSH questions.

Specifically, our own Horizon Scanning began with a core team producing Terms of Reference (Ryghaug et al., 2019), which set the boundaries and starting points for each of the four Working Groups. Each Horizon Scanning exercise involved a Working Group of 25+ energy-SSH experts from across Europe. The Terms of Reference fed into the production of methodological guidelines (Foulds et al., 2019), which all Working Groups followed. Please see these guidelines for an in-depth overview, but in brief²:

1. We systematically constructed a Working Group that prioritised diversity of e.g. SSH disciplines, interdisciplinary experiences, genders, geographies, research interests, career stages, etc. Appendix 1 includes a breakdown of final Working Group member characteristics.
2. We utilised the contacts of Working Group members, to gather submissions of priority questions via a first Horizon Scan survey (generating 299

.....
 2 All four Energy-SHIFTS Working Groups followed the same five steps, albeit with each yielding e.g. different numbers of questions.

questions in total) from European transport and mobility SSH communities. Appendix 2 includes a breakdown of respondent characteristics.

3. We centrally processed and edited the submitted questions, to address e.g. irrelevance to transport and mobility, non-SSH focus, cross-question similarity, English language (Appendix 3).
4. Working Group members evaluated the newly-produced list of 274 SSH questions, via a second Horizon Scan survey, scoring them on a scale of 1 (‘definitely exclude’) to 5 (‘definitely include’), and providing other qualitative feedback. Appendix 4 includes the headline results from this Working Group member evaluation task.
5. Evaluation results were centrally analysed, feeding into two virtual workshops with Working Group members, where question selection decisions were deliberated. Appendix 5 includes information on the systematic procedure adopted in creating the ‘longlist’ of questions that was provided to members for deliberation. This deliberative process resulted in the final list of 100 priority questions.

Sitting alongside this Horizon Scanning exercise are 10 interviews with an interdisciplinary cross-section of Working Group members. These 10 interviews were undertaken shortly before the launch of the first Horizon Scanning surveys and were focused on past SSH developments and debates on transport and mobility. They have provided steering context when reflecting on the past and future directions and contributions of SSH on transport and mobility.

1.4. Mission statement from Transport and Mobility Working Group members

The mission of research priorities presented by the Transport and Mobility Working Group’s 100 priority questions is:

To promote SSH research in the transition towards a carbon-neutral and socially just European transport system by 2050, which caters for human well-being, while acknowledging planetary boundaries and the need for climate change mitigation.

We recognise that transforming the current unsustainable transport system and mobility practices requires rebalancing the focus from technical to societal dimensions of the transport and mobility transition. Specifically, this means that: questions of



justice should be centre-stage; a shift is needed from techno-economic to a socio-technical perspectives on mobility transitions; and deep interventions in technology, knowledge production, policies and practice should be seriously considered.

The research priorities put forward aim to challenge the narrow techno-economic framing that has been dominating transport research and policy during the last two decades, by recognising the roles of a broad spectrum of SSH perspectives necessary for shaping novel avenues for studying and enabling sustainability transitions in the transport and mobility sector. SSH research recognises the importance of a better understanding of the complexity of transport and mobility as a socio-technical system and therefore aims to account for diversity in terms of cultural, political, and geographic constraints and specificities. This proposed research agenda acknowledges that this diversity can result in both diverging paces of change and different transition pathways across different geographic scales and spaces within Europe, which can be harnessed for cross-country knowledge development. Indeed, harnessing the unique strengths of SSH will require support for inter- and trans-disciplinary research, to enable integrated thinking that examines transport and mobility as interrelated with the rest of society, instead of developing solutions in silos, and to facilitate the co-production of knowledge within broad networks of societal actors.

1.5. Navigating our 100 questions

This report provides 100 priority questions, which are grouped into eight themes. It is significant to note that these themes were generated inductively after the majority of questions were selected, and not imposed top-down from the start by either the EC or the Working Group. Neither the themes nor the questions are ordered by importance; we have aimed to present closely-related questions adjacently where possible. It will also be apparent to readers that different question types exist; for example, the list includes descriptive, explanatory, evaluative and normative questions. This diversity is deliberate. Not least, we were happy to include many questions that were project-driven and tightly-targeted in their scope (alongside wider questions), given how the EC, and indeed other funders, typically construct funding calls.

It is important to note when reading these questions that our intention is to not be comprehensive. Instead, these questions aim to assist with the process of prioritisation, to ensure that SSH research can best support and pragmatically align with policy ambitions. We acknowledge that the field is ever-evolving and that it is not possible to produce one perfect set of research priorities that all SSH communities (or indeed all Working Group members) can agree upon. These questions do not represent an end point, but rather the stimulus for multiple points of discussion with the EC and other stakeholders, and amongst energy-SSH communities.

Finally, in posing these questions, we are not advocating for particular ways to answer them. The diversity of SSH means that answers can be constructed in many different ways, whether theoretically or methodologically. We hope that a wide range of knowledge and skills from across all the SSH communities will be called upon in addressing these priority questions for transport and mobility research.



2. Presenting 100 priority questions for Social Sciences and Humanities (SSH) research on transport and mobility





2.1. Theme 1: Co-producing knowledge and professional practices



This theme focuses on how to facilitate learning across different professional practices, such as those within research, policy and planning. If transport systems are to be transformed, there is a need for better integration of SSH research insights into existing practices. This theme therefore includes questions concerning how to improve knowledge-producing processes and professional practices related to transport and mobility; including, transdisciplinary approaches and ways of collaborating across disciplines. It also includes questions that are more concerned with conceptual discussions, as well as practical aspects of transport planning, such as the use and developments of specific tools and measures.

1 How should the transport and mobility research field develop in order to: facilitate processes of learning across different professions, domains and sectors; foster more transdisciplinary research, with systems thinking at its heart; and maximise the impact of SSH research on sustainable transitions?

2 What can be learnt from cross-national and cross-regional comparisons of different mobility cultures and imaginaries in the development of European transport policies and practices?

3 What theoretical and policy tools are needed to better attend to rural and small-town geographies, in both the Global South and the Global North, in envisioning inclusive and sustainable mobility futures?

4 How can transport research, policy and planning be better integrated with social science and ethical considerations, to ensure that the implementation of greener transport solutions do not increase injustices and to ensure accessibility for all users?

5 How can more inclusive mechanisms and approaches that co-produce research and policy making be developed, to not only include technocrats, but also other equally important voices (e.g. citizens, vulnerable groups, SSH researchers)?

6 How can transport planning change from being an increasingly technocratic profession (characterised by e.g. big-tech solutions, desk work, computer modelling, big-data mining), into a more critical profession that incorporates SSH aspects in transport planning and better engages with embodied (user) experiences?

7 How can innovative analytical tools be developed to: identify socially equitable transportation policies; address fair transport planning measures; and assess their distributional impacts?

8 How can transport planning and urban planning be better integrated through planning practices and policies, in order to develop more sustainable transport systems?



9 How can transport planning frames become less dominated by economic thinking; in particular, what can be done to lessen the influence of economic growth concerns on the development of mobility agendas?

10 What tools and methods can help the public anticipate effects of future transport infrastructural changes in their urban environment?

11 How can mobility innovation processes (e.g. experimentation, laboratories) be modified to study more social aspects of mobility and not only purely technological innovations?

12 In recognising that transport planning is political, how does the 'everyday work', practices and rationales of planners, bureaucrats and politicians, affect politics and (un)productively shape transitions towards sustainable mobility?

13 Can planning concepts such as 15-minute neighbourhoods and similar (e.g. hyper proximity, super blocks) contribute to more sustainable patterns of mobility; and, if so, how?

14 What is the potential of co-creating new sustainable transport technologies (i.e. different societal groups involved in technology development) and how can it best be facilitated?

15 How can the 'implementation' gap between researcher-led mobility foresight methodologies and action by policymakers be addressed?



2.2. Theme 2: Scenarios, futures, visions and transition pathways



This theme concerns questions relating to what sustainable transport and mobility systems should look like in the future, and possible transition pathways to achieve such visions. The theme covers topics such as different drivers and barriers for change, narratives and imaginaries of fossil free and low-carbon mobility cultures, and the roles of different trends, solutions and technologies such as big-tech and the platform economy.

16 What should a sustainable transportation system look like in 30-50 years; and how could possible transition pathways be structured to achieve such a system?

22 What kinds of shifts in the social organisation of practices are needed to halt the growth in air traffic?

17 How should future mobility be organised in post-fossil fuel cities?

23 What is the potential of scaling up slow-mobility (e.g. walking and cycling) to support low-carbon transitions?

18 What social changes would be required to a mobility system, to help achieve the IPCC's 1.5°C target?

24 What social, cultural, and political factors need consideration in the development of neighbourhood vehicle-sharing systems?

19 How can mobility within societies be reimagined to better support low-carbon energy transitions; for instance, night trains instead of flying, or slower forms of mobility?

25 How do automated and/or electric vehicles advance sustainability; and what are the implications for the utilisation of public transportation, urban sprawl and non-motorised travel?

20 What are the non-technological and non-economic drivers and barriers of transitions towards zero-carbon transport systems?

26 What is the potential of shared-mobility services to stimulate substantive decarbonisation, and how can it be achieved?

21 How can existing transport infrastructures be reimagined and repurposed to achieve rapid decarbonisation?

27 How can broad visions of alternative futures be created; in particular, how can such futures involve people willingly adjusting their mobility routines?



28 How is 'big-tech' and the platform economy changing urban spaces and transport systems?

29 Given the interconnectedness and systemic nature of mobility, how can interventions be organised to ensure that cross-sectoral impacts (regarding e.g. health, environment, social justice) are positive and represent mutual co-benefits?

30 How can multiple pathways towards more sustainable transport and mobility be identified, i.e. different pathways in different geographical locations?

31 What could be the role of emerging mobility technologies (e.g. automated vehicles) within different policy pathways, in working towards desirable, healthy, inclusive and sustainable urban futures?

32 What roles do the media play in preventing or supporting transport system change?

33 In which ways can synergies or conflicts between energy goals and other goals – such as the reduction of air and noise pollution, traffic accidents, a lack of physical movement, land-use, and a loss in biodiversity – slow down or accelerate a transition to sustainable mobility; and which (changeable) factors may influence these relationships?



2.3. Theme 3: Dominant mobility regime and car dependency



This theme focuses on what stabilises, changes and/or disrupts lock-ins created by the dominant mobility regime, where the car usually takes centre-stage. The questions in this theme focus on how new technologies and solutions may contribute to either strengthening or reducing private car-dependency. The theme also looks at countries where automobility is still growing and where attitudes are difficult to change.

34 How do autonomous vehicle futures further lock cities and societies into car dependency; and what can be done to ensure that this lock-in is either mitigated or avoided altogether?

38 How can SSH researchers conceptualise the stability of the existing system of (auto)mobility, which persists despite the multitude of attempts to decarbonising transportation?

35 How can micro-mobility and shared-mobility be implemented in the existing public transport system, in order to strengthen low-carbon mobility and reduce private car dependency?

39 How can a modal shift be achieved, from energy-consuming mobility modes towards more sustainable modes; and what may be the most appropriate governance solutions for especially rapidly motorising countries (in e.g. Eastern Europe)?

36 How can the car industry be fundamentally reorganised to leverage a transformation towards sustainable mobility; and concurrently, how can the role of corporations and their large-scale investments (e.g. in efforts to shape policies, assessment methods, software algorithms, towards commercialisable transport and mobility solutions) be governed towards reducing travel needs and car dependency?

40 What are the main factors contributing to attitude changes among people in countries where motorisation is still growing?

37 In what ways do state politics and power dynamics contribute to keeping automobility regimes stable over time?

41 How may shared-mobility services be used to reduce the dominance of private car ownership?

42 How are mobility patterns affected by children in families; and how can less car-dependent lifestyles be nurtured for such families?



2.4. Theme 4: Governance, policy and incentives



This theme focuses on the role of governance, policies and incentives in shaping current transport and mobility systems, and their effect on the development and implementation of different technologies and modes of transport (e.g. walking, cycling, rail). Further, this theme includes questions concerning how policies and regulations could be used to govern transport and mobility systems in desired directions, so that they become more sustainable and just, for instance with regard to gender and place.

43 How are sustainable and non-sustainable transport policies formed through political practices (i.e. how do politicians influence the making of transport policies)?

49 What policies could ensure that future mobility systems will be just and egalitarian, particularly with respect to gender, income and ethnicity?

44 How are cities and metropolitan areas managing the emergence of micro-mobility?

50 What regulations and accountability measures are needed to ensure that mobility data are best utilised for the common good; for example, harnessing the potential of data to stimulate innovation and guide urban planning, while also protecting citizen privacy?

45 What policy tools are most effective in supporting increased cycling and walking in cities?

51 How does the European Union need to reform its own governance instruments (e.g. Trans-European Transport Network), in order to produce a 'phase-out' policy effect for private car use and achieve the decarbonisation of mobility across Europe?

46 How can the use of night trains in Europe be stimulated; and what roles do the EU Railway Regulations play in the development of night trains?

52 How can transport and mobility policies be developed in a more geographically- and place-sensitive way?

47 How can the design of transport and mobility policies improve accessibility in geographically peripheral areas?

48 How can mobility policies be better integrated with policies from other sectors (e.g. energy efficiency, renewables, gender mainstreaming, poverty reduction)?

53 What are the drivers for public acceptability of stringent and mandatory transport policies (e.g. carbon taxes, urban traffic bans)?



54 How will driverless vehicles affect urban areas and land use (e.g. land used for parking); and how can such effects be governed?

55 What types of city cooperation or funding programmes can facilitate large, well-managed, accessible, user-friendly, and safe cycling networks between cities for medium- to long-distance commuting and traveling?

56 What is the potential of (shared) mobility hubs at the neighbourhood-level and how can organisational innovations support such hubs?

57 What would be the most effective strategies in promoting the transition to more sustainable freight transport (e.g. road goods transport, maritime transport, logistics) in Europe?

58 How can knowledge on gendered mobilities inform decision-making regarding sustainable urban mobility?

59 What governance approaches are required to address the increased movement of goods (e.g. urban freight, last mile services) that have emerged due to recent and ongoing changes in consumer culture, such as the increase in e-commerce and online shopping?



2.5. Theme 5: Participation and citizen engagement



This theme includes questions that address public participation and how to engage citizens in transport and mobility systems. These questions also address how stakeholder engagement can be nurtured and improved.

60 What are the most effective approaches to involving citizens and non-experts in the planning, development, and evaluation of new transport systems and future mobility scenarios?

63 How can participatory governance and participatory budgeting support more sustainable mobility and transportation patterns?

61 What is (and/or should be) the roles of civil society in achieving the radical and rapid reductions required in non-renewable energy consumption within the transport sector?

64 How can goods movement be better integrated into city planning; and how can this integration be improved through stakeholder engagement (e.g. to achieve collaborative urban freight planning)?

62 How can residents' opinions and priorities be better integrated into mobility planning?

65 What engagement methods and approaches are most appropriate in generating citizen-led visions of mobility futures; and specifically, what would a reduced-car or car-free city in such visions mean to citizens?



2.6. Theme 6: Mobility practice and mobility needs



This theme focuses on questions regarding everyday experiences with and meanings of mobility. It includes questions about current mobility practices or ways of living that affect mobility behaviours, cultures, and needs, as well as possible alternative avenues that may ensure the well-being of people. Furthermore, the questions target different ways current transport systems may be changing people's perceptions of, and values attached to, particular mobility practice, and the role of particular actors such as industry and commerce.

66 To what extent can more sustainable forms of transport and mobility increase human well-being?

67 What kinds of new practices emerge at the household- and community-level, in the course of transitioning to low-carbon mobility systems; and how are new mobility practices connected with other types of everyday practices?

68 How is speed constructed as a central value in mobility cultures and systems; and how may slow mobility values be nurtured?

69 How can societies enjoy prosperity and quality of life, while becoming increasingly independent from long-distance, frequent, and high-speed mobility (i.e. become more 'immotile')?

70 What is the role of micro-mobility in urban public transport systems, and to what extent does micro-mobility change current travel behaviour?

71 How can car culture be changed, and soft mobility (i.e. walking and biking) promoted, through the development of educational strategies; in particular, how may such strategies successfully target children?

72 How can the reduction of car infrastructure in urban areas (e.g. lanes, parking spots) be achieved, with public legitimacy?

73 How may the value and symbolic meanings of the car be affected by the multitude of technological innovations currently in development?

74 How are social media algorithms influencing lock-ins related to current mobility behaviours and practices?

75 How is the concept of sustainable mobility interpreted and adapted at the local-level, as well as shaped by local actors in different geographical, cultural and institutional contexts?



76 How can users' sensory and emotional experiences with different transport technologies and mobility practices better inform efforts to change mobility habits?

77 How can the development of long-distance travel be better understood; for example, what are the implications of relevant societal groups, business cultures and different technologies for future emission reductions?

78 What makes individuals perceive air travel as necessary and desirable; and what factors could change such perceptions?

79 How may barriers to disrupting transport system lock-ins, which are produced by industry complexes and decision-makers outside the transport domain (e.g. CEOs and policy-makers related to all industries), be addressed?

80 How can changing consumer cultures, as an element of e-commerce, be better understood; and what are the consequent impacts of consumer culture on the sustainability of freight mobility?

81 How can companies and organisations affect the mobility behaviour of their employees to be more sustainable?



2.7. Theme 7: Risks, disruptions and negative or unanticipated consequences



This theme is concerned with disruptive events such as natural disasters or the pandemic and possible disruptive drawback and risks related to low-carbon, autonomous or connected transport technologies. These questions specifically focus on the challenges and lessons connected to the global pandemic situation caused by the COVID-19 virus, but may contribute to broader learning on how to deal with possible future disruptive events to mobility and transport systems such as those caused by climate change (e.g. extreme weather, landslides).

82 What are the main unintended consequences of new low-carbon transport technologies; and how can undesirable effects be minimised?

87 What are the negative impacts of connected and automated vehicles on mobility?

83 How do new forms of low-carbon transport (re)produce socio-economic inequalities?

88 What lessons can be drawn from the impacts of the COVID-19 pandemic on mobility practices; and how can these lessons be fed into future transformations of transport and mobility systems, such as public transport, biking, home office solutions for example?

84 What are the potential social consequences and risks of transitioning to a 100% electricity-dependent mobility system?

89 What are the likely long-term implications of the COVID-19 outbreak for future transport and mobility; what are the likely associated governmental responses; and how could a review of current long-term forecasts (by mode) provide insights on this?

85 Will automation and enhanced connectivity widen or narrow existing spatial differences and social inequalities; and how may this vary (or not) between/within different countries, regions, and urban and rural areas?

90 How can temporary mobility and public space measures be implemented during or after disruptive events (e.g. COVID-19 pandemic, Fukushima, extreme weather events), to best utilise windows of opportunity for accelerating systemic change towards sustainable urban mobility?

86 To what extent do social attitudes surrounding privacy pose a challenge for the acceptability of shared-mobility practices?



2.8. Theme 8: Social justice and inclusion



This theme focuses on how sustainable transport and mobility transitions also can be socially just and inclusive. The theme includes questions on how specific technologies can be governed and regulated, in order to ensure social justice and the inclusion of different vulnerable social groups.

91 How can green mobility transitions be socially inclusive?

92 How can micro-mobility and shared-mobility implementation be organised and regulated in order to achieve transport justice; in particular, what can be done to reduce the risk of transport exclusion?

93 How can mobility justice concerns be accounted for in evaluation criteria of emerging mobility solutions?

94 How can gender perspectives inform visions for inclusive and fair mobility; for example, how could systematic investigations of the gender inequalities embedded in current transport-energy systems help illuminate hidden injustices?

95 How can inclusive mobility be provided for rural areas in the future?

96 In recognising the intersections between energy poverty and mobility needs, how can questions of transport poverty be incorporated into concerns of energy poverty, and vice versa?

97 How can the mobility of elderly people be improved; for example, how could the digitalisation of mobility services be used to improve their accessibility?

98 In what ways are policies aiming to achieve sustainable transport and avoid car dependence (e.g. congestion pricing, low-emission areas) deepening transport-related inequalities?

99 How is transport affordability considered in smart and autonomous mobility futures?

100 How should transport systems be organised to meet the mobility needs of those who, for various reasons, do not have (access to) a car; and how can transport systems in car-free cities be organised?



3. Acknowledgements

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no. 826025. We are grateful to Zareen Bharucha, in her role as methods advisor. We also thank our many energy-SSH colleagues for kindly submitting their research questions for consideration. Note that the first five co-authors acted as the Steering Committee for this Working Group, the sixth co-author oversaw all the Horizon Scanning exercises, and then the following (alphabetised) co-authors kindly contributing in the capacity of Working Group members.



4. References

- Baum, C.M. and Bartkowski, B., 2020. It's not all about funding: Fostering interdisciplinary collaborations in sustainability research from a European perspective, *Energy Research & Social Science*, 70, pp.101723.
- EC, 2015. *Final Communication from the Commission. Towards an Integrated Strategic Energy Technology (SET) Plan: Accelerating the European Energy System Transformation*. C(2015) 6317. Brussels: European Commission.
- EC, 2018. *Final Communication from the Commission. A Clean Planet for all. A European strategic long-term vision for a prosperous, modern, competitive and climate neutral economy*. COM(2018) 773. Brussels: EC.
- EC, 2019a. *Clean Energy for all Europeans*. Brussels: European Commission.
- EC, 2019b. *Final Communication from the Commission. The European Green Deal*. COM(2019) 640. Brussels: European Commission.
- EC, 2019c. *Orientations towards the first Strategic Plan implementing the research and innovation framework programme Horizon Europe – Co-design via web open consultation*. Brussels: European Commission.
- European Parliament and Council, 2012. *Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 on energy efficiency, amending Directives 2009/125/EC and 2010/30/EU and repealing Directives 2004/8/EC and 2006/32/EC*. Available: <https://eur-lex.europa.eu/legal-content/en/TXT/?uri=CELEX:32012L0027> [Accessed 22 November 2019].
- Foulds, C. and Christensen, T.H., 2016. Funding Pathways to a Low-carbon Transition. *Nature Energy*, 1(7), pp.1–4.
- Foulds, C., Bharucha, Z.P., Krupnik, S., de Geus, T., Suboticki, I., Royston, S. and Ryghaug, M., 2019. *An approach to identifying future Social Sciences & Humanities energy research priorities for Horizon Europe: Working Group guidelines for systematic Horizon Scanning*. Cambridge: Energy-SHIFTS.
- Genus, A., Fahy, F., Goggins, G., Iskandarova, M. and Laakso, S., 2018. Imaginaries and Practices: Learning from 'ENERGISE' About the Integration of Social Sciences with the EU Energy Union, In: Foulds, C. and Robison, R., eds. *Advancing Energy Policy: Lessons on the integration of Social Sciences and Humanities*, Cham: Palgrave Macmillan. pp.131-144.
- Ingram, J.S., Wright, H.L., Foster, L., Aldred, T., Barling, D., Benton, T.G., Berryman, P.M., Bestwick, C.S., Bows-Larkin, A., Brocklehurst, T.F. and Buttriss, J., 2013. Priority research questions for the UK food system. *Food Security*, 5(5), pp.617-636.
- Kania, K., Lemaire, C. and Swinnen, L., 2019. *Integration of Social Sciences and Humanities in Horizon 2020: Participants, Budget and Disciplines – 4th Monitoring Report on SSH Flagged Projects Funded in 2017 Under the Societal Challenges and Industrial Leadership Priorities*. Brussels: European Commission Directorate-General for Research and Innovation.
- Overland, I. and Sovacool, B.K., 2020. The misallocation of climate research funding, *Energy Research & Social Science*, 62, pp.101349.
- Pretty, J., Sutherland, W.J., Ashby, J., Auburn, J., Baulcombe, D., Bell, M., Bentley, J., Bickersteth, S., Brown, K., Burke, J. and Campbell, H., 2010. The top 100 questions of importance to the future of global agriculture. *International journal of agricultural sustainability*, 8(4), pp.219-236.
- Robison, R. and Foulds, C., 2019. *7 principles for energy-SSH in Horizon Europe: SHAPE ENERGY Research & Innovation Agenda 2020-2030*. Cambridge: SHAPE ENERGY.
- Rudd, M.A., Ankley, G.T., Boxall, A.B. and Brooks, B.W., 2014. International scientists' priorities for research on pharmaceutical and personal care products in the environment. *Integrated environmental assessment and management*, 10(4), pp.576-587.
- Ryghaug, M., Suboticki, I., de Geus, T., Looibach, D., Foulds, C. and Bharucha, Z.P., 2019. *Terms of Reference: Energy-SHIFTS Working Group 4 – Transport and Mobility*. Cambridge: Energy-SHIFTS.
- Sutherland, W.J., Fleishman, E., Clout, M., Gibbons, D.W., Lickorish, F., Peck, L.S., Pretty, J., Spalding, M. and Ockendon, N., 2019. Ten years on: A review of the first global conservation horizon scan. *Trends in ecology & evolution*, 34(2), pp.139-153.



5. Appendices

5.1. Appendix 1 – Socio-demographic breakdown of Transport and Mobility Working Group members

SOCIO-DEMOGRAPHIC CRITERIA	COUNT	%
Working Group members participating in the full Horizon Scanning exercise ³	24	100.00
Held a researcher identity	24	100.00
Based in organisations/countries eligible for Horizon 2020 funding	24	100.00
Had research interests directly relating to Working Group topic area	24	100.00
Different countries represented	17	N/A
Number of members in Northern Europe ⁴	8	33.33
Number of members in Eastern Europe ⁴	4	16.67
Number of members in Southern Europe ⁴	5	20.83
Number of members in Western Europe ⁴	7	29.17
Male	14	58.33
Female	10	41.67
Different SSH disciplines represented	15	N/A
Frontrunners ⁵	6	25.00
Field leaders ⁶	18	75.00

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³ The Transport and Mobility Working Group began with 31 members, with seven dropping out for different reasons throughout the Horizon Scanning exercise.

⁴ European regions classified using the UN's Geographic Regions classifications for Europe's regions (<https://unstats.un.org/unsd/methodology/m49/>). For those Horizon 2020 Associate Countries, which fell outside of UN European regional classifications, they were classified/counted in accordance with their nearest neighbouring European country.

⁵ Full guiding definition available in methodological guidelines (Foulds et al., 2019a, p.18). Focus on researchers working at the boundaries of conventional academic structures and conventions, perhaps through their research's interdisciplinarity, practical applications, exploratory nature, etc.

⁶ Full guiding definition available in methodological guidelines (Foulds et al., 2019a, p.18). Focus on representatives of key SSH projects/communities, as well as on theoretical expertise, rather than practical application.



5.2. Appendix 2 – Socio-demographic breakdown of respondents to Transport and Mobility Horizon Scanning survey

SOCIO-DEMOGRAPHIC CRITERIA	COUNT	%
Number of respondents	86	100.00
Male	58	67.44
Female	28	32.56
Other	0	0.00
Rather not say	0	0.00
Number of SSH (sub-)disciplines represented ⁷	17	N/A
1 st most represented (sub-)discipline – Geography	20	23.26
2 nd most represented (sub-)discipline – Transport Planning	15	17.44
3 rd most represented (sub-)discipline – Urban Planning	9	10.47
4 th most represented (sub-)discipline – Science & Technology Studies	7	8.14
Joint 5 th most represented (sub-)discipline – Psychology; Sociology	5 (each)	5.81
Number of different countries represented ⁸	22	N/A
1 st most represented country – UK	11	12.79
2 nd most represented country – Germany	9	10.47
Joint 3 rd most represented country – Italy; Poland	8 (each)	9.30
5 th most represented country – The Netherlands	7	8.14
Joint 6 th most represented country – Finland; Portugal	5 (each)	5.81
Number of different nationalities represented	26	N/A
1 st most represented country – German	11	12.79
2 nd most represented country – Italian	10	11.63
3 rd most represented country – Polish	8	9.30
4 th most represented country – Dutch	7	8.14
5 th most represented country – Portuguese	5	5.81
Completed PhD	75	87.21
Not completed PhD	11	12.79
Of those without a PhD: Not currently participating in a PhD programme	4	4.65
Of those without a PhD: Currently participating in a PhD programme	7	8.14
0-5 years since graduating PhD	11	12.79
6-10 years since graduating PhD	15	17.44
11-15 years since graduating PhD	16	18.60
16-20 years since graduating PhD	10	11.63
21-25 years since graduating PhD	12	13.95
26-30 years since graduating PhD	4	4.65
31-35 years since graduating PhD	3	3.49
36-40 years since graduating PhD	2	2.33
41+ years since graduating PhD	2	2.33

7 Self-assigned in open textbox question.

8 Representation indicated by at least one Horizon Scanning respondent completing the survey. Country representation was specifically based on the location of their organisation.



5.3. Appendix 3 – Processing of submitted questions via Horizon Scanning survey, prior to Transport and Mobility Working member evaluations

PROCESSING STEP	COUNT	%
Number of questions submitted via first Horizon Scanning survey	299	100.00
Number of submitted questions immediately deleted due to: lack of SSH grounding, lack of relevance to transport and mobility, or not containing question content.	59	19.73
Number of additional questions generated through disaggregating multiple questions from one single submitted question, or through sourcing further questions from accompanying explanatory texts that were provided by the respondents	43	14.38
Number of questions removed due to merging, i.e. where a same question had been posed multiple times in overly similar ways.	9	3.01
Final number of questions sent to Working Group members for evaluation in the second Horizon Scanning survey.	274	91.64



5.4. Appendix 4 – Headline results from Working Group member evaluations of 274 edited questions

Working Group members evaluated a list of 274 edited SSH questions, via a second Horizon Scanning survey, scoring them on a scale of 1 ('definite exclude') to 5 ('definitively include') and providing other qualitative feedback.

CLUSTERS ⁹	No. OF QUESTIONS IN EVALUATION SURVEY	MEAN SCORE	VARIANCES OF MEANS	% OF QUESTIONS WITH MEDIAN ≥ 4	% SCORES OF 5, ACROSS ALL Qs IN THEME	% OF QUESTIONS SCORED 4	% OF QUESTIONS SCORED 3	% OF QUESTIONS SCORED 2	% OF QUESTIONS SCORED 1
Cluster 1: Imaginaries, scenarios, transitions	32	3.81	0.95	78.13	21.29	27.54	43.46	5.76	1.95
Cluster 2: Planning, professional knowledge and SSH impact	29	3.49	1.02	48.28	15.70	26.52	42.44	13.20	2.14
Cluster 3: Cars, EVs and AVs	30	3.57	1.07	63.33	17.56	27.22	42.33	9.00	3.89
Cluster 4: Micro-, shared-, freight-, and long-distance mobility	45	3.65	1.05	73.33	12.10	20.20	59.45	6.62	1.63
Cluster 5: Digitalization and innovation	27	3.43	1.10	48.15	14.13	32.10	35.80	4.39	13.58
Cluster 6: Governance	55	3.41	1.16	40.00	7.50	14.45	68.69	7.01	2.35
Cluster 7: Mobility culture, needs and practices	27	3.55	0.95	66.67	14.40	38.00	33.06	11.11	3.43
Cluster 8: Justice and geographical considerations	29	3.77	0.93	75.86	20.33	34.24	35.92	7.49	2.02

⁹ The 274 questions were organised and presented for evaluation in eight inductively-generated clusters. These clusters were intended only to aid the evaluation exercise and were not intended to directly feed into our final themes.



5.5. Appendix 5 – Systematic procedure used to create and deliberate on the longlist of questions for the Transport and Mobility Working Group

STEP	DESCRIPTION
1	All five questions with a median of 5 automatically selected for inclusion.
2	All 86 questions with medians of 1-3 automatically excluded.
3	From those remaining questions with median of 4, the top 95 questions were selected based on the highest scores.
4	Top 100 questions (from step 1 and 3) cut to 81 questions, based on merging (12 questions) or cutting due to overlap (13 questions).
5	All remaining 88 questions with median 4 marked for consideration by the Working Group.
6	Working Group propose additional questions from these remaining 88 questions, as well suggest new questions for possible inclusion.
7	Additional 19 questions selected based on discussions with Working Group during a second virtual workshop, which focused on deliberating such matters.
8	All 100 questions sent out for final approval by and feedback from the Working Group.



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 826025.

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