

International non-binding policies for sustainable land passenger transport in Europe: A scoping review

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ABSTRACT

In addition to binding policies, a multitude of non-binding policies can be found in the transport sector. Non-binding policies often provide visions, guidelines, recommendations, and even agreements and targets, which can influence the policy agenda and its implementation. To date, few studies have focused on non-binding policies in the transport sector. This article presents a scoping review of non-binding policies on land passenger transport in Europe, based on the PRISMA-ScR methodology. We analysed 5826 documents from 49 policy databases maintained by public international institutions and identified more than 500 non-binding policies on sustainable land transport in Europe published between 2015 and 2024. We then applied Latent Dirichlet Allocation (LDA), a topic modelling approach, to identify the key topics addressed in these non-binding policies. The analysis indicates that non-binding policies represent a widely used and established instrument in transport policy with different levels of formality. They tend to increase in number between 2015 and 2024 with a peak in 2021. Non-binding policies are produced by a variety of institutions with the majority being issued by the European Union, rail transport organisations, the United Nations and networks of cities and regions. Position papers are the most common type of non-binding policies followed by resolutions and opinions. Key themes in non-binding policies on sustainable land passenger transport address modes and services, land use and infrastructure, access and safety, funding and development, transport externalities, governance and research. A range of transport issues are addressed in these non-binding policies, and it is conceivable that some of these issues may enter the binding policy sphere in the future. This article helps to illustrate the growing role of non-binding policies in the changing transport policy landscape and highlights the capacity to shape future binding policies, particularly regarding inclusivity and intersectoral planning.

1. Introduction: non-binding policies and sustainable transport

A range of binding policies shape the transport sector and its sustainability transformation (Akerman et al., 2000; Annema, 2013; Ryghaug et al., 2023). In addition to these binding policies, a multitude of non-binding policies exist (Bradley et al., 2023; Stead, 2016). While there are many assessments of binding policies (Ovaere and Proost, 2022; Stead, 2018; Tsemekidi Tzeiranaki et al., 2023), studies of non-binding policies for sustainable transport are far more limited. The main objective of this study is to explore non-binding policies concerning sustainable land passenger transport in Europe, and to identify and describe the main topics they address.

The number of non-binding international policies has increased over the last few decades (Blomqvist, 2022; Bradley et al., 2023; Friedrich,

2013; Meier, 2024) and they are now considered to be a “dominant part” of the international agreement landscape (Bradley et al., 2023, p. 1288). Non-binding policies are often faster and less controversial to draft and agree than binding policies (Smeele, 2015) and can potentially complement them (Mattila and Heinilä, 2022). Non-binding policies are closely related to ideas on soft law (Bradley et al., 2023; Torfing and Sørensen, 2014), soft governance (Maggetti, 2015) and soft planning (Mattila and Heinilä, 2022; Purkarthofer, 2019). Within a multi-level governance setting, non-binding policies can shape the transport sector and its transformation. These policies can provide broad overarching guidelines and frameworks that help to harmonize efforts towards sustainable transformations in the transport sector (Tilly et al., 2025). By defining and articulating transport issues, non-binding policies can potentially set the future political agenda (Bali and Halpin,

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2021) and contribute to the acceptability of transport transitions (Banister, 2008). Additionally, as visionary documents, non-binding policies can contribute to integration between transport modes, policy sectors and levels of decision-making (Buser et al., 2025). For example, in the case of the West Midlands Combined Authority (UK), strategies addressing challenges in transport and other sectors were aligned through the United Nations' 2030 Agenda for Sustainable Development and its Goal 11 (Kulashri, 2026). To date, however, little research exists on the types and topics covered by non-binding international policies, both in a cross-sectoral sense (Bradley et al., 2023), and in the transport sector in specific (Sustainable Mobility for All, 2018).

In this article, we consider non-binding policies as documents with the primary purpose of providing visions, guidance, recommendations or objectives for action while compliance remains voluntary (Haarstad et al., 2024; Schachter, 1977). In line with Bradley et al. (2023), we distinguish between informal and formal non-binding international policies. Informal non-binding international policies refer to joint statements or communications, which are issued by two or more countries or an international organisation (Bradley et al., 2023). Meanwhile, formal international non-binding policies refer to the same document characteristics which are complemented by a format similar to binding agreements, such as “articles, entry-into-force and termination provisions” (Bradley et al., 2023, p. 1306).

Non-binding policies are important for policy and action formation by setting the agenda. They can provide visions, guidelines, recommendations and often even agreements and targets. As such, these documents not only address the question what to do, but also how to do it. In local, regional and national efforts towards sustainable transformation, stakeholders often draw on non-binding policies as guidance (Biermann et al., 2022; Krombach et al., 2024). Non-binding policies can “frame [...] beliefs and expectations” (Ladi, 2005, p. 4). They can gain their impact through “acceptability [...] or effectiveness and expediency” (Mattila and Heinilä, 2022, p. 5). In some instances, non-binding transport policies can even directly influence transport decision making by tying funding with policy compliance, as has been observed with Sustainable Urban Mobility Plans (Munkácsy et al., 2024) and Climate City Contracts (Christidis et al., 2024). Sometimes non-binding policies further solidify (Metzger and Schmitt, 2012) and influence binding policy (Bradley et al., 2023). For example, around climate and energy, some EU stakeholders have called for hardening of soft governance instruments (Bruch et al., 2024). In the transport sector, shifts have occurred where legally binding mechanisms have replaced voluntary policies in areas such as complete street (Gregg and Hess, 2019) and Sustainable Urban Mobility Plans (Hartl et al., 2024).

To date, transport policy research has mainly focused on binding policy measures, devoting little attention to the role of the non-binding policy sphere for sustainable transport transition. This article focuses specifically on non-binding policies, aiming to answer three research questions (RQ).

1. Which non-binding policies concerning sustainable land passenger transport in Europe have been proposed by public international institutions?
2. How can these non-binding policies be classified?
3. Which transport topics do these non-binding policies address?

This article provides a state-of-the-art review of non-binding policies which were published from 2015 to 2024 against the backdrop of significant shifts in transport policy. During these ten years, several important changes have taken place in European land passenger transport policy. Notable examples include the European Green Deal, the European Sustainable and Smart Mobility Strategy (European Commission, 2019, 2020), the European Alternative Fuel Infrastructure Regulation (AFIR), stricter CO₂ standards, the European General Safety Regulation (GSR) (European Union, 2019a, 2019b, 2023a; European Union, 2019a), the 4th Railway Package, revised passenger

rights, and the TEN-T revision (European Commission, 2016; European Union, 2021; Council of the European Union, 2024). Meanwhile, several global events have also had important repercussions for the transport sector during this period, such as the global COVID-19 pandemic (European Commission, 2023b) and the Russo-Ukrainian war.

The analysis makes three main contributions. First, it provides an extensive and systematic overview of non-binding transport policies in the context of the shifting landscape of European land passenger transport policy (briefly outlined above). Second, the article applies the PRISMA-ScR methodology to policy documents, demonstrating its usability for transport policy research. Third, the article illustrates a growing emphasis on non-binding policies and identifies key transport topics with discursive prominence.

The article is structured in three main parts. The first part presents the methods applied in the scoping review as well as further analytical steps. The second part contains the results of the analysis. The third part concludes with a discussion of results and the implications for research and practice.

2. Methods

For this analysis of international non-binding policies for sustainable passenger transport, we employed a broad set of methodological steps. Fig. 1 provides an overview of the methods used in this article, covering its protocol and registration, eligibility criteria, information sources, search strategy, selection of sources of evidence as well as the data charting process and synthesis.

2.1. Protocol and registration

Grant and Booth (2009) distinguish between several types and approaches of review articles. A mapping review is one possible approach for this analysis but is more suited to a review of research literature (Grant and Booth, 2009). In this article, policy documents are reviewed, rather than research articles. Meanwhile, a systematic review restricts itself to studies of a single methodological design, which would not have suited the analysis of policy documents (Grant and Booth, 2009). Given that the focus of the article is on an emerging topic contained in policy documents, and the ambition to perform a systematic approach, a scoping review was chosen, following the PRISMA Extension for Scoping Reviews (PRISMA-ScR; Tricco et al., 2018). While rigorously following the PRISMA-ScR methodology, it can be argued that this study moves beyond a scoping review by including elements of a qualitative content analysis. This study therefore bears some characteristics of a scoping review, mixed methods review and systematic search and review, according to the classification of reviews proposed by Grant and Booth (2009).

While PRISMA-ScR was not originally designed for the review of policy documents, it nevertheless provides a suitable review framework. The review was carried out according to the PRISMA-ScR checklist of steps.¹ The protocol was drafted in accordance with the PRISMA-ScR guidelines (Tricco et al., 2018). The final protocol was registered with the Open Science Framework on January 26, 2025.²

2.2. Eligibility criteria

This article focuses on documents authored by public international institutions which addressed sustainability and transport. The documents included in the review were published from 2015 to 2024, thereby providing a review across 10 full years.

¹ The set of PRISMA-ScR steps is available online at <https://www.prisma-statement.org/scoping>.

² The registered protocol and final dataset can be found at <https://doi.org/10.17605/OSF.IO/QUSSP>.

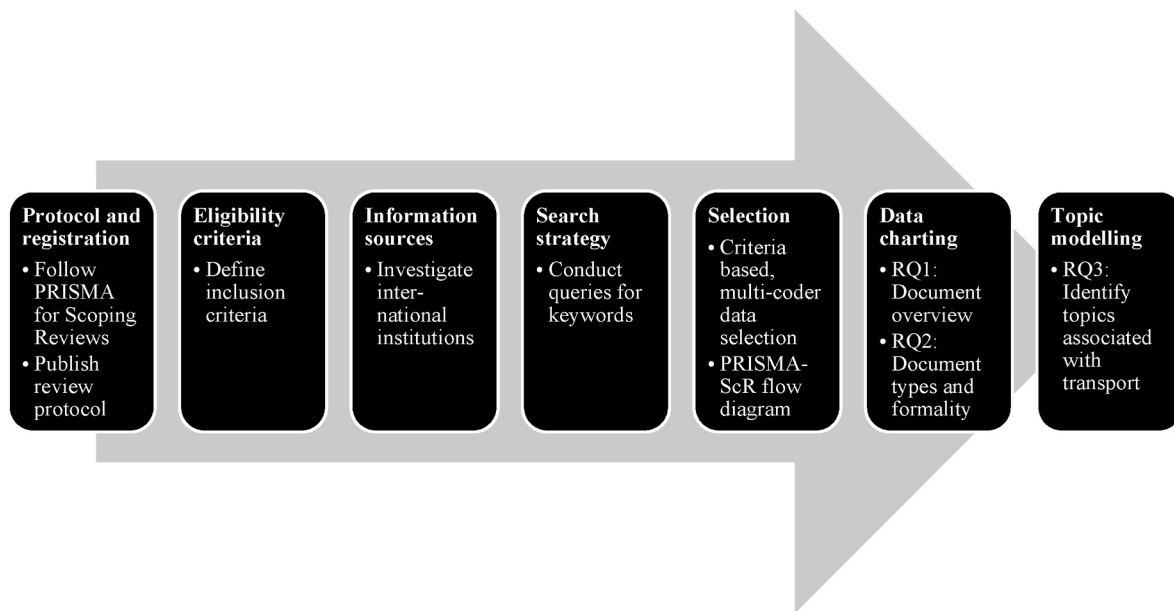


Fig. 1. Overview of methods.

Only online-accessible policy documents published in English and in PDF form were included in the review. Documents that fell into our definition of non-binding policies might be referred to under terms like resolutions, agreements, declarations recommendations, positions or even policy briefs. Non-binding policies move beyond mere information provision that is commonly known from documents like reports or scientific papers. Furthermore, non-compliance of non-binding policies was required to be non-sanctionable (Haarstad et al., 2024; Schachter, 1977).

All international non-binding policies on sustainable land passenger transport included in the study refer specifically to land passenger transport modes (e.g. road transport, railways, public transport, active mobility, road safety, road networks). Documents only addressing freight transport or non-land passenger transport modes (e.g. aviation or maritime transport) were excluded. Land passenger transport only needed to be mentioned once in a document, for it to be included.

The scope of this review was limited to EU member states, meaning all documents are applicable to actors within the EU to be included. A document was considered applicable if it did not specifically focus exclusively on regions outside Europe.

In summary, documents were eligible for the review if all the following inclusion criteria were satisfied: 1) they were authored by public international institutions relevant to land passenger transport that cover at least three different EU member states and they apply to actors within the European Union; 2) they were published between 1 January 2015 and 31 December 2024; 3) they contained the words “sustainable” and “transport” and address land passenger transport; and 4) they were available online, and are published in English and in PDF format.

2.3. Information sources

Non-binding policies were identified via 49 policy databases maintained by public international institutions. The databases were gathered from overviews (Global Cities Hub Geneva, 2024; United Nations Department of Global Communications, 2023) and extended with explorative web searches. As well as including intergovernmental institutions, such as the United Nations, the EU, G20, G7 and the OECD, transport-specific networks were also included (rail transport networks, public transport networks, multimodal transport networks, road transport networks, bike networks and automated transport networks).

Non-binding policies produced by networks of cities and regions were also included. All institutions represent at least three different EU member states (or regions or municipalities in at least three EU countries). Appendix A provides a full overview of the included information sources.

2.4. Search strategy

The search terms were intended to be as similar as possible across information sources. Given the constraints using different databases, a simple search strategy was chosen, searching for “Transport AND Sustainable”. The specific query was implemented in four ways. (a) Inserting “transport AND sustainable” in the search field if Booleans were possible, (b) selecting the filter “transport” and inserting “sustainable” in the search field (or the other way around), (c) inserting “transport” in the search field and manually searching all results and their full text for “sustainable”, if none of (a) and (b) were possible. (d) Manually testing all result and their full text for “sustainable” and “transport” if neither (a) nor (b) nor (c) were possible.

Following the above search strategy, few information sources provided more data than could reasonably be included in this review. Therefore, with nine information sources filters for document types had to be applied so that the likelihood of including non-binding policies was maximized, while minimizing irrelevant results (see Appendix A). The data gathering process was designed to be fully reproducible. Other research can include the same international institutions and employ the listed search terms and inclusion criteria. Furthermore, we make the final dataset of non-binding policies accessible for future research and analysis.

2.5. Selection of sources of evidence and data items

All identified documents were collected in separate spreadsheets. Each row recorded details about one document and was complemented with information such as the document title, abstract, publication date and URL of the online document. Duplicates were later identified, recorded and removed.

The main coder screened all documents of the raw dataset (title, abstract, and full text) to identify if they addressed land passenger transport and were applicable to the EU. Randomized parts with $n = 0.5$ percent of the overall sample were presented to two additional coders

who had not been involved in screening up to that point. Inter-coder-reliability with the first coder was then calculated based on the coding results from the three coders. A first exploratory test for inter-coder-reliability with a randomized sample of the dataset was conducted. After close examination and discussion among all coders, it was found that the inclusion criteria needed to be adjusted to be more liberal. With adjusted inclusion guidelines, Krippendorff's alpha (Krippendorff, 2019; Marzi et al., 2024) indicating whether a document was addressing land passenger transport was above the threshold of 0.67 and thus acceptable (Subjects = 30, Raters = 3, $\alpha = 0.734$). Krippendorff's alpha for applicability to actors within EU-member states was found to be acceptable (Subjects = 30, Raters = 3, $\alpha = 0.664$). The overall agreement among all coders on whether a document should be included or excluded based on the above listed conditions was acceptable (Subjects = 30, Raters = 3, $\alpha = 0.735$).

The raw dataset was then thoroughly screened to ensure that only non-binding policies remained. Binding policies, research or reporting documents and information material were excluded from the final dataset. A broad understanding of non-binding policies was used based on inductive coding, therefore allowing for the inclusion of different document types prior to their classification (see Table 2 in the results section). In addition, the non-binding policies were assessed in terms of the degree of formality.

2.6. Data charting process and synthesis of results

From the initial dataset of documents, we extracted the number of documents by information source to later be provided in graphs. During screening, based on inductive coding of all documents, we classified the documents by extracting document types and identified non-binding policies (see Table 2 in the results section). Third, we evaluated how these non-binding policies addressed transport. For data preparation, all non-binding policies were saved as a final dataset and checked for sentences mentioning “transport”. The full corresponding sentence, as well as three sentences before and after the term, were collected in a document-content matrix. Where transport was mentioned on multiple occasions in the text, this procedure was repeated for each section, and overlapping sections were merged. For further analysis we removed insignificant words, that were frequent but contributed little to no meaning (e.g. “the”), so called stopwords, from the data. After reviewing possible stopword lists (Brigadir, 2016; Nothman et al., 2018), we opted for the English snowball stopword list given its short length of 174 words and transparency on inclusion criteria (Porter, 2001). Following

Table 1
Percentage of non-binding policies by international institutions.

International network or institution	Number of documents on sustainable transport	Number of non-binding policies on sustainable passenger land transport in EU
United Nations	1675	72
European Union	3317	233
G20 and G7	210	25
OECD (ITF)	58	9
Rail transport networks	165	108
Public transport networks	31	21
Bike networks	27	11
Road transport networks	53	20
Multimodal transport networks	115	26
Automated transport networks	12	3
Networks of cities and regions	163	35
Sum	5826	563

Table 2
Typology of non-binding policies.

Document type	Decision	Reasoning
Action plan	Non-binding policy	
Agenda	Non-binding policy	
Amendment	Exclusion	Binding policy
Article	Exclusion	Research or reporting document
Charter	Non-binding policy	
Communiqué or Communication	Non-binding policy	
Decision	Exclusion	Binding policy
Declaration	Non-binding policy	
Directive	Exclusion	Binding policy
Discussion paper	Exclusion	Research or reporting document
Factsheet	Exclusion	Research or reporting document
Guides, Guideline or Handbook	Non-binding policy	
Information material	Exclusion	Information material
Legislative resolution	Exclusion	Binding policy
Manifesto	Non-binding policy	
Manuals or Toolkits	Exclusion	Research or reporting document
Memorandum	Non-binding policy	
Opinion	Non-binding policy	
Pledge	Non-binding policy	
Policy brief	Non-binding policy	
Position	Non-binding policy	
Programming document	Exclusion	Research or reporting document
Proposal	Non-binding policy	
Recommendation	Non-binding policy	
Regulation	Exclusion	Binding policy
Report	Exclusion	Research or reporting document
Roadmap	Non-binding policy	
Resolution	Non-binding policy	
Staff working document	Exclusion	Research or reporting document
Statement	Non-binding policy	
Strategy	Non-binding policy	
Study	Exclusion	Research or reporting document
Vision	Non-binding policy	
White paper	Exclusion	Research or reporting document
Working paper	Exclusion	Research or reporting document

examination of the dataset, we additionally removed the following words from the analysis: “shall”, “https” and “http”.

Latent Dirichlet Allocation (LDA) (Blei et al., 2003), a topic modeling method, was used to analyse topics the non-binding policies associated with transport. LDA has been successfully used for understanding the topics in text on transport issues (Schreiber et al., 2023). In LDA (Blei et al., 2003), texts are understood as bags of words, each document is a topic mixture, each topic is a word distribution, and words can belong to

multiple topics. The number of topics as well as their interpretation is based on human inference. When identifying topics, different numbers of topic were tested (3, 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 70 and 100 each with 50 iterations). In promising ranges, all numbers were tested (e.g. between 40 and 50). The total number of topics was decided based on maximizing semantic coherence within topics and minimizing semantic overlap between topics. The number of iterations for the finally selected model was 1000. Topic interpretation was done by the three authors of this article and based on the most representative documents and words per topic. For technical implementation of topic modelling, we relied on jsLDA 2.0 hosted by the Harvey Mudd College (Babb et al., 2021; Mimno et al., 2025).

We used three measures to explore the topics. First, we calculated the top words for each topic. The script counted occurrences of non-stopword tokens³ assigned to a topic and transferred them into descending order by frequency. Next, the counts were converted into probabilities by dividing them by the total tokens assigned to each topic. Therefore, top words indicated terms that were most representative of a topic. Second, the script calculated top texts by ranking documents based on a topic score that was calculated as the proportion of non-stopword tokens in the document assigned to the topic. High top text scores consequently revealed documents that were most representative of a given topic. Third, we examined the average document proportion over time. For each document, the proportion of tokens assigned to a topic was calculated by dividing the number of tokens assigned to that topic by the total number of tokens in the document, including stop-words. These document topic proportions were averaged across all documents for a year. Stopwords were counted in the total token count but not assigned to any topic. In that way, the average document proportion over time reflects the relative presence of topics in the meaningful content of the documents, considering that stopwords dilute the overall proportions. As a result, the sum of all topic proportions in a document or in a year was expected to be considerably lower than 100 percent.

2.7. Limitations

This scoping review and analysis has its limitations. First, we only cover a limited share of international non-binding transport policies by focusing on English documents that address sustainable passenger land transport and are relevant to the European Union. We may have thereby excluded documents published in other EU languages. We expanded existing overviews (e.g. [Global Cities Hub Geneva, 2024](#); [United Nations Department of Global Communications, 2023](#)) through explorative web searches to include 49 international institutions, trying to capture all relevant institutions. Second, this paper's adaptation of the PRISMA-ScR structure to a policy analysis, while providing a transparent methodological approach, required compromises such as deviations from the original registration protocol. Third, this study does not assess the impact that the analysed documents may have had on past policy debates, binding policies, and practice. Fourth, while the analysis provides some links and comparisons to binding policies, there is no systematic comparison between hard and soft policy. Fifth, methodological constraints of our analysis include the fact that the quantity of documents does not necessarily indicate their audience and readership. It is important to note, that a single non-binding international resolution might have been more influential than a policy brief. Sixth, by excluding few document types like reports from the final dataset of nonbinding policies, we may have omitted policy elements contained within these documents. Seventh, the text segments used for topic modelling in some instances deviated from content representation on a document level. For example, some documents contributed many segments to the dataset, while others contributed few. Eighth, the reproducibility of the no-seed

LDA approach can be considered as a limitation. Multiple test runs confirmed highly similar results for our model with 45 topics. The chosen method and implementation with jsLDA 2.0 (Babb et al., 2021; Mimno et al., 2025) are more reproducible than a project-specific encapsulated topic modelling script. The interpretation of topics and the subjective clustering of similar topics is context dependent by design. As a result, different interpretations are possible.

3. Results

3.1. Selection of sources of evidence

6088 records containing the words “Sustainable” and “Transport” were identified from international institutions for this scoping review. However, by time of completion of data gathering 8 documents had to be removed, since they were no longer accessible. After removal of 254 duplicates at the information source, an initial dataset of 5826 documents remained to be screened. From this initial dataset, 3369 documents were removed since they did not address land passenger transport (see Eligibility criteria above). A further 293 documents were removed since they did not apply to actors within the EU. Subsequently, 1601 documents were removed since they were not considered to be true non-binding policies. Therefore, the analysis was conducted with a final dataset of 563 non-binding policies on sustainable land passenger transport (see Fig. 2).

3.2. Characteristics of sources of evidence

Only around 10 percent of all documents from the initial dataset were identified as non-binding policies. A large proportion of the non-binding policies were issued by the European Union, rail transport organisations and the United Nations (Table 1). A more detailed disaggregation can be found in Appendix A.

3.3. Classification of documents

Table 2 presents a typology of non-binding policies based on the definition of non-binding policies in section 1. In this understanding, we classified as non-binding policies: action plans (n = 6), agendas (n = 7), charters (n = 1), communiqués and communications (n = 37), declarations (n = 18), guides, guidelines or handbooks (n = 44), manifestos (n = 3), memorandums (n = 1), opinions (n = 69), pledges (n = 1), policy briefs (n = 45), positions (n = 136), proposals (n = 39), recommendations (n = 27), roadmaps (n = 22), resolutions (n = 84), statements (n = 13), strategies (n = 5) and visions (n = 5). The following types of documents were not classified as non-binding policies: amendments, articles, decisions, directives, discussion papers, factsheets, information material, legislative resolutions, manuals or toolkits, programming documents, regulations, reports, staff working documents, studies, white papers and working papers. All provided document types were represented by examples in the initial dataset. Nearly a quarter of all non-binding policies in the final dataset were position papers, 15 percent were resolutions, and 12 percent were opinions. These three document types, therefore accounted for more than half of all non-binding policies.

3.4. Formal and non-formal non-binding policies

After reviewing the types of non-binding policies in the final dataset (title, abstract and full text), we found all resolutions and declarations to be of formal character (n = 102). These documents provide content organized by articles or entry-into-force and termination provisions. In consequence, around 1 out of 5 of the non-binding policies were of formal character (18 percent). Fig. 3 highlights how most of these formal non-binding policies have been authored by the United Nations or the European Union. Only few formal non-binding policies have been published by the OECD or the G20 and G7 or multimodal transport

³ Tokens are individual words or terms extracted from the text corpus.

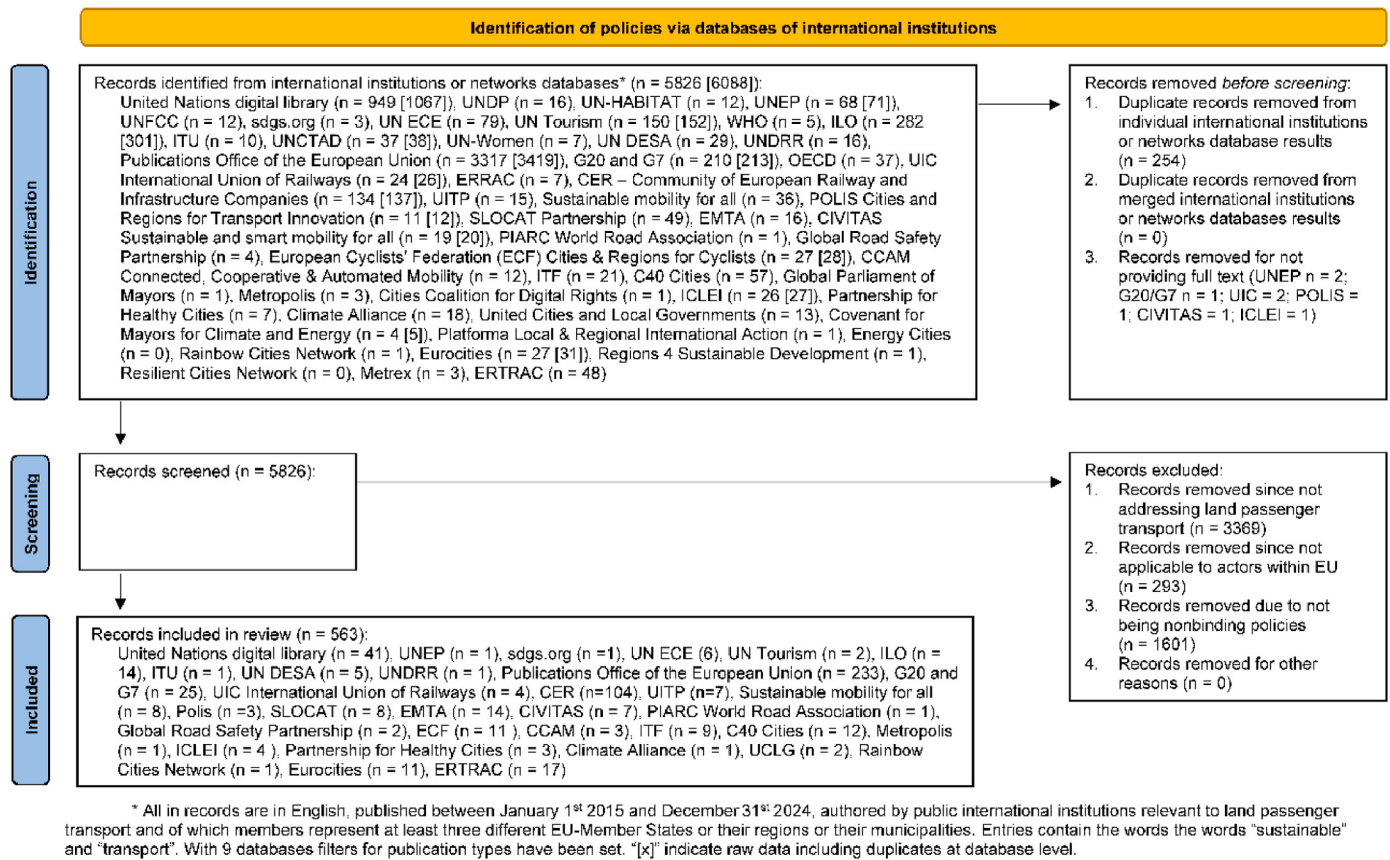


Fig. 2. Search PRISMA-ScR flow diagram.

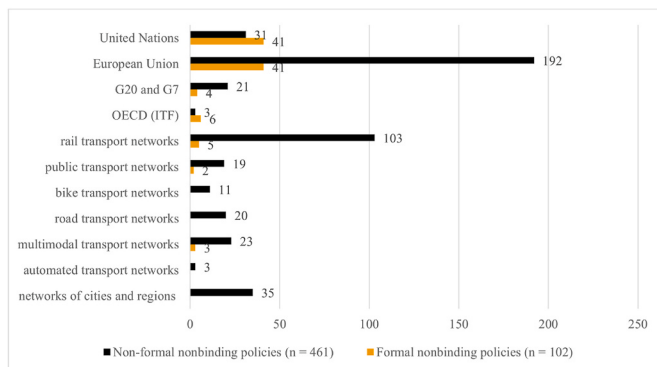


Fig. 3. Formal and non-formal non-binding policies in the final dataset.

networks.

3.5. Topics associated with transport

We identified 35,862 instances of the word “transport” in our final dataset of 563 non-binding policies on sustainable passenger land transport in the EU. In two documents, a policy brief by the ILO and a policy brief by the ECF, we were unable to discover any segments – possibly a result of these documents using other transport related terms. Based on 561 non-binding policies, we created a document matrix of 6152 text segments containing the word “transport”. The average segment length was 186 words. The distribution of segments over time broadly follows the distribution of records and non-binding policies over time. All tend to increase on average between 2015 and 2024 with a peak in 2021. However, segments are overrepresented by 12 percentage

points for the year 2019 and underrepresented by 5 percentage points for the year 2022 when compared to the full non-binding policy dataset (see Fig. 4).

After evaluating models (see 2.6. Data charting process and synthesis of results) between 3 and 100 topics (see Appendix B for the models with 3, 5, 10 and 45 topics) a model containing 45 topics was chosen as it was considered to offer the most interpretable, distinguishable results. Since 45 topics were challenging to list individually, similar topics were clustered by the authors based on their conceptual alignment (see Fig. 5). Topic identifiers linking to extensive topic information (see Appendix B) were listed in parentheses.

First, a Modes and Services cluster grouped topics associated with texts that focused on transport modes like public or active transport, electric or automated vehicles, and emerging mobility services. Second, we connected topics focusing on urban and rural transport planning, infrastructure development, and intelligent transport systems into a Land Use and Infrastructure cluster. Third, topics associated with texts on inclusivity, gender equity, passenger rights, and road safety were grouped in a cluster labelled Access and Safety. Fourth, a Funding and Development cluster, combined topics on financial resources, and transport's role in international development. Fifth, we found that topics on transport impacts like emissions, congestion, noise, and risks could be combined into a cluster labelled Externalities. Sixth, topics on policies and their implementation were connected in a Governance cluster. Last, a Research cluster included topics on transport data, and research initiatives, while a Miscellaneous cluster combined institution-specific and less relevant topics.

3.5.1. Modes and services

Transport modes were a feature in multiple topics. Documents associated with a topic on Public Transport and Cycling (2) depicted strategies to improve active mobility and public transport. While the

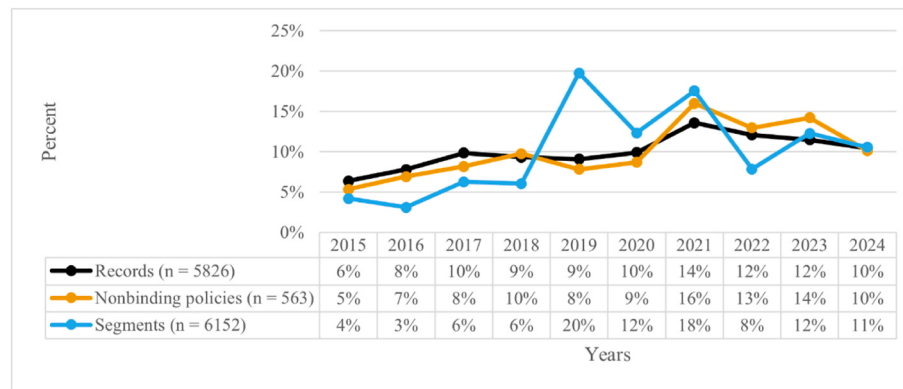


Fig. 4. Distribution of cases over time for screened records, non-binding policies and their segments.

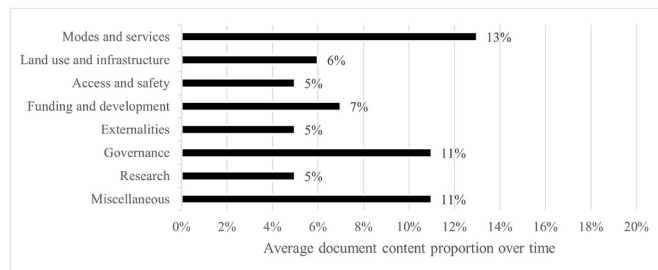


Fig. 5. Aggregated document proportion of topic clusters over time.

focus was on public transport and cycling, other modes like walking or shared mobility were also addressed. The topic on Electric Vehicles, Energy Fuels and Charging (20), addressed changes in drive technologies, fuels and associated infrastructure in the transport sector with a focus on cars. The topic on Automated and Connected Vehicles (28), described plans for a transport system incorporating automated vehicles. Strategies and commitments on Rail (36) transport and Aviation (8) were being addressed in other topics. Three topics were more transport service oriented: New Mobility Solutions and Services (11), Public Transport Services (30), and Airport Access (44). As Fig. 6 reveals, all topics in combination accounted for an average of around 13 percent of the content across documents over time.

Exploring the different topics, it was apparent that except for the topic on Aviation (8) all other topics did not only follow a technological transport understanding but included the human dimension as well. For example, the topics Public Transport and Cycling (2), Rail (36), Automated and Connected Vehicles (28) and New Mobility Solutions and

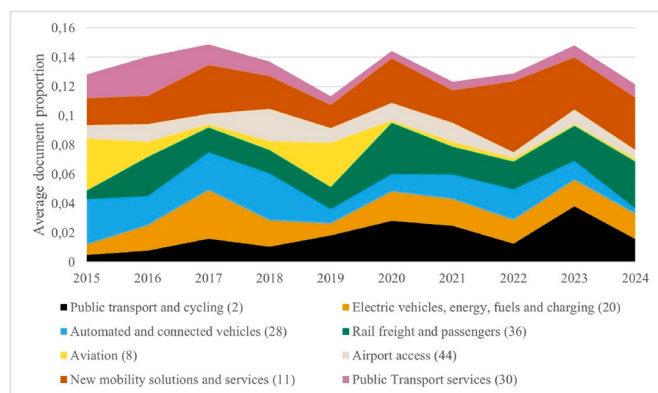


Fig. 6. Transport modes and services in non-binding policies – Average document proportion over time.

Services (11) include high probability words like “people”, “passenger”, “driver”, and “users”. The topics listed above were mainly published by Networks on transport modes as well as the G20 and G7 and OECD (IFT), while the EU and UN appeared to play a minor role for them.

3.5.2. Land use and infrastructure

Non-binding policies concerning sustainable land passenger transport, focused on the spatial dimension of transport. Transport was, therefore, considered as an issue of Improving Cities (5) by promoting sustainable spatial management, housing and transport. In addition, Urban Transport (18), was presented as a planning issue calling for local measures like decreasing car dependency as well as the implementation of sustainable urban mobility plans. Some non-binding policies framed transport with a rural perspective. A Rural Transport (16) topic emphasized the urgency to plan for accessible transport systems in sprawling and low-density population regions. In tendency, documents connected urban transport to mobility planning, community building and housing, while for rural transport the focus appeared to be more on the expansion of fast and accessible public transport through planning.

Non-binding policies also highlighted the relation between transport and infrastructure. While this was an issue in many topics, like those on transport modes and services, some topics had this relation at their core. One of them focused on Road Infrastructure (10) from a planning and construction perspective. Another topic highlighted trans-European infrastructure development through the Infrastructure Network TEN-T (33). An additional topic emphasized the developments in the field of Intelligent Transport Systems (26) that can be utilized to improve transport, for example by providing ideas on traffic flow optimisation through intelligent traffic signal systems. As Fig. 7 shows, all topics in combination accounted for an average of around 6 percent of the document content over time.

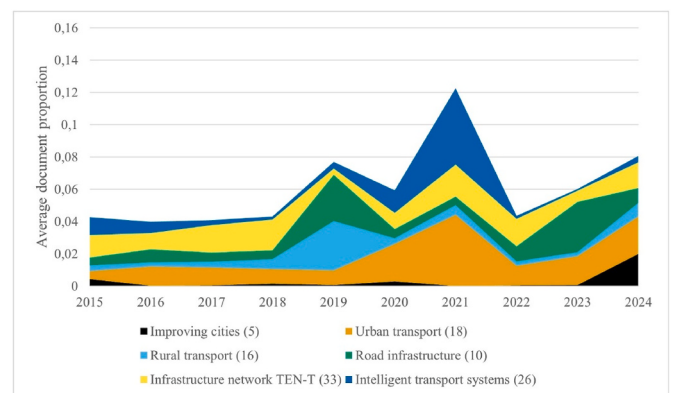


Fig. 7. Transport land use and infrastructure in non-binding policies – Average document proportion over time.

The topics connected to the spatial dimension of transport were mainly associated with multimodal and public transport networks as well as networks of cities and regions. Road transport infrastructure was pushed by both road transport networks and multimodal transport networks. Other infrastructure, especially the TEN-T was discussed by all institutions, but especially the EU, rail and public transport networks. The topic of intelligent transport systems was mainly found within UN documents.

3.5.3. Access and safety

Some non-binding policies addressed the well-being of transport users. For example, a topic on Accessibility (12) connected transport to inclusion and health. Thematically closely related was the connection of transport and Disability (15), highlighting the rights of persons and arguing for inclusive, barrier free transport. Perspectives on Women and Gender (29) were provided in some documents by focusing on women as transport workers and transport users. Thereby documents, for example, highlighted how women were under-represented as workers in the transport sector facing discouragement and discrimination. In addition, documents emphasized why and how transport must be redesigned to address the needs of women as transport users. Passenger Rights (7) were another topic, highlighting the connection of transport and rights by emphasizing the liabilities of carriers. The Road Safety (27) topic was focused on the wellbeing of transport users, their possible injuries, fatalities and vehicle safety. The five topics together put a focus on how transport can be made more accessible and highlighted the need for a just and safe transport system. While some vulnerable transport users like disabled people and women received more attention, others like children or elderly people were not a noticeable part of the discovered topics. For example, there were 306 mentions of “disab” in the dataset. At the same time, there were 188 mentions of the word “women” and 42 mentions of “girl” across the dataset, while there were only 32 mentions of the word “men” and 9 mentions of the word “boy” in the dataset. There were only 29 mentions of the word “elderly”, 17 mentions of the word “senior”, and 27 mentions of the word “child” in the dataset. As Fig. 8 shows, all topics in combination accounted for an average of around 5 percent of the document content over time.

Overall, the topics were mainly associated with intergovernmental organisations (EU, United Nations, OECD and G20 and G7), however content on passenger rights was associated with rail transport networks. The OECD was an important stakeholder pushing the topic of road safety into the discourse by providing non-binding policies. Apart from intergovernmental organisations, mainly networks of cities and regions contributed to the discourse on Disability and Accessibility.

3.5.4. Funding and development

Funding (0) and Transport Aid (24) were issues of transport standing at the core of two topics. Documents associated with these topics

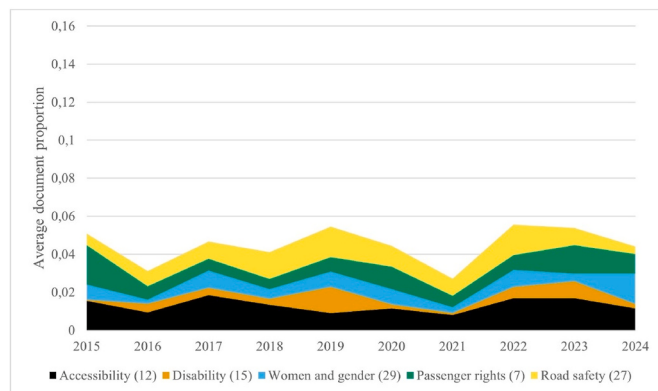


Fig. 8. Transport access and safety in non-binding policies Average document proportion over time.

stressed the need to provide financial resources for transport development and described structures to do so. While some non-binding policies addressed the need for further financial infrastructure investment in the European Union, others highlighted the administrative constraints and needs around transport investments. Thematically in close connection was a topic on Equity (42), emphasizing the burden that individuals must bear when it comes to sustainability-oriented transport policy. For example, a document strongly associated with the topic stated that “the increase in the price for fossil fuels may disproportionately affect vulnerable households, [...] and vulnerable transport users” (European Committee of the Regions, 2022).

Four topics connected transport to development. One topic addressed the nexus of International Development (31) and transport, for example by underscoring the role of international transit corridors and cooperation. In documents associated with a topic on Global Transport Growth (34), the positive connections of economic development, emission reduction and transport growth were emphasized. Mobility and Sustainable Development (25) was at the heart of another topic, highlighting the need for global policy development and action in the transport sector. When it comes to development, a topic on Tourism (23) thematically appears closely related, since the accessibility of destinations by transport is a precondition for tourism. Together, these seven topics accounted for an average of around 7 percent of the of the document content over time (Fig. 9).

All topics highlighted the need for investments and collaboration in the transport sector. Funding and Transport Aid was mainly addressed by rail transport networks and the European Union, while bike networks and the G20 and G7 were important stakeholders addressing transformational costs. While international development was a topic mainly associated with the United Nations, the Global Transport Growth was associated with the EU and transport networks. Tourism was an issue addressed by networks of cities and regions, while Mobility and Sustainable Development was mainly addressed by multimodal transport networks and road transport networks.

3.5.5. Externalities

Four topics had the externalities of transport at their core. A topic on Emissions and Climate (1) associated transport with greenhouse gas emissions and reduction targets following the Paris Agreement as well as environmental pollution. Another topic on the External Costs of Transport (41), showed a focus on the impacts of congestion, noise and accidents on people and urban areas. A topic on the COVID-19-pandemic (14) addressed public health and the connection between transport, the pandemic and the transport sectors economic wellbeing. This topic also highlighted the impact of the pandemic on free passenger travel. One topic on Risks and Hazards (9) was associated with texts on addressing and mitigating the dangers of transport systems. Thereby documents, provided strategies to mitigate accidents, disasters and transport

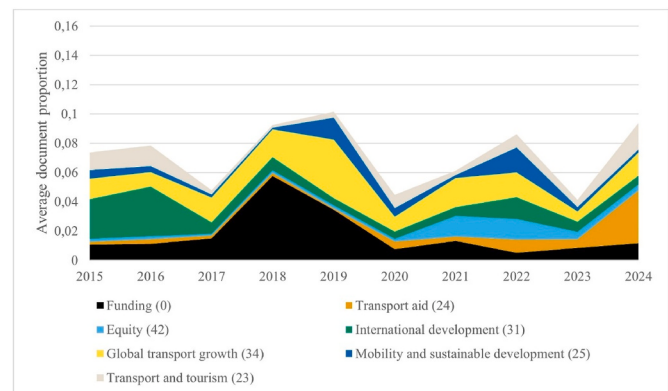


Fig. 9. Transport funding and development in non-binding policies Average document proportion over time.

hazards such as those arising from the transport of dangerous goods.

Together, these four topics accounted for an average of around 5 percent of the of the document content over time (Fig. 10). Notable there was a strong spike for the topic External Costs of Transport (41) in 2019, the year of the publication of the European Union's Handbook on the external costs of transport (European Commission et al., 2019). This may be explained by 307 text snippets of the dataset being attributed to this document.

All topics underlined the connection between transport and external effects and framework conditions. The topic of Emissions and Climate was mainly associated with intergovernmental organisations, while External Costs of Transport was associated with the EU. The pandemic on the other hand was mainly being discussed in publications by the OECD and other intergovernmental organisations as well as bike networks. The topic of risks and hazards in non-binding policies on transport was more associated with authorship by the United Nations.

3.5.6. Governance

Transport politics were at the core of five topics, focusing on Transport Policy (4, 21, 32, 40), as well as Policy Implementation (35, 43). The first four topics were very similar. They focused on terms associated with policies like regulation, rule or proposal (4), or actors like the European Council, the Parliament or the Committee (21, 40). They also described shared European strategies for the transport sector (32). Thematically, these transport policy topics could be combined into one. The two topics on the implementation of policies (35, 43) underlined the need for EU Member States to act in accordance with policies and were very similar. They were associated with words relating to needed adjustments in existing policies as well as calls for action towards governmental actors. Fig. 11 shows how all topics in combination accounted for an average of around 11 percent of the of the document content over time.

The five topics were relatively evenly distributed across authorship, with the European Union being the most important actor across topics.

3.5.7. Research

Four topics addressed transport research. Two topics focused on (European) Transport Research (13, 22) in a broad sense, often by linking to research actors. An additional topic addressed the nexus of European Transport Regulation and Research (3). Finally, another topic provided a focus on Data, Information and Indicators (38), connecting documents on standards for data collection, sharing and protection. As Fig. 12 shows, all topics in combination accounted for an average of around 5 percent of the of the document content over time.

The four topics were relatively evenly distributed across authorship, with only road transport networks moving out of the line, by contributing strongly to the transport research topic, a result of publications by the European Road Transport Research Advisory Council (ERTRAC).

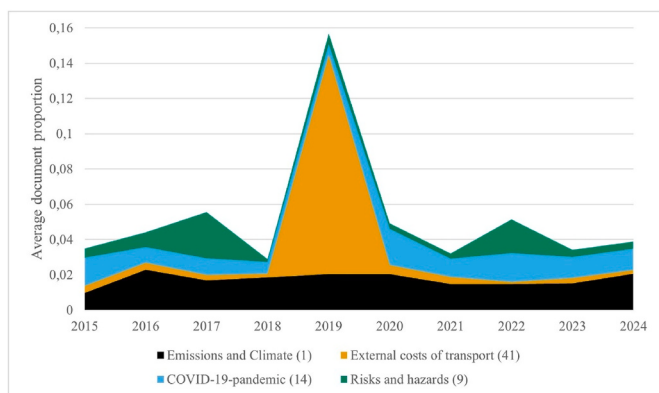


Fig. 10. Transport externalities in non-binding policies Average document proportion over time.

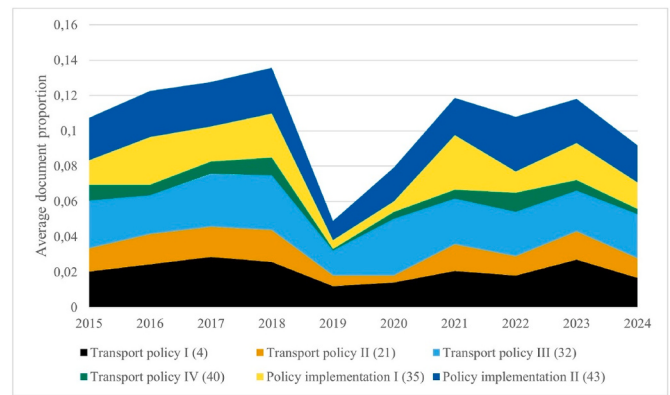


Fig. 11. Transport governance in non-binding policies Average document proportion over time.

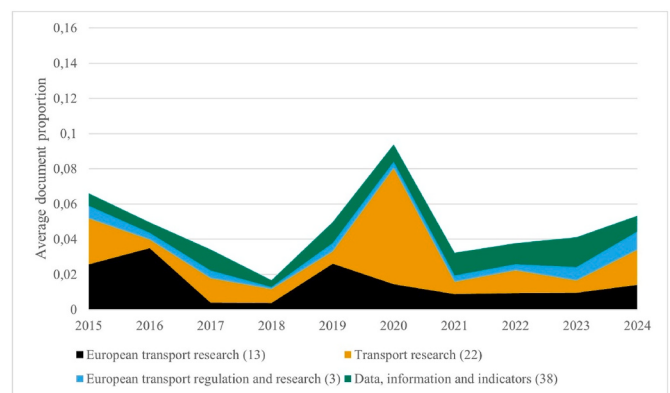


Fig. 12. Transport Research in non-binding policies Average document proportion over time.

3.5.8. Miscellaneous

Three topics were centred around the authoring institutions. A first topic (17) focused on Connected, Cooperative and Automated Mobility (CCAM) – a result of many text sections describing their activities. A second topic (19) combined issues addressing the European Economic and Social Committee (EESC) that were often brought up in opinions and resolutions. Lastly, a topic was associated with the CER (37) mainly based on repetitive texts on the work of the Community of European Railway and Infrastructure Companies (CER). Two topics did not provide us with meaningful information on transport. One No Meaning (39) topic combined terms that could likely only have been excluded by applying a more exhaustive stopword list to the dataset, which would have increased the risk of biased results. Another topic evolved around the terminology used to describe best practice examples and did not provide us with much information on transport (6). The most associated document type of this topic was Guide, Guideline or Handbook. Together, these topics accounted for an average of around 11 percent of the document content over time. As expected, the topic of CCAM was mainly associated with automated transport networks, the topic of EESC was associated with the EU and the topic of CER was associated with rail transport networks. The No Meaning topic was associated with all institutions. The topic on good practice, on the other hand, was mainly associated with public transport networks and the European Union.

4. Discussion and conclusions

Building on an extensive search via 49 policy databases maintained by public international institutions, this article reviews more than 500 non-binding policies on sustainable land passenger transport in Europe.

Employing the rigorous PRISMA-ScR methodology and a large, systematically assembled corpus, this study delivers a comprehensive synthesis of a previously underexamined area of transport policy.

In general, the publication of non-binding transport policies has been increasing between 2015 and 2024 and experienced a peak in 2021. Most documents were developed by the European Union, rail transport networks, the United Nations and networks of cities and regions. However, a range of other institutions has also developed non-binding policies to steer and guide the transport sector. Non-binding policies are therefore an established instrument in the transport sector.

Various document types can be considered as non-binding policies: action plans, agendas, charters, communiqués and communications, declarations, guides, guidelines or handbooks, manifestos, memorandums, opinions, pledges, policy briefs, positions, proposals, recommendations, roadmaps, resolutions, statements, strategies and visions. Position papers were the most common category, comprising nearly a quarter of the non-binding policies. In combination with resolutions and opinions, these accounted for more than half of all non-binding policies. Applying a simple differentiation on policy formality (Bradley et al., 2023), we found around a fifth of the non-binding policies to be of a harder, formal character. Most of these documents were authored by the United Nations and the European Union. This suggests that formal non-binding policies in the transport sector are commonly used by international institutions. The reasoning behind these non-binding law-like policies has received little attention in research to date.

The topic analysis revealed a wide range of transport issues that were addressed in international non-binding policies for sustainable land passenger transport in Europe published between 2015 and 2024. Across these documents, transport was often understood as a service for the public good, focusing on public and active transport modes, alongside new mobility options and services. Relatively few topics addressed car-based transport. The non-binding policies highlighted the importance of land use and infrastructure for a sustainable transport system. For urban areas, documents adopted an intersectoral and holistic planning understanding with issues like housing, liveability and decreasing car dependence being raised. In contrast, rural mobility was understood as primarily an infrastructure challenge, pointing towards a structural urban-rural asymmetry in planning paradigms. In non-binding policies an overall emphasis on inclusive and equitable transport was often narrowly centred on people with disabilities and women. While documents addressed needs and financing mechanisms for sustainable transport transition, they also raised distributional questions such as the impacts of transition costs. Thereby the transport development was directly linked to social issues of distributional fairness. Adverse impacts of transport beyond greenhouse gas emissions, including congestion, pollution and health, were addressed in many non-binding policies. This reflects a detailed, although not always holistic, framing of transport externalities.

Non-binding policies can contribute to agenda formation. They can influence stakeholders by introducing new policy concepts and principles (Biermann et al., 2022; Krombach et al., 2024; Mattila and Heinilä, 2022), thereby helping to diffuse ideas on the transition of the transport sector and providing alternative frameworks for coordination (Banister, 2008; Stead, 2016). Issues currently addressed only by non-binding policies may therefore gain further influence in the future and could move into the binding policy sphere (Bradley et al., 2023; Hartl et al., 2024; Metzger and Schmitt, 2012). For example, while transport for people with disabilities is already an issue of EU binding policy (Charitakis, 2020), the situation of women as transport users is less prominent there (Hortelano et al., 2021). In non-binding policies female transport users were an issue of interest and from there might enter the binding policy sphere. Groups other than people with disabilities or women, like children or the elderly, played a minor role in the analysed non-binding policies. In our view this absence could indicate limited attention to children and the elderly in transport agenda setting. Moreover, this points towards a potential gap in transport equity

considerations within non-binding policies, possibly skewing the framing of problems and corresponding strategies and indicators. Furthermore, this raises the question of whether these groups are similarly underrepresented in binding policies. Addressing such gaps could enhance inclusivity in policy outcomes. In addition, the growing prominence of non-binding policies raises normative questions that go beyond their potential transformation into binding ones. For example, questions arise regarding which actors should be held accountable for the outcomes of non-binding policies and at which governance level.

While many non-binding policies on transport exist, the study of these policies has been limited. This review shows that non-binding policies represent a widely used instrument in transport policy, produced by a variety of institutions. Overall, this prominence of non-binding transport policies calls for more research on soft policy. In this regard, further work on classifying non-binding policies appears promising, as seems applying a similar research approach to other transport modes, languages and continents. The topics possibly indicate emerging issues for transport policy. These include a stronger role of public and shared modes and women that might leap to future binding policymaking. Transport planners may benefit from familiarizing themselves with these issues and monitoring their development. The analysis suggests that certain issues may be more prominent in non-binding policies than in binding policies. However, establishing whether this is the case requires more detailed research. Future research could also shed light on the roles that non-binding policies play for a diverse set of stakeholders, ranging from the intentions and motivations behind their creation to their reception and implementation at the national, regional and local levels.

Overall, the analysis indicates a growing emphasis on non-binding policies and a discursive prominence of public and shared mobility, intersectoral urban planning, accessibility, women, transport funding and transport externalities in the policy sphere. However, there is little attention to holistic transport inclusiveness and understandings of mobility differ between urban and rural areas. For example, mobility is primarily viewed as an infrastructure challenge in rural areas whereas urban mobility is linked to wider issues such as liveability and housing. Since non-binding policies can shape policy and practices agendas, future research could focus on their uptake and impacts across transport modes and regions to trace how discourse translates into policy outcomes. Future research can build on the results as a baseline for replications that focus on different regions or transport modes. As such, the findings can help to identify a more comprehensive perspective on the role of non-binding policies in the transport sector.

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Declarations of interest: none.

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CRediT authorship contribution statement

Jonathan Schreiber: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Visualization, Writing – original draft, Writing – review & editing. **Dimitris Milakis:** Conceptualization, Data curation, Supervision, Validation, Writing – review & editing. **Dominic Stead:** Conceptualization, Data curation, Supervision, Validation, Writing – review & editing.

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evaluating the manuscript. Their constructive feedback has greatly improved our work.

Appendix A. Information Sources

Table A.1

Policy databases maintained by public international institutions and filters

International institution	Institutional type	Applied filters (if any)
United Nations (UN digital library)	United Nations	resolutions and decisions; treaties and agreements; concluding observations and recommendations
UNDP	intergovernmental organisation	
UN-HABITAT	intergovernmental organisation	
UNEP	intergovernmental organisation	
UNFCCC	intergovernmental organisation	
HLPF on Sustainable Development (sdg.un.org)	intergovernmental organisation	
UN ECE	intergovernmental organisation	
UN Tourism	intergovernmental organisation	
WHO	intergovernmental organisation	
ILO	intergovernmental organisation	guidelines; statements; briefs
ITU	intergovernmental organisation	
UNCTAD	intergovernmental organisation	
UN-Women	intergovernmental organisation	
UN DESA	intergovernmental organisation	policy briefs
UNDRR	intergovernmental organisation	policy briefs; documents and publications; UN resolutions (and reports)
European Union (Publications Office of the EU)	intergovernmental organisation	EU law; EU publications
G20 and G7	intergovernmental fora	
OECD	intergovernmental organisation	
International Transport Forum (ITF)	intergovernmental organisation	policy brief; summit declaration
UIC International Union of Railways	rail transport network	
European Rail Research Advisory Council (ERRAC)	rail transport network	
CER	rail transport network	positions; agreements and resolutions
International Association of Public Transport (UITP)	public transport network	
Sustainable mobility for all	multimodal transport network	
POLIS Cities and Regions for Transport Innovation	multimodal transport network	
SLOCAT Partnership	multimodal transport network	
European Metropolitan Transport Authorities (EMTA)	public transport network	
CIVITAS Sustainable and smart mobility for all	multimodal transport network	
PIARC World Road Association	road transport network	
Global Road Safety Partnership (GRSP)	road transport network	
European Cyclists' Federation (ECF) Cities & Regions for Cyclists	cycle network	
CCAM Connected, Cooperative & Automated Mobility	automated transport network	
C40 Cities Climate Leadership Group	network of cities and regions	policy brief; implementation guides
Global Parliament of Mayors	network of cities and regions	declarations, calls to action and resolutions
Metropolis	network of cities and regions	
Cities Coalition for Digital Rights	network of cities and regions	
ICLEI - Local Governments for Sustainability	network of cities and regions	
Partnership for Healthy Cities	network of cities and regions	
Climate Alliance	network of cities and regions	
United Cities and Local Governments	network of cities and regions	

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Table A.1 (continued)

International institution	Institutional type	Applied filters (if any)
Covenant for Mayors for Climate and Energy	network of cities and regions	
Platforma Local & Regional International Action	network of cities and regions	
Energy Cities	network of cities and regions	
Rainbow Cities Network	network of cities and regions	
Eurocities	network of cities and regions	
Regions4 Sustainable Development	network of cities and regions	
Resilient Cities Network	network of cities and regions	
METREX	network of cities and regions	
European Road Transport Research Advisory Council (ERTRAC)	road transport network	

Appendix B. Topic models

Table B.1

Topic models, topics, most frequent words and documents with closest match.

Model	Topics	Most frequent words ^a	Document with the closest match ^b
3 topics	Urban public transport (0)	transport (1.90%), mobility (1.41%), public (1.14%), urban (1.05%), services (0.72%), data (0.65%), cities (0.66%), use (0.59%), sustainable (0.59%) also (0.56%)	SUM4ALL (2019). Global Roadmap of Action Toward Sustainable Mobility: Universal Urban Access .
	Road transport (1)	transport (2.59%), road (1.52%), safety (0.98%), development (0.89%), research (0.81%), international (0.75%), countries (0.72%), sustainable (0.72%), european (0.65%) global (0.59%)	CCAM (2021). SRIA: European leadership in safe and sustainable road transport through automation .
	Rail transport (2)	transport (2.61%), european (1.61%), eu (1.38%), rail (1.33%), commission (0.79%), regulation (0.70%), member (0.65%), emissions (0.60%), infrastructure (0.59%), state (0.59%)	CER (2019). Commission study results suggest greater role for European railways
5 topics	Urban public transport (0)	transport (2.37%), mobility (1.87%), public (1.64%), urban (1.34%), cities (0.98%), services (0.74%), also (0.73%), use (0.83%), local (0.62%), areas (0.58%)	SUM4ALL (2019). Global Roadmap of Action Toward Sustainable Mobility: Universal Urban Access .
	EU transport policy (1)	transport (2.72%), european (2.61%), eu (2.21%), rail (1.58%), commission (1.29%), states (0.95%), member (1.05%)	EU (2015). European Parliament resolution of 9 September 2015 on the implementation of the 2011 White Paper on Transport: taking stock and the way forward towards sustainable mobility (2015/2005(INI))

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Table B.1 (continued)

Model	Topics	Most frequent words ^a	Document with the closest match ^b
10 topics	Transport data (2)	regulation (0.90%) infrastructure (0.86%) emissions (0.79%) transport (1.72%) research (0.94%) data (0.92%) mobility (0.84%) road (0.77%) systems (0.76%) system (0.71%) vehicles (0.64%) innovation (0.61%) automated (0.60%)	ITU (2021). Handbook on Land Mobile – Volume 4: Intelligent Transport Systems
	Rail passengers (3)	transport (2.42%) rail (1.36%) services (0.98%) passenger (0.97%) costs (0.88%) services (0.74%) aid (0.59%) passengers (0.75%) travel (0.55%) information (0.53%)	EU (2019). Best practices guide on the carriage of persons with reduced mobility: final report.
	Road transport, sustainable development, safety and climate (4)	transport (2.38%) road (1.54%) sustainable (1.18%) development (1.13%) safety (1.12%) international (0.86%) countries (0.83%) global (0.76%) including (0.76%) climate (0.62%)	SUM4ALL (2019). Global Roadmap of Action Toward Sustainable Mobility (GRA).
	Rail (0)	rail (2.99%) transport (2.65%) railway (1.16%) will (1.12%) services (1.05%) passenger (0.96%) freight (0.96%) modes (0.87%) aid (0.82%) travel (0.66%)	EU (2020). Multi-annual action plan.
	Accessible, inclusive transport (1)	transport (1.28%) persons (1.21%) access (1.20%) including (1.15%) disabilities (1.09%) rural (1.09%) accessibility (0.98%) women (0.89%) safety (0.83%) people (0.76%)	UN (2020). Improvement of the situation of women and girls in rural areas: resolution adopted by the General Assembly.
	Public transport, cycling and cars (2)	transport (2.60%) public (2.09%) mobility (2.07%) cities (2.01%) urban (1.67%) city (1.28%) use (1.18%) policy (0.89%) cycling (1.14%) car (0.89%)	SUM4ALL (2019). Global Roadmap of Action Toward Sustainable Mobility: Efficiency
	Infrastructure (10-t) (3)	european (5.36%) transport (3.66%) rail (2.06%) commission (1.77%) infrastructure (1.47%)	EU (2015). European Parliament resolution of 9 September 2015 on the implementation of the 2011 White Paper on Transport: taking stock and the way forward towards sustainable mobility (2015/2005(INI))

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Table B.1 (continued)

Model	Topics	Most frequent words ^a	Document with the closest match ^b
	Energy and climate (4)	network (1.30%) union (1.12%) europe (0.95%) 10-t (0.90%) cer (0.87%) transport (2.56%) energy (2.14%) emissions (1.57%) climate (1.41%) sustainable (1.33%) development (1.02%) will (0.94%) sector (0.84%) support (0.81%) international (0.78%)	UN (2024). The Pact for the Future: resolution adopted by the General Assembly. A/RES/79/1
	Road safety (5)	road (3.13%) safety (2.09%) vehicles (2.06%) systems (1.46%) will (1.44%) system (1.38%) automated (1.32%) traffic (1.12%) transport (1.10%) vehicle (1.09%)	CCAM (2021). STRATEGIC RESEARCH AND INNOVATION AGENDA: European leadership in safe and sustainable road transport through automation
	Costs (6)	transport (2.89%) costs (2.14%) road (1.65%) per (1.39%) air (1.24%) emissions (0.96%) external (0.92%) countries (0.82%) noise (0.76%) cost (0.70%)	SUM4ALL (2019). Global Roadmap of Action Toward Sustainable Mobility (GRA)
	Transport Research (7)	transport (2.96%) research (1.88%) european (1.30%) project (1.14%) projects (1.13%) programme (1.05%) national (0.81%) funding (0.77%) mobility (0.73%) innovation (0.61%)	EU (2024). Support study on the climate adaptation and cross-border investment needs to realise the TEN-T network: executive summary
	Transport policy (8)	member (1.89%) states (1.66%) regulation (1.58%) should (1.43%) directive (1.23%) article (1.22%) transport (1.13%) commission (0.98%) which (0.82%) rules (0.73%)	EU (2018). Opinion of the European Committee of the Regions — Delivering on low-emission mobility.
	Urban transport and data (9)	mobility (2.39%) transport (2.12%) urban (1.64%) public (1.42%) data (1.41%) sustainable (1.30%) services (1.12%) development (0.89%) local (0.74%) access (0.70%)	UN (2024). Inter-agency policy briefs on accelerating progress on the 2030 Agenda from local to global levels: The critical importance of SDG localization
45 topics	Funding (0)	projects (3.27%) cef (2.44%) financial (2.35%) funding (2.35%) investment (2.19%)	EU (2018). Opinion of the European Committee of the Regions — Connecting Europe Facility.

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Table B.1 (continued)

Model	Topics	Most frequent words ^a	Document with the closest match ^b
	Emissions and climate (1)	infrastructure (1.80%) digital (1.67%) fund (1.51%) energy (1.49%) eur (1.44%) emissions (7.19%) transport (4.27%) climate (3.5%) energy (2.09%) reduction (1.93%) air (1.77%) gas (1.74%) greenhouse (1.62%) ghg (1.5%) pollution (1.45%)	UN (2024). The Pact for the Future: resolution/adopted by the General Assembly.
	Public transport and cycling (2)	public (4.3%) cycling (4.07%) transport (3.00%) car (2.50%) parking (2.38%) use (1.69%) mobility (1.61%) active (1.56%) modes (1.44%) walking (1.43%)	UITP (2023). Pathways to a multi modal lifestyle: Reinforcing public transport with active and micromobility.
	European transport regulation and research (3)	european (3.72%) transport (3.57%) regulation (1.76%) regulatory (1.35%) florence (1.35%) policy (1.18%) ing (0.86%) research (0.85%) tion (0.83%) stakeholders (0.79%)	EU (2019). Towards EU-wide multi modal ticketing and payment systems.
	Transport policy I (4)	regulation (2.11%) rules (1.78%) directive (1.67%) proposal (1.63%) commission (1.33%) will (1.31%) framework (1.25%) legal (1.22%) transport (1.17%) transport (1.17%) which (1.07%)	EU (2023). Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on the accounting of greenhouse gas emissions of transports services.
	Improving cities (5)	promoting (3.10%) public (2.55%) urban (2.29%) access (1.87%) improving (1.74%) creating (1.74%) providing (1.69%) sustainable (1.59%) management (1.54%)	United Nations Division for Sustainable Development Goals (2024). Inter-agency policy briefs on accelerating progress on the 2030 Agenda from local to global levels: The critical importance of SDG localization
	Good practice (6)	transport (1.48%) transport (4.19%) practice (3.37%) good (2.74%) practices (1.79%) best (1.72%) mobility (1.40%) here (1.11%) mode (1.11%) reduced (1.09%)	EU (2019). Best practices guide on the carriage of persons with reduced mobility: final report.
	Passenger information and rights (7)	travel (3.81%) passengers (3.59%) passenger (2.42%)	EU (2015). Position (EU) No 13/2015 of the Council at first reading with a view to the adoption of a Directive of the European Parliament and of the Council on package travel and linked travel arrangements, amending Regulation (EC) No 2006/2004 and Directive

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Table B.1 (continued)

Model	Topics	Most frequent words ^a	Document with the closest match ^b
		multimodal (2.39%) rights (2.28%) information (2.03%) ticketing (1.79%) transport (1.67%) services (1.59%) ticket (1.42%)	2011/83/EU of the European Parliament and of the Council and repealing Council Directive 90/314/EEC Adopted by the Council on 18 September 2015
	Aviation (8)	air (4.88%) aviation (4.61%) countries (3.00%) per (1.54%) international (1.54%) airports (1.48%) group (1.37%) aircraft (1.30%) airport (1.25%) asia (1.13%)	EU (2015). COMMISSION STAFF WORKING DOCUMENT Accompanying the document Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of Regions An Aviation Strategy for Europe.
	Risks and hazards (9)	security (3.54%) risks (1.87%) training (1.61%) such (1.32%) use (1.19%) hazards (1.10%) equipment (1.07%) activities (0.96%) risks (0.91%) dangerous (0.86%)	UNDRR (2017). Words into Action guideline: Man-made/technological hazards
	Road infrastructure (10)	road (3.21%) transport (2.35%) infrastructure (1.77%) plan (1.37%) work (1.21%) management (1.17%) policy (1.10%) technical (1.02%) roads (1.00%) national (0.94%)	SUM4ALL (2019). Global Roadmap of Action Toward Sustainable Mobility (GRA).
	New mobility solutions and services (11)	mobility (6.33%) transport (3.73%) services (3.18%) urban (2.13%) public (1.54%) management (1.37%) systems (1.31%) new (1.28%) system (1.21%) solutions (1.17%)	CIVITA (2023). Policy Paper on Mobility as a Service (MaaS)
	Accessibility (12)	including (2.46%) health (2.14%) access (2.01%) public (1.69%) rural (1.68%) development (1.64%) services (1.32%) social (1.30%) areas (1.23%) sustainable (1.15%)	United Nations (2020). Improvement of the situation of women and girls in rural areas: resolution/adopted by the General Assembly
	European Transport research (13)	transport (3.04%) transportation (1.57%) european (1.46%) association (1.36%) research (1.35%) university (1.21%) institute (1.07%) public (0.97%) international	CCAM (2023). STRATEGIC RESEARCH AND INNOVATION AGENDA: European leadership in safe and sustainable road transport through automation - Final Updated Version 2023

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Table B.1 (continued)

Model	Topics	Most frequent words ^a	Document with the closest match ^b
	COVID-19-pandemic (14)	(0.93%) federation (0.80%) transport (3.19%) covid (2.13%) million (1.80%) pandemic (1.55%) billion (1.46%) crisis (1.45%) people (1.36%) per (1.33%) which (1.23%) recovery (1.14%)	EU (2020). Proposal for a Regulation of the European Parliament and of the Council establishing measures for a sustainable rail market in view of the COVID-19 pandemic.
	Disability (15)	disabilities (7.76%) persons (7.64%) accessibility (4.62%) rights (2.43%) disability (2.28%) accessible (2.23%) inclusive (1.65%) services (1.51%) public (1.45%) reduced (1.28%)	UN (2022). Inclusive development for and with persons with disabilities: resolution/adopted by the General Assembly
	Rural transport (16)	rural (4.08%) access (3.86%) areas (2.05%) transport (2.03%) land (1.55%) urban (1.47%) transit (1.20%) low (1.16%) development (0.94%)	SUM4ALL (2019). Global Roadmap of Action Toward Sustainable Mobility: Universal Urban Access
	CCAM (17)	table (0.93%) ccam (2.75%) will (2.44%) innovation (2.27%) research (2.17%) system (1.82%) joint (1.22%) partnership (1.16%) activities (1.10%) technologies (1.07%)	EU (2020). Multi-annual action plan.
	Urban transport and planning (18)	solutions (0.97%) urban (6.05%) cities (5.77%) mobility (3.08%) transport (2.94%) city (2.71%) planning (2.46%) sustainable (1.57%) policy (1.55%) public (1.44%) local (1.41%)	CIVITAS (2021). CREATE Guidelines: Pathways to Tackling Current Congestion and Reducing Levels of Car Use in European Cities
	EESC (19)	eesc (5.32%) calls (4.55%) commission (3.36%) transport (2.77%) european (2.38%) stresses (2.20%) notes (2.13%) welcomes (1.70%) states (1.73%) order (1.64%)	EU (2017). Opinion of the European Committee of the Regions — A European strategy on Cooperative Intelligent Transport Systems.
	Electric vehicles, energy, fuels and charging (20)	vehicles (5.12%) energy (4.59%) fuels (2.68%) infrastructure (2.40%) charging (2.27%) electric (2.17%) alternative (1.99%)	Eurocities (2020). Cities recommendations for alternative fuels infrastructure deployment.

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Table B.1 (continued)

Model	Topics	Most frequent words ^a	Document with the closest match ^b
	Transport policy II (21)	vehicle (1.70%) hydrogen (1.57%) clean (1.47%) european (9.92%) council (6.63%) parliament (5.47%) regulation (4.63%) directive (3.98%) transport (3.67%) regard (3.10%) commission (3.05%) union (2.32%) proposal (2.03%)	EU (2017). European Parliament resolution of 18 May 2017 on road transport in the European Union (2017/2545(RSP)) .
	Transport research (22)	research (4.71%) transport (3.03%) programme (2.77%) projects (1.60%) mobility (1.53%) funding (2.08%) innovation (1.41%) road (1.37%) national (1.28%) project (1.15%)	ERTRAC (2020). D2.4 Recommendations for the deployment of innovative road transport solutions in Europe .
	Tourism (23)	tourism (9.28%) waste (2.48%) water (1.72%) sector (1.59%) food (1.24%) sustainable (1.19%) local (1.17%) travel (1.11%) services (1.00%) impact (0.96%)	C40 (2020). C40 Strategic Recommendations guidelines
	Transport aid (24)	aid (6.96%) transport (4.26%) costs (2.59%) guidelines (2.21%) rail (2.15%) states (2.01%) inland (1.73%) railway (1.21%) waterways (1.20%) external (1.10%)	CER (2022). CER Position - Revision of the Railway State Aid Guidelines
	Mobility and sustainable development (25)	mobility (5.67%) sustainable (3.44%) transport (3.11%) global (2.23%) policy (1.72%) development (1.58%) action (1.48%) world (1.38%) international (1.31%)	SUM4ALL (2019). Global Roadmap of Action Toward Sustainable Mobility (GRA)
	Intelligent transport systems (26)	roadmap (1.24%) systems (4.45%) intelligence (2.47%) figure (2.22%) transport (2.16%) information (1.82%) communication (1.81%) system (1.66%) traffic (1.52%) applications (1.44%) table (1.35%)	ITU (2021). Handbook on Land Mobile – Volume 4: Intelligent Transport Systems
	Road safety (27)	road (14.36%) safety (11.12%) traffic (2.82%) safe (2.51%) users (1.78%)	SUM4ALL (2019). Global Roadmap of Action Toward Sustainable Mobility: Safety

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Table B.1 (continued)

Model	Topics	Most frequent words ^a	Document with the closest match ^b
	Automated and connected vehicles (28)	injuries (1.42%) system (1.28%) roads (1.19%) fatalities (1.42%) vehicles (1.01%) vehicles (5.36%) automated (4.88%) driving (3.12%) road (2.59%) systems (2.21%) safety (1.99%) vehicle (1.95%) connected (1.95%) traffic (1.73%) transport (1.55%)	ERTRAC (2015). ERTRAC Automated Driving roadmap, July 2015
	Women and gender (29)	women (3.44%) gender (3.03%) workers (2.88%) sector (2.68%) transport (2.67%) work (2.67%) skills (2.54%) social (2.48%) employment (2.48%) transition (2.08%)	EU (2024). Commission Recommendation (EU) 2024/236 of 29 November 2023 on means to address the impact of automation and digitalisation on the transport workforce
	Public transport services (30)	public (8.03%) services (6.31%) transport (4.37%) service (4.22%) authorities (2.61%) market (2.44%) passenger (1.97%) operators (1.62%) contracts (1.45%) access (1.41%)	EU (2018). Opinion of the European Economic and Social Committee on the Regulation of the European Parliament and of the Council amending Regulation (EC) No 1073/2009 on common rules for access to the international market for coach and bus services (COM(2017) 647 final — 2017/0288 (COD))
	International development (31)	transport (4.29%) international (3.57%) sustainable (3.16%) development (2.93%) countries (2.65%) united (2.16%) nations (2.13%) global (2.01%) developing (1.49%) economic (1.46%)	UN (2016). Towards comprehensive cooperation among all modes of transport for promoting sustainable multimodal transit corridors: resolution/adopted by the General Assembly
	European rail (32)	european (6.38%) transport (6.20%) mobility (3.85%) sustainable (2.80%) strategy (2.08%) commission (1.70%) towards (1.46%) green (1.44%) europe (1.25%) smart (1.22%)	EU (2020). COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS Sustainable and Smart Mobility Strategy – putting European transport on track for the future
	Infrastructure network (10-t) (33)	network (6.76%) 10-t (4.35%) infrastructure (3.89%) transport (3.66%) core (2.20%) nodes (1.66%) corridors (1.60%) european (1.49%) should (1.46%) urban (1.43%)	EU(2021). COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT AND THE COUNCIL on the extension of the trans-European transport network (TEN-T) to neighbouring third countries
	Global transport growth (34)	transport (2.74%) will (1.84%) new (1.39%) development (1.37%)	SLOCAT Partnership (2016). Declaration from Ministers on Green and Inclusive Transport Agreed by the Council of Ministers of Transport at the 2016 Summit of the International Transport Forum in Leipzig, Germany

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Table B.1 (continued)

Model	Topics	Most frequent words ^a	Document with the closest match ^b
		sector (1.22%) also (0.88%) infrastructure (1.11%) sustainable (0.87%) economic (0.87%) public (0.80%) article (4.72%) member (3.24%) states (2.22%) regulation (2.13%) transport (1.70%) may (1.49%) which (1.38%) means (1.34%) directive (1.27%) following (1.26%)	EU (2023). Proposal for a DIRECTIVE OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL amending Directive (EU) 2015/413 facilitating cross-border exchange of information on road-safety-related traffic offences
	Policy implementation I (35)	9 rail (12.45%) railway (4.60%) freight (2.87%) capacity (2.10%) passenger (2.08%) infrastructure (2.04%) railways (1.95%) transport (1.64%) european (1.57%) services (1.56%)	CER (2022). Vienna Declaration on Digitalisation in the Railway Sector
	Rail (36)	cer (5.70%) rail (4.84%) information (3.54%) 9 companies (2.82%) railway (2.78%) transport (2.50%) infrastructure (2.46%) made (1.83%) public (1.76%) managers (1.61%)	CER (2016). Vehicle authorisation for broad gauge railways
	CER (37)	data (15.40%) information (2.02%) collection (1.46%) indicators (1.46%) analysis (1.16%) sharing (1.13%) use (0.95%) used (0.95%) transport (0.91%) public (0.87%)	SUM4ALL (2019). Global Roadmap of Action Toward Sustainable Mobility: Universal Urban Access
	Data, information and indicators (38)	also (1.67%) transport (1.60%) should (1.57%) which (1.52%) these (1.19%) such (1.09%) will (1.06%) there (1.03%) need (0.75%) important (0.71%)	CIVITAS (2021). CREATE Guidelines: Pathways to Tackling Current Congestion and Reducing Levels of Car Use in European Cities
	No Meaning (39)	whereas (7.34%) committee (5.23%) european (3.67%) opinion (2.60%) transport (2.34%) economic (2.28%) adopted (2.20%) union (2.135) session (1.82%) plenary (1.79%)	EU (2017). Opinion of the European Economic and Social Committee on 'Women and transport — Platform for change' (Exploratory opinion requested by the Commission)
	Transport policy III (40)	costs (7.49%) external (3.52%) transport (3.40%) road (2.81%)	EU (2019). Handbook on the external costs of transport: version 2019.
	External costs of transport (41)		

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Table B.1 (continued)

Model	Topics	Most frequent words ^a	Document with the closest match ^b
	Equity (42)	handbook (2.67%) cost (2.42%) per (1.90%) january (1.80%) capacity (2.42%) congestion (1.57%) energy (3.69%) climate (2.65%) buildings (2.57%) transport (2.37%) fund (2.19%) social (1.97%) emissions (1.94%) vulnerable (1.93%) support (1.64%) households (1.62%)	EU (2022). Opinion of the European Committee of the Regions — Towards a socially fair implementation of the Green Deal
	Policy implementation II (43)	states (4.20%) member (4.15%) should (3.16%) national (2.40%) support (1.86%) level (1.41%) commission (1.31%) european (1.28%) implementation (1.24%) regional (1.22%)	EU (2017). COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS Towards the broadest use of alternative fuels - an Action Plan on Alternative Fuels Infrastructure under Article 10(6) of Directive 2014/94/EU, including the assessment of national policy frameworks under Article 10(2) of Directive 2014/94/EU
	Airport access (44)	city (3.12%) area (1.79%) airport (1.63%) project (1.48%) bus (1.32%) centre (1.03%) stations (0.94%) plan (0.84%) region (0.83%) areas (0.69%)	Metropolis (2018). Sustainable Airport Areas

^a Percentages show the probability of a word appearing in a given topic.

^b Document with the highest topic association.

Data availability

Data is available under the protocol that was registered with the Open Science Framework.

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