



Decarbonization of passenger transport in Reykjavík, Iceland – A stakeholder analysis

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ABSTRACT

The climate change mitigation potential of cities is high, and transportation plays a key role in achieving effective climate change mitigation. Mitigation strategies require stakeholder engagement to be effective. This case study sets out to explore the opinions of those who influence or are influenced by transportation in the Reykjavík Capital Region of Iceland, through focus groups, to identify how stakeholders believe the passenger transport sector should be decarbonized. Stakeholders' views and opinions were collected through four focus group meetings facilitated by the research team. The themes that arose from the conversations between stakeholders were; Raised awareness, Holistic view, Multimodal approach, and Energy transition in transport. Their opinions were then positioned against two climate action plans, on a municipal and governmental level, to identify commonalities and differences. The two most underrepresented themes were Raised awareness and Holistic view, which indicates the need for strengthening the issues raised in these themes in the action plans.

1. Introduction

As cities are responsible for the majority of global greenhouse gas emissions (Chen et al., 2016; Kennedy et al., 2012), they also have high potential for mitigation (Lwasa et al., 2022; Mi et al., 2019). City planning, operation, and management influence the behavior of urbanites by providing, or not providing, the essential infrastructure for acting in a climate-sustainable manner (Williams & Dair, 2007). The majority of cities in the EU already have climate mitigation plans in place (Reckien et al., 2018) and the targets might well be more ambitious than the national-level targets (Laine et al., 2020). However, stakeholder engagement has been identified as crucial to meet ambitious carbon neutrality goals (Huovila et al., 2022).

Transportation is responsible for a large share of global greenhouse gas (GHG) emissions (Jaramillo et al., 2022; Sims et al., 2014), and has been identified as a key area of mitigation (Aamaas et al., 2013; Ivanova et al., 2020). The technologies for decarbonization, as well as planning practices to minimize vehicle kilometers traveled (VKT), have already been realized, although successful implementation may require thoughtful strategy. Electrification alone is not enough (Dillman et al., 2021), but to reach deep decarbonization in this sector, Lefèvre et al. (2021) have suggested that all pillars of strategy have to be mobilized,

where demand-side solutions are a crucial staple. Therefore, stakeholder engagement is needed to gain understanding of which demand-side solutions are needed, and qualitative storylines can be used while designing decarbonization pathways (Lefèvre et al., 2021).

The importance of engaging stakeholders during decision-making and policy development is progressively more recognized (May 2015). By engaging stakeholders, it is possible to identify different viewpoints which can lead to more comprehensive policy and increase stakeholder buy-in (Irvin & Stansbury, 2004). Several studies have involved stakeholders to assess the sustainability of cities and their transportation (e.g. AlSabbagh et al. 2017; Polydoropoulou et al., 2020; Rześny-Cieplińska et al. 2021; Shi et al., 2018; Yangka et al., 2019; Yashiro & Kato, 2019) and stakeholder involvement has been identified as a popular topic of sustainable transport research in the past two decades (Zhao et al., 2020). However, no such study has been carried out for Reykjavík, the capital of Iceland, where car-oriented lifestyles are deeply rooted (Heinonen et al., 2021), and cars are the main local source of emissions due to the renewables-based stationary energy system. The municipality has set ambitious goals of carbon neutrality, where the transportation sector is a fundamental pillar. Therefore, in this study the following research question is addressed: How do stakeholders think Reykjavík's transportation should be decarbonized, and how do these views align with

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the existing policies?

One way of engaging stakeholders is through focus group interviews (Kitzinger, 1995). Stakeholders thought to either influence or be influenced by transportation in the Reykjavík Capital Region of Iceland were identified through a comprehensive stakeholder mapping process. Thereafter, these stakeholders were engaged through focus group interviews to address the following primary objectives of the study. These were laid out to study the key aspects of the above research question.

- analyze how stakeholders discuss decarbonization of Reykjavík's transportation and identify emerging themes
- compare stakeholders' policy suggestions to current policy and identify similarities and potential gaps
- provide a list of policy suggestions not covered by current policy for the decarbonization of passenger transport in Reykjavík mentioned by stakeholders.

The paper is structured as follows: Section 2 contains an overview of the research design including a brief description of the case study chosen, Reykjavík Capital Region. The results of the study are presented in the third section of the paper. In the fourth section, these results are further discussed and compared to current action plans on a governmental and municipal level. Furthermore, a list of policy suggestions based on stakeholder input is presented, along with the limitations of the study. In the last section, the paper is concluded.

2. Research design

In this chapter, background on the chosen case study is given and the data collection theory is described. Subsequently, the details of the data collection and analysis are presented.

2.1. Case study - Reykjavík Capital Region, Iceland

Reykjavík is the capital of Iceland, an island located in the North Atlantic Ocean. About a third of the country's population lives in Reykjavík, with a population of around 135 thousand. However, the Reykjavík Capital Region, which includes the well-connected neighboring municipalities, has a population of 240 thousand, about 64% of Iceland's population (Hagstofan, 2022). The Capital Region is car-oriented (Reynarsson, 2014; Valsson, 2003) and car dependency is high (Heinonen et al., 2021). In 2019, the transportation modes used by the citizens of the Capital Region were private vehicle, walking, cycling, and bus, and they were used for 74%, 14%, 5%, and 5% of trips, respectively. When looking at commuting trips, private vehicles were used 85% of the time (Samgönguráð & SSH, 2019). Currently, there are over 52 thousand alternative fuel vehicles in Iceland, a little over 19% of the total vehicle stock (Samgöngustofa, 2022). Even though it has improved significantly in the past decade, the cycling infrastructure is still deficient (Heinonen et al., 2021), and the public transportation service level is low in most neighborhoods (Czepakiewicz et al., 2018), which is reflected in the low cycling and public transportation mode share. Reykjavík is by far the largest municipality within the Reykjavík Capital Region and has the most comprehensive climate action plan. The plan has a focus on transportation, as it is responsible for 69–83% of emissions within the city's boundaries, depending on the measured scope (EFLA, 2022; Reykjavíkurborg, 2021).

2.2. Focus groups

Multiple approaches exist with the aim of collecting the opinion of a group of people, such as the focus group method (Kitzinger, 1995), the Nominal Group Technique (NGT), the Delphi technique (Rowe & Wright 2001), brainstorming, and brainwriting (Gallagher et al. 1993). When selecting which approach to use, it is important to keep in mind the goal of the stakeholder engagement. For this study, the aim was to have

stakeholders discuss decarbonization in Reykjavík in general so that the main challenges and potential solutions would appear naturally through stakeholder discussion. The goal was not to have stakeholders reach a consensus, come up with concrete policy suggestions, or rank potential ones. Therefore, group decision making techniques, such as NGT and the Delphi technique, where the goal is to reach a group consensus were thought less suitable (Gallagher et al. 1993; Rowe & Wright, 2001). Brainstorming and -writing can lead to the generation of multiple ideas, where quantity often is emphasized over quality, which did not align with the goals laid out here (Brahm & Kleiner, 1996).

The focus group method is thought to be an effective approach to discussing a complex topic that requires some discussion between stakeholders, which suited the purpose of this study well (Reed et al., 2009). Focus groups are a method of collecting qualitative data from many individuals at once. Participants interact with each other in addition to answering questions from the researcher (Kitzinger, 1995). Using the focus group method for data collection is a fast way to acquire rich data from many diverse stakeholders (Merriam & Tisdell, 2016; O. Nyumba et al., 2018). Due to many participants at once, it requires effective facilitation by the researcher guiding the discussion (Reed et al., 2009). The downside of focus groups is that they generally lead to a less in-depth analysis of individual stakeholder opinion (O. Nyumba et al., 2018).

Researchers' bias was thought to be minimized through focus groups guided by a semi-structured interview guide, where open-ended questions started off a conversation between participants that then was allowed to flow freely. A more structured approach could have hindered this conversation flow. Additionally, it is important to keep in mind that the research described in this paper was part of a larger research project where the aim was to explore potential decarbonization pathways considering technological, urban structural, and behavioral changes (Dillman et al. 2021). One of the project's goals was to quantitatively show the importance of simultaneously employing diverse and radical policies and a general stakeholder analysis was performed to potentially improve model inputs and inform policy recommendations.

2.3. Data collection

Stakeholders of this analysis were deemed to be those that influence or are influenced by transportation in the Reykjavík Capital Region. To identify those stakeholders, a stakeholder map was created through a top-down analysis of the system with a combined mind-mapping and value-chain approach, as demonstrated by Gunnarsdóttir et al. (2021). The stakeholder map (Fig. 1) clearly illustrated the vast number of actors related to the transportation sector in the Capital Region.

When selecting which stakeholders to engage, an emphasis was placed on selecting an overall balanced group across the different stakeholder groups, as well as an equal gender ratio of participants in each of the focus groups. This was done to maximize different stakeholder perspectives. The invitations were then sent out and the response rate was 96%, although some stakeholders appointed more suitable representatives from their organizations. Four diverse focus groups were formed, each containing 4–6 stakeholders. To protect the anonymity of participants, only the overarching stakeholder groups are presented in Table 1. More specific information on each stakeholder would demonstrate better the diversity within each group, however, it could also give away stakeholder anonymity.

In late November 2020, four 1-hour long focus groups were conducted via Microsoft Teams. Prior to the focus groups, an interview guide was developed with general open-ended questions, see Appendix. A semi-structured approach was taken to allow for flexibility in the focus groups and allow for prompting questions if needed, while mainly letting the conversation flow freely (Merriam & Tisdell, 2016). Therefore, interviewers attempted to say as little as possible, and not all questions from the interview guide were asked in every focus group interview. For instance, in one of the focus groups, only the first two questions were

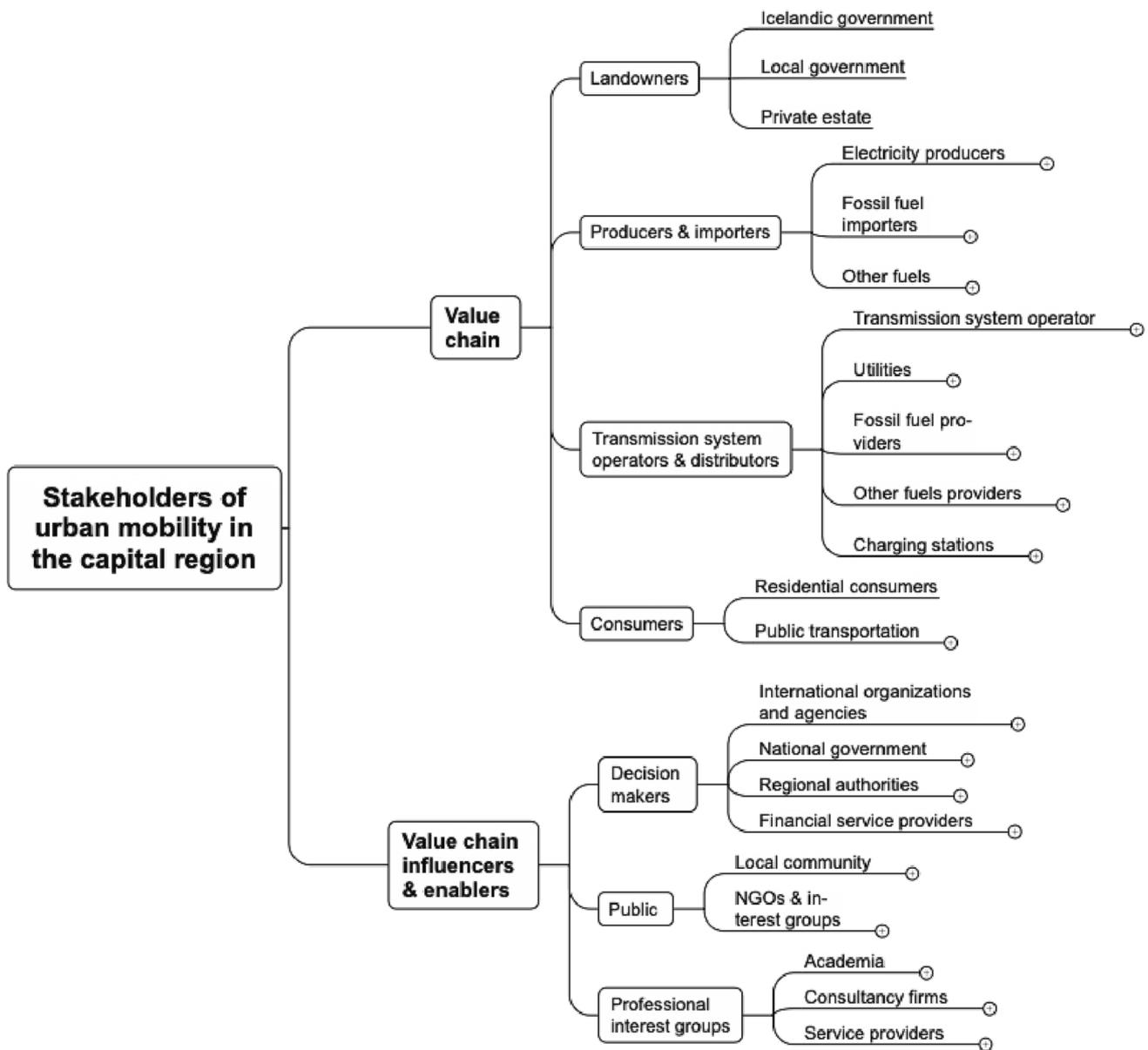


Fig. 1. Stakeholder map for urban mobility in the capital region. Map expands into more detail as indicated by + on the right. Diagram based on an approach developed by Gunnarsdottir et al. (2021) and presented in Gunnarsdottir et al. (2022).

needed to guide a fruitful discussion. Two researchers participated in each focus group; one facilitator which led the discussion and one taking notes. As tends to happen, some talked more than others, however, everyone did participate in the discussions to some extent. The participants were not aware of the research questions the team was attempting to address, to avoid influencing the conversation.

The focus groups were recorded with consent, both as video and audio files, and subsequently, transcribed. At the end of each focus group, participants were asked whether they could recommend any other relevant parties that should be engaged, i.e. the snowballing technique. However, this snowballing demonstrated that the initial selection of participants was comprehensive as most suggestions pinpointed participants in other focus groups. After each focus group, the researchers discussed how they went, field notes were made, and the next focus group mediation was adjusted accordingly. The methods used for data collection and analysis were inspired by the Grounded theory approach which prescribes data collection can be influenced by prior interviews' successes and failures (Glaser & Strauss, 1967; Merriam & Tisdell, 2016).

2.4. Data analysis

For the analysis of the qualitative data from the focus groups, a thematic analysis was carried out inspired by the Grounded theory approach and based on steps provided by Strauss and Corbin (Glaser & Strauss, 1967; Strauss & Corbin, 1998). Thematic analysis is used in qualitative data analysis for coding and generating themes. It is a flexible method which can be used to analyze various types of qualitative data, and the researchers take active roles in the study design (Clarke et al., 2015). The data collection and analysis done for this study align with the first few steps of a stakeholder-centric approach to selecting sustainable energy development indicators laid out by Gunnarsdottir et al. (2021).

The data analysis carried out for this study involved coding transcriptions of focus group interviews, grouping similar codes to develop initial themes for each focus group separately, and eventually, developing more robust combined themes through the constant comparison method (Glaser & Strauss, 1967). This approach was found flexible and allowed for a systematic analysis of the data. Data was collected and

Table 1
Focus group participants representing the different stakeholder groups identified.

Focus group 1 (FG1)	Focus group 2 (FG2)	Focus group 3 (FG3)	Focus group 4 (FG4)
Public - Local community	Professional interest groups - service providers	Producers & Transmission system operators & distributors	Decision makers - national government
Public - NGOs & interest groups	Consumers - public transportation	Decision makers - national government	Producers & importers - methane
Public - NGOs & interest groups	Consumers - public transportation	Decision makers - regional authorities	Decision makers - national government
Consumers - Car rentals	Decision makers - national government	Transmission system operators & distributors - utilities	Producers & importers - electricity producers
	Decision makers - national government	Decision makers - national government	Public - NGOs & interest groups
	Producers & importers - fossil fuel importers	Decision makers - regional authorities	Producers & importers - other fuel providers

analyzed simultaneously, which allowed adjustment of methods for the remaining focus groups and, for instance, updating the interview guide as needed, as mentioned above. After the development of robust themes, each sentence from the transcriptions was categorized into the sub-themes to verify that no content was lost in the combining and further development of themes. This second stage confirmed the sufficiency and validity of the themes. The data along with the quotes are categorized in the results by each focus group (FG1-4) rather than by individuals.

3. Results

In this chapter, the results of the stakeholder analysis are presented, including the overarching themes and sub-themes from focus group discussions. These themes and sub-themes represent topical areas that according to stakeholders need to be addressed to decarbonize passenger transport in the Reykjavík Capital Region. The overarching themes from the stakeholder analysis were Raised awareness, Holistic view, Multimodal approach, and Energy transition in transport. Each of these themes had sub-themes, which are presented in Table 2 below. The contents of each sub-theme, along with relevant quotes, will be presented in this chapter.

3.1. Raised awareness

This overarching theme highlights the attitudes of the residents of Iceland, both their current attitude and recent changes, which includes how respondents want them to be in the future to enable decarbonization.

Table 2
The overarching themes along with sub-themes based on focus group interviews.

Overarching themes	Sub-themes
Raised awareness	Current attitude Attitude change
Holistic view	Openness for innovation and failure Long-term thinking and system boundaries Clarity and transparency Coordinated goals
Multimodal approach	Sharing Incentives Planning and infrastructure
Energy transition in transport	Infrastructure Incentives

3.1.1. Current attitude

This sub-theme reflects Icelandic culture, such as attitude towards weather, public transportation, and car ownership, possible resistance against action, perceived responsibility, and people’s tendency to be technocrats.

The most prominent opinion in this sub-theme was that the culture in Iceland contributes to the inability to decarbonize. Some participants felt that Icelanders would *sadly* never use public transportation (FG1, FG4), bicycles (FG2, FG4) or Mobility as a Service (MaaS) (FG4) because they were brought up in a private car-oriented culture (FG1), and that for example the weather (FG1, FG4), urban form (FG1, FG2) and poor public transportation (FG1) was a hindrance. Some felt that they could not be persuaded differently as car ownership and use was simply the will of the people (FG1), although some said that they thought people would be up for being carless (FG2). This view is partially demonstrated by the following quotes:

“It’s very sad that Icelanders can’t learn to use public transportation” - FG1

“...the weather conditions in Iceland are just that way that we just have to accept that it isn’t always possible to grab these devices [electric scooters] and go ride them at 7 in the morning” - FG4

“The cars are just way, way, way too many I think” - “Isn’t that just, you know, the will of the people?” - “Yeah, yeah probably and it’s just what we are brought up with” - FG1

There was concern that if actions towards decarbonization went too far, resistance would form as policies can often affect families financially.

“...but when are we affecting the people with low wages etc ... this affects people and families ... there is good support for such actions, but if we go too far then resistance will form” - FG3

Many talked about their different experiences from living abroad, such as in Denmark (FG2) and Boston (FG3), and feeling the need to buy a private vehicle when moving back to Iceland.

The largest barrier to decarbonization is not just infrastructure, but the mentality of the people (FG2, FG4). Mentality was also mentioned in terms of both being a consumption-oriented population as well as technocrats, always waiting for technology to solve problems.

“My opinion is that maybe the biggest hindrance isn’t infrastructure, but this mentality” - FG2

“We humans are so fixated on technological solutions, this Western world, we are all technocrats. We think technology will solve everything” - FG4

In addition, it was mentioned that many do not feel that the climate crisis is their responsibility, because the consequences are not noticed in Iceland as harshly as some other countries.

“(although) the awareness and recognition of the problem has increased incredibly much in recent years, I still sometimes feel like we are writing it a bit off as other people’s problem because we do not feel it quite as much on our own skin as other nations do” - FG3

3.1.2. Attitude change

This sub-theme includes aspects to enable decarbonization such as a flexible work arrangement, a changed lifestyle, mindset and pace, and a rising EV culture.

There have been some goals set to encourage active, shared, and public transportation modes, but it is mentioned that it takes some time to change culture. It’s going in the right direction, for example, there is a better public opinion of the bus, but it needs more of a push.

“Yes I think it is not more than 10 years ago or 10 to 15 years ago that if you took the bus then the only possibility was that you had lost your driver’s license” - FG2

“...of course, it always takes a while to change culture but there is nothing to help” - FG3

It was mentioned as “a shame” (FG2) that we as a population cannot skip some of the stages of development and learn from others. Some say that the changes being made, such as the new bus rapid transit (BRT) system, need to prove themselves first.

“*[name redacted] mentioned that people are scared, or a little bit on the brakes regarding change, and that’s true, I agree. Personally, I would like to see bigger steps towards public transport and active means of transport, but I can also understand [the fear of change] ... let’s just say we need to allow the good BRT to prove itself a bit.*” - FG2

There is a lot of potential for changes in travel habits due to COVID-19, as people are learning to work from home (FG3, FG4), and there are opportunities in designing decentralized office spaces (FG3) or including working from home in employment contracts (FG4). Some are optimistic about how the fourth industrial revolution will affect mobility and find it likely that our projections on mobility are merely casting our current bad behavior into the future (FG3). There is a need for a changed mindset, and that people stop using their cars even if the weather is terrible (FG4).

“*We also need to change our mindset, you know, ours as a community and ours as individuals in this community, and then exactly that, continue working from home, utilizing those solutions such as Teams. ... Just rethink our lives a bit...*” - FG3

There is a big increase in the purchase of EVs, which nobody could foresee, but although some mention that the EV mindset is taking over (FG1, FG4), others point to the fact that we still have a long way to go (FG1). Companies must adapt to this new changed mindset, and car rentals will do so. Also, it was not foreseen that shared mobility, mostly in the form of electric scooters, would become popular, but young people have adopted it well. The young also emphasize less getting a driver’s license than they have been in the past, and there has been a great awakening among the nation of using alternative transportation modes.

“*Shared transport is something that the young people have adopted with these electric bikes or electric scooters ... which people have for a long time said would never work in Iceland*” - FG2

“*There has been a great awakening among the people regarding, for example, other modes of transport, whether it is bicycles or electric scooters*” - FG1

Humans are conservative in their nature and do not think changes are taking place when they truly are (FG3). Instead of focusing on technological solutions, we need systemic change and to think outside of the box, take a step back and slow life down (FG4).

3.2. Holistic view

This overarching theme consists of opinions on decarbonization goals and actions, and the landscape in which goals are made and actions are taken. It is split into four subsections; Openness for innovation and failure, long-term thinking and system boundaries, clarity and transparency, and coordinated goals.

3.2.1. Openness for innovation and failure

This sub-theme encompasses allowing for mistakes, the complexity and non-flexibility of laws on tenders and appeals, the political landscape, and research and development (R&D).

Participants from all focus groups, except FG1, mentioned in some way a need to allow for mistakes in the decarbonization transition, but FG2 was the most vocal on the subject. Participants discussed the political landscape and appeals on tenders. Charging stations and methane production were discussed and costly appeals. This leads to public and

half-public companies being the only ones who decide to bear the cost of R&D.

“*there doesn’t seem to be a will to [set up charging stations] except with these half public companies, to take that on, to take on that development cost*” - FG4

The complexity and non-flexibility of laws on tenders was mentioned as a barrier, as well as the process being time-consuming and a feeling of being locked in a system while we miss our goals of carbon neutrality (FG2). A need for more incentives for innovation and development was identified, because of how expensive R&D can be.

“*Somehow innovation and development in the market need to be encouraged.... So there is a need for some kinds of incentives because it’s expensive. It’s expensive to try.*” - FG2

According to the stakeholders, Icelanders are very critical and always looking for someone to blame, and the prevailing attitude is that it is not acceptable to make mistakes. Due to this, there is fear of being held responsible for any mistakes, for example, with local blending of biodiesel (FG2), and great fear of having evaluative elements in tenders (FG2), which would allow companies to choose something other than simply the cheapest offer. However, another participant stated that there is just a lack of professional work practices and too much hurry, so a lot of these appeals could be avoided.

“*...people do not dare to take the step for fear that a mistake will be made, and it is just not tolerated to make mistakes in Iceland today. It’s unfortunate. We are always looking for a culprit.*” - FG2

“*Politics are ruthless. ... I feel that there is a considerable lack of professionalism in many areas, and there’s always some hurry. I’m not saying in all areas, but you know, these appeals which you are mentioning [name redacted], to [company redacted], much of it could have been avoided with a little more professional work methods in the tender process for example*” - FG2

This kind of attitude tends to hinder innovation, as innovation of course entails the possibility of something not working the way it was planned out (FG2). Interestingly, this attitude was confirmed by one participant who, while talking about new policies related to the speed limit, said:

“*They are trying to create some kind of perspective that should solve something that people do not know if it will even happen or could even work*” - FG4

It was emphasized that we should stop being afraid of not reaching the goals set and that it should be acceptable to try and not succeed.

“*So I think it’s very important that people are not afraid to say we did not achieve our goals, you know. We tried it, we couldn’t*” - FG3

Regarding R&D, it was mentioned that there were a lot of grant opportunities that could be utilized if tasks were properly defined (FG2).

3.2.2. Long-term thinking and system boundaries

This sub-theme is about life cycle cost, including considering the whole value chain, expanding system boundaries, thinking beyond political terms, and prioritization.

As society is colored by car use, people often find it difficult to imagine 10 years into the future, but it is crucial to do so. Often, the initial cost of a decarbonization transition can be high, which is a barrier. It is necessary to take life cycle costs into account and look decades into the future. Stakeholders mention that the government should start thinking and planning more ahead and consider the fact that saving money today could negatively impact the future and lead to more costs (FG2).

“*One obstacle is clearly the cost. It is extremely costly to build, you know, new infrastructure and change society and while the start-up costs are of*

course high, there is also no one directly thinking about the lifetime cost.” - FG3

“We live in a society that has been shaped a lot by the use of private vehicles ... I think sometimes people aren't aware of how it will look in 10 years” - FG1

It was mentioned that when there is a goal of mitigating carbon emissions, the whole value chain needs to be taken into account, and system boundaries considered. For example, infrastructure and production of EVs should not be overlooked, as they affect emissions outside of the national or local boundaries.

“Are we looking at the whole value chain? I mean something happens inside this system, but it has an effect outside of it.... You know, of course, you are looking at certain system boundaries, but you need to understand what is happening outside of them.” - FG3

Some mentioned the need to think beyond political terms, and that policies should be unpolitical, chopped up and dated 5–10 years into the future, and that those goals should be met regardless of the outcomes of future elections (FG1).

Stakeholders also mentioned the need for prioritization. It is necessary to decide how to prioritize the immense action opportunities, decide which to do immediately and which ones to do in the future, and be aware that some things take longer than others.

“It's just a matter of priorities, you know where to start, you know, there are so many opportunities.... is there something we can do right away, is there something that takes longer, and what are the benefits” - FG4

Actions taken today are sometimes not thought out long-term. An example of this was the elimination of value-added tax (VAT) on new electric vehicles (EVs). As resale was not taken into account, owners of EVs that want to resell are having a hard time, due to the small price difference between a used and a new EV (FG1).

3.2.3. Clarity and transparency

This sub-theme is about clear, transparent, and measurable goals along with measurable criteria and indicators, as well as increasing visibility. It was mentioned that first, we need to know what decarbonization is and what it entails and discuss it so that we are all on the same page.

“It is in fact still completely unclear what it entails, nothing clear since 2017 when it was stated in the government charter. And what exactly the system boundaries are.” - FG3

“What I often feel is missing is the transparency of plans ... That one can fully understand what lies behind the plans..... there is so little predictability sometimes in action... And I feel, it often just lacks a clearer strategy in general.” - FG3

Clear, more detailed policies ensure that private companies can plan ahead and act accordingly. The system boundaries of policies and goals need to be clear, transparent, simple, and predictable (FG4, FG2). For example, banning diesel and petrol vehicles is an example of a very clear and comprehensible goal (FG4).

“I think the government should take, set much clearer policies and stick to them ... If the plan was in place, if the report for the next 5 years on what the government is really going to do, [not] some election promises that are always betrayed, you know, then that's something the private sector could take and work with.” - FG1

Measurable criteria and indicators are important tools, and currently, there are too few policies that entail some kind of environmental measurement. As climate change is less visible, less tangible, and more complicated than for example particulate matter pollution, it becomes even more important for nationals to be able to somehow follow the progress (FG3).

“We pay close attention to particulate matter pollution because there is always regular news that it is so noticeable and measured every day. I find this climate thing much more intangible.... It is always a good incentive to be able to compare yourself to others. A bit of peer pressure.... Whether it would be possible to do something similar that tells us better what the situation is today and then we can follow the development.” FG3

We have to have a clear end goal to aim at achieving, and to be able to see more clearly where we stand currently, and what has been achieved already (FG2, FG3, FG4). It is beneficial to be able to see the outcome of all the effort you have put into mitigation (FG3, FG4). Some respondents suggested chopping up the emissions and mitigation targets into smaller units, for example, by company, domain, or municipality. Being able to compare to others is important, as it creates competition and can act as motivational.

“... it's always a good incentive to be able to compare yourself to others. Like a little bit of peer pressure” - FG3

3.2.4. Coordinated goals

The main discussions in this sub-theme were surrounding goals being linked to action, consistency between goals and conversations between stakeholders, silo thinking, unrealistic goals, and polarization.

A prominent topic was that although there may be good policies in place, there is often little action that follows (FG1, FG2, FG3). A need was identified to set ambitious goals and follow through with them (FG3). On that note, it was mentioned that action plans should be directly linked to goals to ensure this follow-through and to ensure that funds for action accompany the goals. The regulatory framework should preferably precede the development of decarbonization infrastructure (FG1).

“Often the only thing missing is the action with the policies. I mean, the government has had some kind of energy policy for a long time ... It is unbelievable, for example, that petrol cars have been bought as ministerial cars until just very recently.” - FG2

It was mentioned that goals and actions tend to work against each other, which points to a need for a more comprehensive approach. Few policies or goals require consistency with other policies (FG3, FG1). There needs to be more of a conversation between stakeholders, and for actors to stop thinking in silos. The thought scope should be broadened, both geographically and in terms of cooperation between municipalities and private stakeholders. The responsibility of actors was discussed as a crucial aspect in this regard.

“We have the BRT project, where the policies are all very good, but then the bus is perhaps daily dealing with demands for cuts. So there is a lot of talk in separate directions.” - FG2

“... sometimes we have to eat the elephant one bite at a time, but we sometimes forget that we are trying to carbon offset the earth ... the focus is sometimes on small areas or very small things” - FG2

“I don't know if there is necessarily a lack of policy. It's more like you say, there is a lack of direct action and direct, you know, who is responsible. Responsible for implementing such actions.” - FG3

In some cases, private companies hinder more sustainable transport, for example, with charging stations that only service certain customers (FG1). There was disagreement about whether or not private companies should be obligated to service all EV customers. This hindering was also mentioned in relation to the government with the new participatory loans, which created an incentive for locating in areas where owning a private vehicle was necessary.

“...in fact, we as a society are often pushing, working with direct action against such goals and there is something wrong with the ideology that people are actually encouraged to settle down far away from the magnet that attracts people, due to, how shall we say, financing methods for housing” - FG3

While some expressed their opinions on the goals of decarbonization being unrealistic and unfair as the transportation sector is the most difficult sector to decarbonize (FG3), others pointed out the clear polarization when it comes to discussions on the best way forward. It was highlighted that transitioning to EVs does not solve other environmental issues, such as particulate matter pollution (FG4).

“[some people say] we are somehow not doing enough, we need to densify more and we need to strengthen public transport and we need to change our lifestyles, and then the others come and say no, we need to transition to EVs faster and we just need to do more of it and we just have to buy old cars from people and so on. So it’s always these politics and polarisation that happens so somehow, we cannot agree and say: No, we have to be sensible and do both” - FG3

3.3. Multimodal approach

This overarching theme encompasses issues related to multimodal transportation, other than changing the energy source of private vehicles. It covers shared transport modes along with planning, infrastructure, and incentives to switch to alternative transport modes.

3.3.1. Sharing

This sub-theme relates to shared transport modes, such as electric scooters, car sharing, car rentals, and public transportation.

The discussion on public transportation had the most obvious disagreements, both within focus groups and between them. While some were optimistic about the upcoming BRT system (FG1, FG2, FG4), others felt that it was either outdated (FG1, FG4), that the focus should rather be on self-driving vehicles (FG1), that the population was simply not large enough to sustain such a system (FG1), that it takes too much space compared to an underground system (FG1), too expensive (FG1), or that emphasis should rather be placed on fixing the current outdated bus system (FG4).

“There are quite a few car manufacturers trying to perfect self-driving cars, you know, and it’s my vision that in 20 years it’s just small cars that will just be self-driving and you do not own the car but just like the electric scooters that are everywhere. ... I have no faith in public transport here or this BRT, you know, which seems to be phasing out in all the big cities in Europe, except it’s being introduced here in Iceland” - FG1

“The only thing I’m afraid of with this BRT is that I feel it costs me terribly much, but I agree with [name redacted] in the way that ... EV transition is the way to go” - FG1

Barriers were mentioned regarding electric buses, as nobody is ready to pay for the infrastructure needed (FG2). Another barrier mentioned related to shared transportation was parking for shared vehicles, as parking passes only work in proximity to your home (FG1), and that owning a shared car company was too expensive, in addition to a lack of charging stations (FG1). It was brought up that electric rental cars do not suit tourists as they are driving the ring road (FG1).

Coordinated child leisure buses were mentioned as a solution to car dependence and were presented as an example of the need to look to many solutions when tackling decarbonization (FG4).

3.3.2. Incentives

Incentives were discussed by some participants, both fiscal, and in the form of making alternative transport modes more attractive. The tax system is already being used as an incentive by lowering prices of sustainable vehicles, but the prices for polluting are yet to be raised, or parking fees introduced in university parking lots (FG3).

“We have yet to begin using economic incentives, that is to say, negative economic incentives with force in these matters. We are abolishing VAT on electric cars here and we are abolishing VAT on electric bicycles and bicycles and we are... these are positive, yes ok guys, some little carrots for

you guys but we are not raising the carbon tax or trying in any way to reduce oil consumption, I feel.” - FG3

Some participants mentioned monetary concessions, along with concessions that do not cost the government any money, such as reserving the best spots at taxi stands for “green” vehicles (FG2). Incentives for companies can come in the form of pressure from clients; if the market is going in that direction, providers will follow. This was mentioned in relation to car rentals, although, the majority of those who rent vehicles still prefer internal combustion engine vehicles (ICEVs) to EVs, as they are less expensive to rent (FG1).

It was mentioned that providing Icelanders with the choice of using alternative transport modes or working from home would reduce household expenses so that in itself is a fiscal incentive (FG3).

“... there is maybe a group of people that don’t have a choice, the government needs to invest in better options and offer them” - FG3

Shortening travel times was mentioned as necessary to make public transportation competitive with the private vehicle (FG4), along with emphasizing the financial and health benefits of alternative transport modes (FG3).

3.3.3. Planning and infrastructure

Although, the discussions were more often surrounding vehicles and EV infrastructure, planning to better accommodate alternative transport modes was mentioned in some way by all focus groups.

Land use, in relation to where residential areas are positioned within the city, was identified as an important factor in changing travel habits. It was thought necessary to improve the proximity to basic services, as only a quarter of Reykjavíks residents live within walking distance of services (FG3) as well as densifying the city (FG3, FG4). It was mentioned that the city center did not accommodate EVs well, but it was easy to walk, cycle or take electric scooters to reach services. However, as grocery stores are often placed on the outskirts of residential areas, a need for owning a vehicle was still mentioned even when residing in the city center (FG1).

“... we still need to make better use of the opportunities of a dense city. Having 250,000 people together in a relatively small area is a definite opportunity to solve the need for travel in another way our opportunities lie mostly in transport and land use. It’s just, we of course have to seize those opportunities.” -FG3

In addition, it was mentioned that a focus should be placed on small towns outside of the capital area, as bikes and walking are relevant in such small societies (FG2).

One respondent suggested looking to other cities abroad and stated that a feasible option would be to close some parts of the city to traffic from vehicles that rely on fossil fuels (FG2).

For shared transport, the tourism industry was specifically mentioned in relation to barriers regarding charging infrastructure. Firstly, the need for more fast-charging stations around the ring road was mentioned (FG1), and secondly, the lack of electricity available close to the main international airport in Keflavík, where a large majority of rental cars are located (FG1).

“There has been a lot of talk about changing the car rental fleet here, but it wouldn’t be that easy, for example, energy to Keflavík, because 90% of our business goes to Keflavík Airport, and you may need to be ready with 2000 cars, you know, 500 cars a day that need to be charged. There’s not even energy going into Keflavík. There’s one, I think there’s only one charging station at the airport now.” - FG1

As well as barriers related to charging infrastructure, the Icelandic public transportation company experienced a bottleneck related to alternative fuels, and no willingness to pay for the infrastructure to get the fuel from production to use (FG2).

3.4. Energy transition in transport

This overarching theme encompasses discussions on switching the power source of private vehicles to decarbonize the transportation sector. It covers issues related to infrastructure and demand, and incentives for both individuals and private entities to switch to alternative fuels.

3.4.1. Infrastructure

This sub-theme covers infrastructure for alternative fuel vehicles, which run on electricity, biofuels, and biogas, as well as the development of the vehicles themselves.

Charging stations were a focal point of discussions on energy transition infrastructure, especially amongst FG1. It was mentioned that the technological solutions are there, but they just need to be implemented (FG3). Building up charging infrastructure was mentioned as time-consuming and costly (FG2), and it was pointed out that it is not keeping up with the fast pace of development of the car fleet (FG1), although the changes in the past 10 years are massive (FG1), and it was also mentioned that there was little supply of EVs due to low production capacity (FG1). There were split opinions regarding who should be responsible for providing the infrastructure; the market driven by needs (FG1), or the government (FG1, FG2, FG4). Those mentioning the government pointed out that it was expensive for private companies to put up fast charging stations (FG2) and no financial incentives to do so (FG1). Urban form was mentioned in relation to charging EVs while living in downtown Reykjavík, where access to charging can be troublesome (FG1). Not everyone can charge at home, leading to a need for charging stations at workplaces (FG1).

“Today, it costs a lot if we are going to do this very quickly ... It costs money and it has to go hand in hand, the implementation of new technologies and building the infrastructure. I just say let’s go, let’s do it faster.” – FG2

Especially in FG4, the discussion steered in the direction of fuel sources other than electric. Barriers related to infrastructure were also mentioned concerning alternative fuels, such as methane, hydrogen, and biodiesel. Although there are some companies producing methane and biofuel, there is little demand for the product (FG4). In addition, there is a lack of infrastructure for blending biodiesel with diesel, and no incentives for the oil companies, with outdated business models, to do so (FG4).

“There is no distribution system, it is not possible to buy methane, it is not possible to buy hydrogen.” – FG4.

It was mentioned that there was no development in alternative fuel vehicles other than electric, because “at some point” it was decided that we would carry on using fossil fuels and then switch to electric (FG4), disregarding other solutions. Also, there is more development with the internal combustion engine as it can be used in conjunction with electricity in hybrid vehicles. Although we are tied to technologies from abroad regarding the vehicles themselves, the energy business is and should be changing from a globalized supply chain to more localized solutions, such as electric fuel and biofuels (FG4). Once the infrastructure is there for methane and hydrogen, it will benefit the rural areas (FG2).

3.4.2. Incentives

This sub-theme mainly pertains to reducing the price of EVs and incentivizing the construction of infrastructure needed for alternative fuel production, but also that the market follows needs.

According to our stakeholders, EVs are still too expensive compared to ICEVs (FG1, FG2), and there is less incentive to switch as the new ICEVs are increasingly more energy efficient and last for a long time (FG1). The older generation is investing in EVs as they are more affluent (FG2). However, there are already incentives in place such as no VAT in addition to no excise duties as they are built on emissions, and the

government has been providing grants for charging infrastructure (FG1). However, there is still a need for removing VAT from electric buses, too, and more support for charging stations for these larger vehicles (FG2).

“...we think with our wallets, and you can see it, for example, with the electric car trend that would never have happened if the state hadn’t subsidized this technology for almost two million for every single vehicle” – FG2

FG3 was the only focus group that did not mention the need for more of these aforementioned economic incentives for sustainable transportation, but instead mentioned the need to start using negative economic incentives to reduce oil consumption (FG3).

Legislation abroad can also push the transition. As European legislation becomes stricter, producers switch from ICEVs to EVs (FG1).

“However much we love the internal combustion engine, it will disappear” – (FG1)

There is a potential for fiscal incentives also coming in the form of low-cost energy if pricing systems in Iceland would change. As cars are being designed to become energy sources, cheap energy charged at off-peak hours can be utilized during peak hours, but currently, there is no price difference in energy usage depending on time (FG1).

Incentives were mentioned regarding alternative fuel infrastructure, especially in FG4. Iceland has the potential to use only locally produced energy, but there are some incentives missing so that the right things happen at the right time (FG4). There is a need for more incentives for infrastructure related to methane and hydrogen production, as well as funding for a factory to produce biodiesel, which would cost 800–1000 thousand ISK (FG4). It was mentioned that the municipalities or the government should bear the cost of it (FG2, FG4). Finally, green incentives in tenders were mentioned as a good tool for the decarbonization transition, albeit rarely used as deemed tricky. That is, evaluating tenders based on other factors than solely costs but also, for instance, on how carbon-intensive the work could be (FG2).

4. Discussion

This paper aimed to answer the question: How do stakeholders think Reykjavík’s transportation should be decarbonized, and how do these views align with the existing policies? To answer the first part of the question, key findings from the focus group data presented in the results section are summarised to capture stakeholders’ general views on decarbonizing the Reykjavík Capital Region. To answer the second part of the research question, a summary is provided of both the Government’s Climate Action Plan (GCAP) (*Stjórnarráðið, 2020*) and the Reykjavík Climate Action Plan (RCAP) (*Reykjavíkurborg, 2021*), as it is by far the largest municipality in the Capital Region, and a discussion is provided on which aspects in them were mentioned by stakeholders. Thereafter, a list of policy suggestions from stakeholders is presented that highlights aspects not covered in the two Climate Actions Plans but were mentioned during focus group discussions. Finally, the limitations of the study are discussed.

4.1. Policy alignment

Focus group discussions highlighted both the vast and complicated challenges of mitigating the emissions from the transportation sector in Reykjavík, but also the opportunities or potential solutions to these challenges. The transportation sector is held as highly important in relation to decarbonizing the capital region, as all focus groups mentioned the sector early on without being prompted to discuss it. The results highlight the issues deemed important by stakeholders for decarbonizing transportation in Reykjavík Capital region which were broadly categorized into four main themes that emerged from the focus group data: *Raised awareness, Holistic view, Multimodal approach, and Energy transition in transport*. A summary of each theme and its sub-

themes can be found in Table 3. To understand how well the views of stakeholders align with existing decarbonization policies in Reykjavik, a summary of relevant actions in The government’s Climate action plan (GCAP) and The Reykjavík Climate Action Plan 2021–2025 (RCAP) is also provided in the same Table 3, followed by a discussion on the uniformity and gaps.

4.1.1. Government climate action plan

The government’s Climate action plan (GCAP) includes nine categories for reducing emissions. The emissions included are those of Effort Sharing Regulation (ESR), Emissions Trading System (ETS), and Land Use, Land-Use Change, and Forestry (LULUCF)). Category A, *Transportation on land*, includes 10 actions, and category G, *Incentives for change*, includes 11. These two categories are discussed further as they are relevant to mitigating emissions from transportation.

There are some definite overlaps between the GCAP category A and the focus group discussions. The GCAP actions in category G (*Incentives for change*) pertain to the themes *Holistic view* and *Attitude change*, although most of the issues raised by stakeholders are missing, and will be discussed in section 4.2. In the theme *Holistic view*, stakeholders mentioned the prioritization and coordination of goals and actions. This is partially covered for infrastructure for eco-friendly vehicles in A5, as a project board has been established to coordinate and Green Energy sets the prioritizations.

In the theme *Multimodal approach*, one issue that was brought up by a car rental representative was the VAT of resold eco-friendly vehicles, was in the GCAP but taking effect one month after the focus groups. This was also the case with the issue stakeholders mentioned about a lack of energy to the main rental hub; Keflavík Airport. It was mentioned by stakeholders that a decarbonization transition was difficult in the car rental fleet due to obstacles related to charging infrastructure. The same issue is addressed in the GCAP with a plan to conduct a needs and cost analysis of this issue. Within the same theme, stakeholders disagreed on the implementation of a new BRT system. The GCAP covers only some of the stakeholders’ opinions on the matter as it would be impossible to address the differing views of stakeholders within the same policy.

The GCAP covers many aspects related to the theme *Energy transition in transport*, for example, improving charging infrastructure downtown and fast-charging stations around the ring road, with fiscal incentives for private companies. Stakeholders’ opinions on localizing energy production and providing incentives and support for the infrastructure are represented in GCAP A6.

Overall, *Energy transition in transport* was the only theme covered well in the GCAP. Although apparent in category G actions, only one small aspect of the theme *Holistic view* was represented by category A actions (*Transportation on land*), but only on the basis of infrastructure for alternative fuel vehicles, which was also found within *Energy transition in transport*. Aspects covered within the theme *Multimodal approach* were mainly connected to car rentals, and in *Attitude change* to school children and project funds that cover general climate education.

4.1.2. Reykjavík climate action plan

The Reykjavík Climate Action Plan 2021–2025 (RCAP) aims at carbon neutrality by 2040. It is a collaborative document, as the steering committee sought to get input from the main stakeholders, such as grassroot organizations and the public. It places emphasis on transportation, as it is stated that the majority of the city’s emissions come from that sector. According to the plan, this holds true even when including the impact of other activities within city boundaries and supply chain emissions. The first three of a total of six main goals pertain directly to transportation; 1) *creating a walkable city*, 2) *decarbonizing the transport sector*, and 3) *promoting active transportation for health and safety*. These three themes have been analyzed by an independent assessor and could result in a 288.8 thousand tonne reduction of CO2eq by 2040, or 82.6% reduction of emissions from road transportation, if the goals are met (Davíðsdóttir et al., 2022). The other three main goals

Table 3

A summary of the main themes (1st column) and issues arising within each sub-themes (2nd column) which emerged from the focus groups, and how well they align with the National climate action plan (3rd column) and the Reykjavik action plan (last column).

Overarching themes	Sub-themes	National climate action plan	Reykjavik climate action plan
Raised awareness	<i>Current attitude</i>	<i>G.5 Climate education in schools - An agreement in place between the Ministry of Education and Children’s Affairs and the Ministry of the Environment, Energy and Climate with the NGO Landvernd regarding the Green Flag project, a planned revision of the subjects of the primary school curriculum.</i>	
	Attitude towards culture, weather, public transportation, car ownership, responsibility, and technocratic thinking.	<i>G.4 Information on climate change for the public - Through the climate fund (G.2.), funding a television series, project grants from the Ministry of the Environment, Energy and Climate, dissemination by the climate council, and an action in the Science and Technology Policy aimed at creating a framework and plan for guaranteeing the public’s access to evidence-based information.</i>	
	<i>Attitude change</i>	<i>G.5 Climate education in schools - An agreement in place between the Ministry of Education and Children’s Affairs and the Ministry of the Environment, Energy and Climate with the NGO Landvernd regarding the Green Flag project, a planned revision of the subjects of the primary school curriculum.</i>	
	Flexible work arrangement, changed lifestyle, changed pace, resistance, and rising EV culture.	<i>G.4 Information on climate change for the public - Through the climate fund (G.2.), funding a television series, project grants from the Ministry of the Environment, Energy and Climate, dissemination by the climate council, and an action in the Science and</i>	

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Table 3 (continued)

Overarching themes	Sub-themes	National climate action plan	Reykjavik climate action plan
		Technology Policy aimed at creating a framework and plan for guaranteeing the public's access to evidence-based information.	
		G.9 The Cabinet's climate policy - making the Cabinet a role model in climate matters and thus influencing institutions, companies and the public, e.g. strengthening transportation agreements that encourage employees to use eco-friendly travel modes and changes to the Cabinet's attendance policy to facilitate work from home.	
Holistic view	Openness for innovation and failure Complexity and non-flexibility of tenders, appeals, political landscape, allowing for mistakes, and R&D. Long-term thinking and system boundaries Decisions made beyond political term periods, prioritization, value-chain and system boundaries, and life cycle cost.	G.2 Climate fund - A fund for innovation, promotional and educational projects, around 170 M ISK annually. National Climate Action Plan as a whole G.6. Climate impact of bills - Bills will be scrutinized based on their climate impact. To begin with, this will be done with selected bills in the Ministry of the Environment, Energy and Climate, but later it is aimed that this will apply to all bills that will be submitted to Alþingi. G.11 Planning and the climate - The action includes putting forward policies and guidelines for local authorities on how planning can be applied in relation to climate issues. The Minister of Infrastructure has decided to revise the National Planning Policy 2015–2026	

Table 3 (continued)

Overarching themes	Sub-themes	National climate action plan	Reykjavik climate action plan
	Clarity and transparency Increasing visibility, clear, transparent and measurable goals, and measurable criteria and indicators.	and the proposal for an annex on climate National Climate Action Plan as a whole and indicators connected to specific actions G.3. Submission of environmental information - Make a regulation on environmental information and a data portal to harmonize information and simplify the submission of such data to operators G.4 Information on climate change for the public - Through the climate fund (G.2.), funding a television series, project grants from the Ministry of the Environment, Energy and Climate, dissemination by the climate council, and an action in the Science and Technology Policy aimed at creating a framework and plan for guaranteeing the public's access to evidence-based information.	Supporting actions - Attitude change and innovation - Emission data processing and accessible publishing - changes between years more visible to the public 2) Decarbonizing the transport sector - The city makes an action plan for efficient and green transport, which is suitable for reducing the total emissions from transport within the city limits in accordance with the interpretation of the Paris Agreement. The action plan will be broken down by means of transport and energy sources with measurable results
	Coordinated goals Comprehensive approach, conversation between different stakeholders, responsibility of actors, goals consistent and linked to action, unrealistic goals, polarization, and silo thinking.	G10. Climate policy of public bodies - All state institutions, municipalities and companies majority-owned by the state must now set a climate policy and targets for a reduction in greenhouse gas emissions A.7 New registration of petrol/diesel cars banned in 2030 - The goal has not been legislated in this country, the next step is to define whether the provision will only apply to cars that run exclusively on fossil fuels or whether it should also cover cars that use mixed energy sources. A.10 Obligation of public bodies to buy eco-friendly cars - In action since 2020, however,	Supporting actions - Operation of Reykjavik City - Obligation to buy fossil fuel free vehicles by the City by 2025 Supporting actions - Attitude change and innovation - Assessing how to best strengthen the city's climate administration with regard to responsibility, implementation of projects, and evaluation. Examine

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Table 3 (continued)

Overarching themes	Sub-themes	National climate action plan	Reykjavik climate action plan
		Government entities are still authorized to purchase fossil fuel vehicles if needed to meet safety or operational requirements.	international cooperation with other cities
		A5. <i>Infrastructure for eco-friendly vehicles</i> - A project board for decarbonization coordinates actions and plans, and Green Energy makes recommendations on the prioritization of projects related to decarbonization infrastructure.	
Multimodal approach	Sharing	A9. <i>Eco-friendly rental cars</i> - Identify the main obstacles and opportunities to speed up decarbonization in car rental fleets, through a detailed needs and cost analysis. This includes analyzing the infrastructure and planning at Keflavík Airport. Partial grants for car rental companies to put up charging infrastructure. Excise duties (calculated by emissions) on rental vehicles lowered, if rental companies commit to 15% of their fleet being electric, hydrogen, or twin by 2021, and 25% by 2022, and no VAT on the rental fees.	2) <i>Decarbonizing the transport sector</i> - fossil fuel-free public transportation
	Scooters, car sharing and parking, car rentals, bike sharing, public transportation, and coordinated child leisure transportation.		1) <i>Creating a walkable city</i> - Lowering car dependence. Actions that help people to stop having to rely solely on using the car as a daily mode of transport. I.e., to set up sharing systems with various means of transport in neighborhoods, encourage people to try the bus and/or e-bikes for a certain period of time
	Incentives	A.2. <i>Incentives for active transport</i> - No VAT on bikes, electric bikes, and electric scooters. Transportation grants from employers are tax-free up to a certain amount if the employee travels to work using sustainable transportation modes.	3) <i>Promoting active transportation for health and safety</i> - Better winter service for active transport modes, equalizing public spending on private vehicle infrastructure and active transportation infrastructure, prioritizing walking and cycling infrastructure, coordinated bike lane system
	Making alternative transportation modes competitive to private cars, attractive and available, and negative and fiscal incentives.	G.1. <i>Carbon tax</i> - put on fossil fuels, has been increased in steps since 2018.	
	Planning and infrastructure	A.3. <i>Promotion of public transport</i> - Continue the implementation of Borgarlína, a BRT	1) <i>Creating a walkable city</i> - Densifying for better service accessibility,

Table 3 (continued)

Overarching themes	Sub-themes	National climate action plan	Reykjavik climate action plan
	services, grocery stores on outskirts, and closing parts of the city to ICEVs.	system in the Capital Region	creating areas and streets with no tailpipe emissions, fewer parking spaces, and roads
		A.1. <i>Infrastructure for active transportation</i> - new walking and cycle paths	3) <i>Promoting active transportation for health and safety</i> - restricting access of fossil fuel vehicles to certain areas when air pollution is high, defining bicycle and scooter parking areas, and having storage by public transportation, bicycle charging stations
Energy transition in transport	Infrastructure	A.5. <i>Infrastructure for eco-friendly vehicles</i> - Grants for putting up charging stations and fast-charging stations by public places. Map for existing charging stations. A project board for decarbonization coordinates actions and plans, and Green Energy makes recommendations on the prioritization of projects related to decarbonization infrastructure.	2) <i>Decarbonizing the transport sector</i> - increasing the number of charging stations
	Incentives	A.4. <i>Incentives for eco-friendly vehicles</i> - No VAT on electric or hydrogen vehicles extended, and electric or hydrogen motorcycles will be added. Phase out concessions on twin vehicles. No VAT on resold used eco-friendly vehicles. No VAT on large passenger-carrying vehicles such as buses and coaches which run on methane, hydrogen, and electricity. No VAT on home charging stations.	2) <i>Decarbonizing the transport sector</i> - Encouraging the use of alternative fuels
	Reducing the price of EVs and incentivizing the construction of infrastructure needed for alternative fuel, and the market following needs.	A.6. <i>Laws and regulations on decarbonization</i> - Charging stations for electric cars must be provided for all newly built housing in the country. Proposals have been submitted for	

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Table 3 (continued)

Overarching themes	Sub-themes	National climate action plan	Reykjavik climate action plan
		priorities regarding local energy production for Energy Fund grants, built on Green Energy's evaluation report.	
		A7. <i>New registration of petrol/diesel cars banned in 2030</i> - The goal has not been legislated in this country, the next step is to define whether the provision will only apply to cars that run exclusively on fossil fuels or whether it should also cover cars that use mixed energy sources.	
		A10. <i>Obligation of public bodies to buy eco-friendly cars - In action since 2020</i> , however, Government entities are still authorized to purchase fossil fuel vehicles if needed to meet safety or operational requirements.	

are; 4) *circularity*, 5) *sustainable structures*, and 6) *carbon sequestration*. As the transportation sector was considered highly important in relation to decarbonizing the capital region, half of the main goals of the Reykjavik Climate Action Plan 2021–2025 are related to transportation.

Several actions are connected to each main goal, some of which include a time frame, cost estimate, performance indicators, responsible party, and the climate change effect of the action. The three main goals analyzed further for this study are connected to 27 different actions. In addition to these actions, there is a relevant *supporting actions* page titled *Attitude change and innovation*.

Multimodal approach was the most covered theme in the RCAP. Although most of the overarching themes from the focus group data are touched upon to some extent, the actions themselves are lacking many of the aspects discussed by the stakeholders, and some seem to be goals about making actions. Policy action plans have to be concrete, but in this respect, the RCAP borders on being a list of wishful thinking, as the policies are not properly funded, and some rely on what is being done at the national level. In addition to lack of funds, many actions are not defined, not cost assessed, and do not have indicators behind them, which could lead to mismatched expectations and results, as it is not realized what is needed to meet the goals.

4.2. Identified gaps/policy suggestions from stakeholders

The action plans are only on the actions which the city and the government are taking responsibility for to reach their goals, but the responsibility lies with many other actors. It is not necessarily the municipalities or the government which should bear all costs and responsibility of decarbonization, but according to stakeholders they should create enabling conditions, facilitate the conversation between stakeholders, and guide cooperation. Policy suggestions arising from the

focus groups that are missing from the current Climate Action Plans are listed below. These could be evaluated, further developed and adopted by the government and municipalities to facilitate the decarbonization transitions.

4.2.1. Cultural shift from car dependence, minimizing the need for travel and private vehicle ownership

Although the RCAP has an action on minimizing car dependence, the action needs to go further than encouraging urbanites to try alternative transport modes for some time. It should take into account aspects related to culture, attitudes towards weather, emphasizing the financial and health benefits of alternative transport modes, possible resistance against action, perceived responsibility, and our tendency to be technocrats.

Another aspect of car dependence is minimizing the need for travel. Many stakeholders were interested in being able to work from home or from decentralized office spaces. They suggested that this should be included in employment contracts, which both the government and municipalities could start doing. Reykjavik municipality would also need to consider this when planning neighborhoods. Stakeholders also mentioned coordinated child leisure buses in relation to minimizing the need for travel.

The action in RCAP on lowering car dependence mentioned setting up sharing systems for vehicles. Stakeholders expressed the need for this and added that residential parking permits have specific zones, so parking for these shared vehicles should be made possible between zones.

4.2.2. More stringent, transparent, and foreseeable incentives and comprehensive goals

According to stakeholders, there are too few negative incentives being utilized. In the GCAP there are actions related to carbon tax, excise duties, and banning new ICEVs in 2030, and in the RCAP on creating areas and streets that are restricted to vehicles running on fossil fuels. On a governmental level, stakeholders mentioned raising carbon tax as a solution towards decarbonization, and on a municipal level, introducing parking fees in university parking lots. An example of a transparent municipal incentive mentioned was reserving the most favored spots at taxi stands for green vehicles.

Although partially present as an action regarding eco-friendly vehicles in the GCAP, stakeholders stressed the importance of clear, transparent, more detailed, and measurable goals, with actions attached and a clear prioritization of actions that are coordinated and consistent between all stakeholders and have a responsible party. This should be taken into consideration in both climate action plans.

4.2.3. Encouraging innovation

R&D should be incentivized, rather than how it currently is, disincentivized through the existing culture that is seen favorable for remaining the status quo, and unfavorable for taking risks. The laws on tenders could be simplified to avoid appeals, and a cultural shift encouraged to allow for mistakes. One idea of incentivizing R&D was clarifying the grant opportunities that were already available and defining tasks properly. This could result in more companies willing to bear the costs and risks of innovation. This cultural shift and clarification of opportunities would need to be tackled on a governmental level.

4.2.4. Accessibility of charging infrastructure

Charging infrastructure was covered well in the GCAP and briefly in the RCAP. However, S stakeholders also mentioned the barrier of some charging stations only being available for certain customers. This requires a review of current legislation.

4.2.5. Foresight and system boundaries

A need was identified to make Life cycle costing and life-cycle analysis mainstream, both to improve foresight and long-term

planning, and to expand the system boundaries of emission calculations. This is relevant on both a governmental and municipal level.

4.2.6. Limitations

The necessity of decarbonizing passenger transport to reach carbon neutrality was clear to every stakeholder engaged in this study. Some even expressed the insufficiency of neutrality, and that carbon negativity should be the aim. However, there was a lack of consensus on the best way forward and the approaches mentioned were diverse. The discussions in each focus group often differed, and the same topics did not always emerge. The chosen methodology assumes interaction between stakeholders, and, therefore, participants influenced each other to some extent. When needed, the moderator facilitated the focus groups to allow for more breadth of issues discussed as well as a more balanced input from different stakeholders. This was kept to a minimum though to minimize the researchers' bias and influence. The focus groups were only one hour long, which did not allow for very comprehensive discussions. For this reason, the more in-depth questions and prompts from the interview guide were not raised. This also allowed dominant persons in the different groups to significantly reduce the opportunities to speak for the more quiet or less engaged participants. Each participant in each group anyway participated in the discussion. Overall, longer focus groups might have led to a more in-depth conversation and, thus, a larger number of concrete policy suggestions. This is one of the downsides of choosing to do focus groups rather than a more structured approach - a thorough analysis of individual stakeholder opinion is sacrificed for a constructive dialogue between stakeholders that also can reduce researchers' influence and bias (Powell & Single, 1996).

5. Conclusion

This study has brought to light several unclaimed opportunities to facilitate the decarbonization transition of Reykjavík's passenger transport system. Mostly, these opportunities lie within the discussions presented in the themes *Holistic view* and *Raised awareness*. These two aspects have been identified as necessary for successful implementation of sustainable urban and transport planning. A holistic view requires strong leadership, which cities have often been taking on as their role. A change in residents' attitudes has been stated as difficult to accomplish and requires research in the field of social science (Nieuwenhuijsen, 2020).

The theme that was best covered in the GCAP was *Energy transition in transport*. Previous research on the possible decarbonization pathways for the Reykjavík Capital Region shows that even in a city with a fully decarbonized electricity grid, electrification of the passenger transport vehicle fleet does not lead to sufficient emission reductions if indirect emissions are accounted for (Dillman et al., 2021). There is a need for a radical and integrated approach, where electrification, MaaS uptake, behavioral change, densification of the urban fabric, and improved public transport are implemented in concert, to lead to a significant reduction in travel demand and a cultural shift where a carless lifestyle is desirable (Dillman et al., 2021). Even when embodied emissions of roads and vehicles are not included, tax-related incentives to encourage electro-mobility are inadequate to reach short-term climate targets (Shafiei et al., 2019).

The policies presented in both The GCAP and RCAP do not seem to address the system-level shift that is needed for successful decarbonization. As a result, it is highly unlikely that the goals laid out there will be reached. Most actions geared towards broader enabling conditions to accelerate mitigation, i.e. related to governance and institutions, financial resources, behavior change, and innovation, are missing, and these enabling conditions are all required to accelerate mitigation (Lecocq et al., 2022). As these conditions are different in each location, more research is needed to examine them and their interconnectivity to create ambitious and realistic decarbonization strategies for the Reykjavík Capital Region.

The policies suggested by stakeholders do not come without fault, and therefore require further assessment for potential social and economic effects, considering a just transition, which refers to the need to incorporate equality and social justice in any sustainability transition, where sufficiency of the wealthy plays a crucial role (Swilling & Annecke, 2012). For example, a carbon tax can disproportionately affect lower-income households and therefore needs to be implemented with just transitions in mind. It should also be taken into account related to other negative economic incentives mentioned by stakeholders. The parking fees in university parking lots have been in discussion within the University of Iceland and are planned to be introduced in the near future. It is important that the current state of the public transportation system is considered when implementing the fees, as some students are currently forced to depend on the private vehicle as their only mode of transportation, and the bus fees are considered to be high (Upham, Sovacool & Monyei, 2022).

Regarding the suggestions on allowing working from home or from decentralized office spaces, both gender and employment type need to be considered before implementation. The former policy suggestion could have a disproportionate impact on men and women, as working from home increases work-to-family conflict for women more than men (Yang et al., 2023), although working from home can decrease depressive symptoms shortly after childbirth (Shepherd-Banigan et al., 2016). In addition, these policy suggestions are only geared toward white-collar workers.

The economic incentives for purchasing electric vehicles (EVs), which were both mentioned by stakeholders and are apparent in the GCAP, tend to help only those who are more affluent. Instead of being in the form of a VAT exemption, it should be considered whether the tax discount should be one lump sum, a one-time discount, or geared more towards less expensive vehicles. The lack of foreseeability and continuity could also have detrimental effects, as they have the potential to be removed when less affluent people are finally able to invest in EVs. This potential for removal can have a radical impact on the demand for EVs, thus pushing the prices up even further.

Despite these downfalls of some solutions mentioned by stakeholders, this study provides a general overview of the themes of actions that stakeholders find important to address to reach decarbonization of the Reykjavík transportation system. It points to the themes which are most underrepresented and can guide policymakers to areas that need to be considered in policy-making.

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Ingunn Gunnarsdóttir: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Visualization, Writing – review & editing. **Áróra Árnadóttir:** Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Validation, Visualization, Writing – original draft, Writing – review & editing. **Jukka Heinonen:** Conceptualization, Methodology, Supervision, Validation, Visualization, Writing – review & editing. **Brynhildur Davíðsdóttir:** Conceptualization, Funding acquisition, Methodology, Project administration, Resources, Supervision, Validation, Visualization, Writing – review & editing.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix

Interview guide.

General open-ended questions (allowing for prompts):

- How should the Reykjavík capital region reach carbon neutrality? Briefly/Mention the first things that come to mind
 - Probing question, if necessary: Short-term vs. long-term actions.
 - Probing question, if necessary: Who needs to do what?
- Many of you mentioned *urban mobility/transportation/energy transition* (grab whatever was mentioned by the stakeholders), what are the main opportunities or possible actions/policies for reaching carbon neutrality in the transportation sector in the capital region?
- What are the main challenges in this context?

More specific questions (if time allows):

- What should the modal shift from ICEVs be and how should it be supported (non-fossil fuel vehicles + non-motorized transport + shared transport)?
- What should be the scope in which the targets and meeting them are considered – global or within Reykjavík's jurisdiction?
- Who are the key actors?

Closing of interview:

- Tell them about the purpose of interviewing focus groups and about ongoing research
- Who else should we talk to? (For snowballing)
- Something else?
- Would you be willing to answer a potential survey?
- Thank you

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