

A mission perspective on emissions reduction at the city level: the case of Glasgow, Scotland

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ABSTRACT

City leaders around the world are setting ambitious targets for emissions reductions. Yet the pathway to achieving this remains largely unspecified. Starting with this objective, the paper explores the merits of deploying a mission-oriented framework within the context of a ‘wicked problem’ by looking at a mid-sized city, Glasgow, which has a target for net zero by 2030. Focusing on themes drawn from one high-emitting sector – transport – the paper points to the real-world policy implications that stem from such a mission-oriented approach to suggest aspects of the approach that may be usefully developed further. The latter hinges on a-priori considerations given to: agency, boundaries and inter-temporality, leading to questions about the nature and scope of wickedness and argues that core issues of wickedness – uncertainty, contestation and complexity – can be amplified in local and multi-layered policy making contexts.

Key policy insights:

- Many cities are looking to reduce emissions including establishing net zero targets and a mission-oriented framework – ‘concrete targets within a challenge that act as frames and stimuli for innovation’ (Mazzucato and Dibb, 2019) – has been a popular framing vehicle.
- Such a framework reveals challenges inherent in such a ‘wicked problem’ at urban scales, which are interwoven with regional and national issues, institutions and influences.
- Exploring these for Glasgow, which hosted COP26, we highlight the policy ‘problem’ and ‘solution’ space for mid-sized cities more generally.
- We highlight three dimensions that reflect the nature of the urban decarbonization challenge: *agency* – the responsibilities of various actors in delivering change; *boundaries* – the interactions between actions to reduce emissions alongside wider policy ambitions such as a ‘Just Transition’ and ‘green jobs’; and *intertemporal issues* – including how ambitions for rapid change might interact with the glacial progress of structural policy change.

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1. Introduction

With countries setting emissions reduction commitments there is a growing leadership role being played by non-state and subnational actors (Kuramochi et al., 2020), including cities. Cities comprised 67% of global emissions in 2020 (IPCC, 2022), making city-level actions crucial to meet national and international targets, and explaining the increasing number of targets set by city leaders themselves.

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While global cities often command attention, mid-sized cities are more common. These are those that are either not the major city within a nation (Parkinson et al., 2015) or that have populations between 300,000 and 5 million (see Rodríguez-Pose & Griffiths, 2021; also see Camagni et al., 2015 for a tighter population range).¹ They have also seen some of the most radical policy ambitions and emissions reduction plans (Hale et al., 2021). The literature concerned with urban-level responses to climate change points to: the economic case for interventions (Gouldson et al., 2015), issues presented by multi-level governance (Bulkeley & Betsill, 2005; Corfee-Morlot et al., 2011; Lee & Koski, 2015; Marsden & Rye, 2010), participatory concerns in adaptation planning (Anguelovski et al., 2014; Chu et al., 2016); as well as the cohesiveness of climate action plans (Deetjen et al., 2018).

Glasgow, the host of COP-26, with a population of around 600,000, is an interesting case that presents issues pertinent for other mid-sized cities. It has declared a climate emergency and set a target of being net zero by 2030 (Glasgow City Council, 2021a). It is also a city that has wrestled with economic and social challenges (Kintrea & Madgin, 2019) and whose meta-policy ambitions now include inclusive growth, productivity and climate (Glasgow City Region, 2021). The city has developed a 'nine-year mission' to creating 'equitable, net zero carbon, climate-resilient living by 2030' through the Glasgow Green Deal (Glasgow City Council, 2021b).

Mazzucato and Dibb (2020) define missions as: 'concrete targets within a challenge that act as frames and stimuli for innovation'. Missions are also generally thought to have value in bringing together disparate agents in a common purpose. Our contention is that applying a mission framework to a wicked problem such as net zero in an urban context has several advantages (Termeer et al., 2016), but presents questions for two sets of stakeholders: first, policymakers developing strategies under such a mission lens that recognizes the different remits and responsibilities actors are charged with; and, second, for researchers seeking to apply mission-oriented frameworks that take account of the varied dimensions of wickedness (Head, 2019; Wanzenböck et al., 2020). Cumulatively, the contribution of this paper is twofold:

- one, we consider the opportunities and tensions facing a mid-sized city² in terms of adopting a mission framework for its net zero ambitions;
- two, we explore how subnational actors and cities, when deploying this mission, grapple with 'wickedness' and its complexities and nuances in the urban context.

Though this paper focuses on the Glasgow context to situate the mission framework and corresponding ideas linked to wickedness, the concepts and frameworks have wider relevance.

Section 2 sets out our analytical framework and the mission approach to policymaking, including the literature's evolution to consider 'wicked problems'. Section 3 assesses the problem-identification and possible solutions in the case of Glasgow's net zero mission (focusing on the nature of the problem and the challenge of identifying solutions). We illustrate these issues in the context of transport as an empirical touch point (which we show is an important area to support the mission³). Finally, Section 4 discusses three specific challenges in the mission-led approach that flow from this analysis – *agency, boundaries and externalities and inter-temporality* – and shows how they relate to mission wickedness in the literature so far.

2. Analytical framework

The 'mission' label is increasingly used by policymakers, although the multifaceted nature of such an approach is not always clearly set out. In essence, missions seek to underpin long-term thinking whilst encouraging policy specifics such as moving toward measurable targets and promoting a trial-and-error ethos in policy

¹C40 classify mega cities as those with a population greater than 3 million by 2030, while "innovators" are cities with a population below this but "show climate leadership" (C40 Cities Climate Leadership Group, 2022).

²Mid-sized cities differ from "global cities" which are likely to have a different set of powers, constraints and influence.

³Other domains, from the built environment through to land use are, of course, important, and indeed interact with transport issues. Our transport permits us to bring focus to some policy complexities and nuances in pursuing such an approach that goes beyond what has been discussed so far in the literature.

development (Mazzucato, 2018a). They are also designed to help align disparate policy levers in the direction of a shared goal. Providing the foundations, Mazzucato (2018b) points to five features of a mission: (1) 'Bold, inspirational with wider societal relevance'; (2) 'A clear direction: targeted, measurable and time-bound'; (3) 'Ambitious but realistic'; (4) 'Cross-disciplinary and cross-sectoral'; and (5) 'Multiple, bottom-up solutions'.

Mission-oriented policymaking has come to prominence in several countries including the UK, as reflected in the government's industrial strategy (HM Government, 2017) and levelling-up agenda (HM Government, 2022), as well as in the Scottish context more particularly. Indeed, a newly published National Strategy for Economic Transformation in Scotland promises that the state will 'play a crucial role in making mission-based public investments' (Scottish Government, 2022). All of this makes a mission-oriented approach for a city such as Glasgow a promising approach to take.

A key point to consider at the outset, however, is the difference between technical missions and missions seeking social transformation. Putting a man on the moon exemplifies the former, while eradicating child poverty the latter (Mazzucato, 2018b). In mission-led social transformations, we often see multiple stakeholders with competing views on how to achieve an objective (if the objective can in fact be clearly defined) (Mazzucato, 2018a). Wanzenböck et al. remark to this effect (2020): 'Pursuing a societal mission-oriented approach raises the issue of how to identify, define, and subsequently target a complex and unstructured problem, for which solutions – be they technological or non-technological – cannot be predefined'.

Societal missions are, therefore, rarely straightforward in terms of their problem definition or means (solutions) for reaching the objective. That is, missions, contra the stylised Mazzucato position, may reflect what can be labelled as 'wicked' problems (see Rittel & Webber, 1973). To develop a mission framework for a 'wicked' problem, Wanzenböck et al. (2020) propose to sketch out the different pathways a societal mission-led policy agenda may need to negotiate. Notably, these authors suggest three pathways: Solution-led: where a solution looks for an as-yet-undefined problem; Problem-led: where a clear sense of a problem looks for a solution(s) to resolve it; and Hybrid: where there is a constantly evolving mix of solution and problem-led pathways. Moreover, contestation, complexity and uncertainty sit at the core of a wicked problem (also see Head, 2019) and are part of the pathway to resolution. To explain these terms: contestation refers to normative disputes over what is intended; complexity refers to the many actors and institutions involved in pursuing an agenda (all holding different capacities to act); uncertainty relates to information gaps and asymmetries concerning the issue at hand.

Wanzenböck *et al* introduce their solution framework through a brief climate example, noting (2020):

Even if there is growing consensus on a problem statement (e.g. greenhouse gas emissions are too high), the proposed solutions to be supported by policy to tackle a challenge are likely to diverge across different stakeholders (e.g. carbon tax, subsidies for renewable energy, subsidies for carbon capture and storage, and expand nuclear energy). It is therefore important to recognize that, despite a relatively clear problem definition, solutions can still be subject to different degrees of contestation, complexity, and uncertainty, resulting in a degree of wickedness of solutions that may well differ from the degrees of wickedness of the problem at hand.

The ease by which such a framework could be implemented is challenged when other 'wicked problems' with parallel and related policy actions are added: such as supplementing a mission to net zero with efforts to create a 'Green Economic Revolution' or implement a 'Just Transition'.

The key idea here is to move to a more 'differentiated' approach to mission-oriented policy (Wanzenböck et al., 2020), and to avoid 'one-size-fits-all' missions, particularly when dealing with societal 'wicked' problems. Where there is 'disorientation' over the problem and the solutions available, a mission may be conceived as requiring incremental steps to figure out what works and what does not (with an emphasis on learning by doing) (Wanzenböck et al., 2020). In the following sections, we deploy and augment such a conceptual framing in the context of Glasgow's transport emissions.

3. Assessment

Glasgow's net zero 'mission' reflects an interesting problem–solution space for mission-oriented policymaking. Following the lens of Wanzenböck et al. (2020), the problem definition described is, in principle, clear: Glasgow aims to have net zero emissions by 2030 (Glasgow City Council, 2021a). It further aims to do this through a just

transition and one that assists productivity. All efforts and actions of city policymakers are to be aligned upon these goals:

the step change in action required by the climate crisis must also address the existing vulnerability and fragility of people and our economy exposed by COVID-19 – addressing emissions and climate risk alongside poverty and inequality, creating high quality green jobs and opportunity in a redefined notion of what prosperity looks like in the twenty-first Century. (Glasgow City Council, 2021b)

Immediately, however, issues of measurement for a mid-sized city such as Glasgow become apparent. Glasgow's emissions target is based upon a methodology developed by the UK Government (BEIS, 2021a). This measure is different from other metrics, such as the widely used GHG Protocol for Cities (GHG Protocol, 2021), or metrics such as Consumption-Based Carbon Footprints (see Heinonen et al. (2020) for a review of methods). The choice of metrics for city-level emissions raises questions for 'exporting' and 'importing' emissions (Athanassiadis et al., 2018). Does a commuter who lives in a neighbouring district but who drives through the city to reach another location 'count' towards Glasgow emissions? Or a business based in Glasgow producing goods for export? At the outset therefore, and in defining the wicked problem, by carefully understanding the metrics used, policymakers are challenged to reflect upon how any actions taken might (or might not) lead to changes in emissions apportioned to the city. This can also help in understanding the extent to which the mission is being impacted by actions of different organizations and jurisdictions (we return to this later).

As highlighted, the Glasgow mission to secure net zero is – similar to other cities – not taken in isolation. The ambition is to do so whilst supporting inclusive growth and improving productivity (a trio of so-called 'Grand Challenges') (Glasgow City Region, 2021). This includes ambitions to 'have the most inclusive major city-region economy in the UK' and to 'have the most productive major city-region economy in the UK'. Glasgow sits at the centre of a metropolitan region home to around 30% of Scotland's businesses (Fraser of Allander Institute, 2018), but like many post-industrial cities, has faced population and relative economic decline in recent decades, with GDP per head in 2020 approximately 80% of neighbouring Edinburgh (ONS, 2022). Poverty and social deprivation are higher than the national average (Scottish Government, 2020a). Seeking to broaden the mission to economic and social development concerns might make sense from a policy and political perspective but adds complexities to the practical steps needed within a mission approach.

Recent performance of emissions for Glasgow suggests a positive trajectory. From 2005 to 2019, emissions for Glasgow fell from 4,108 ktCO₂ to 2,414 ktCO₂, a fall of 41% (BEIS, 2021a). This improvement can, however, be explained by changes in a relatively small number of areas. The black line in Figure 1 shows the overall cumulative reduction in CO₂ emissions while each block in the bars shows the contribution from the three transport elements published in BEIS (2021a).⁴

What about transport? Transport emissions in 2019 comprise 32.6% of all city emissions, with emissions from motorways increasing by 2 ktCO₂ over the period between 2005 and 2019. Overall, and in contrast to other large emitting sectors, there has only been a small reduction in aggregate emissions from transport activities over this period.

It is interesting to reflect upon what policy – or other – factors have driven such trends. We find that few have originated, thus far, from within local policymakers' competencies. The fall observed in Figure 1 primarily reflects a host of national (and to a lesser extent regional – i.e. Scottish) policies to decarbonize the electricity system.⁵ Few – if any – of these changes stemmed from urban policies and city policymakers.⁶ This serves to

⁴Annual data on emissions at local authority level are published around 18 months after the end of the year (BEIS, 2021a). Data is available on emissions from energy consumption (including gas and electricity) and broken down by domestic and commercial. With energy consumption data also available for at the local authority level (BEIS, 2021b; BEIS, 2021c), we can further disentangle emissions from energy consumption between changes in physical energy use and the associated emissions.

⁵We calculate that decarbonisation of the electricity system (i.e., reductions in the emissions intensity of electricity consumption) alone contributed nearly half (48.9%) of the reported changes in Glasgow's total emissions between 2005 and 2019. Policies which have influenced GB electricity decarbonisation include, but are not limited to: UK Government financial incentives for renewable generation from national (and multinational) energy suppliers; expansion of the UK electricity grid; new UK-wide regulatory rules for admitting independent generation to the grid; business innovation; and UK Government policies to increase environmental stringency on non-renewable electricity generation (Green & Staffell, 2021)

⁶A related example would be city-wide air pollution during the COVID-19 lockdowns (Bailey, 2020).

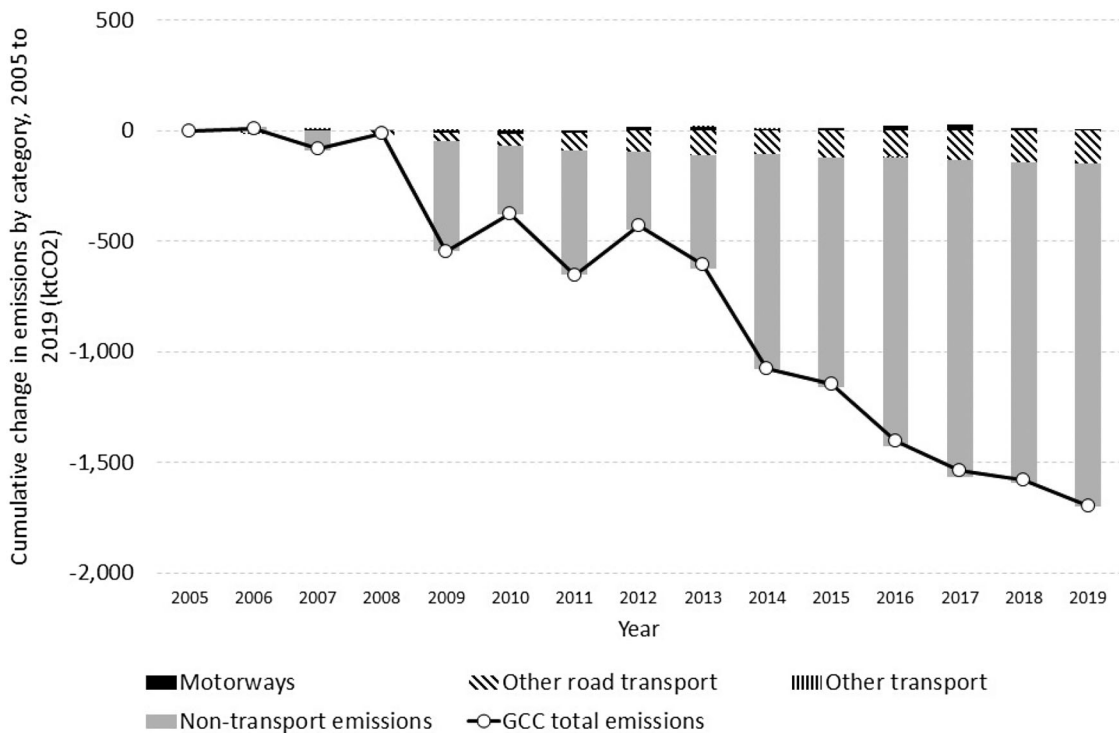


Figure 1. Cumulative changes in emissions for Glasgow City Council local authority, 2005–2019, ktCO₂. Source: BEIS (2021a).

highlight how emission trajectories toward the city's mission of 'net zero' have been shaped to date by decisions made by policymakers (and in boardrooms) far beyond a city boundary. It follows that if Glasgow is to achieve net zero, a different set of actors and suite of actions will be needed.

Solution identification for the Glasgow mission is in its infancy. The Glasgow Green Deal (Glasgow City Council, 2021b) is a first attempt. Given the data discussion above, a key concern relates to transport emissions. The Green Deal refers to integrated public transport, particularly a proposed Metro system (i.e. bus rapid transit, tram, light rail and/or Metro rail), electric vehicles and changes in travel and commuting behaviours (both on modes and frequency). The document is revealing about the nature of the challenge:

In some sectors where significant transition is needed (e.g. energy and transport) the preferred solutions for a low carbon, climate resilient future are not fully clear, and in all cases, we need to consider multiple possible climate and socio-economic futures.' (Glasgow City Council, 2021b)

In the case of transport, what is clear is that a wide set of stakeholder groupings will be crucial to solution identification in a mission toward net zero. In the Glasgow context, as in other mid-sized cities, this will include private sector and community networks, such as Sustainable Glasgow – a network of leading employers supporting action on climate change – different tiers of government (national, regional and municipal), neighbouring local (or municipal) authorities, the private and third sector⁷ and public agencies (Figure 2).

While a review of the all strategy documents that influence Glasgow's transport net zero mission is beyond the scope of this paper, some critical elements amongst stakeholders other than the city authorities include: the economic and climate change strategies from neighbouring authorities within the wider economic region (East Renfrewshire Council, 2021; Glasgow City Region, 2021; Inverclyde Council, 2021) and the Scottish and UK governments (HM Government, 2017; Scottish Government, 2022, 2020b); to the strategies of arm's-length public

⁷The third sector "includes voluntary and community organisations (both registered charities and other organisations such as associations, self-help groups and community groups), social enterprises, mutuals and co-operatives" (National Audit Office, n.d.).

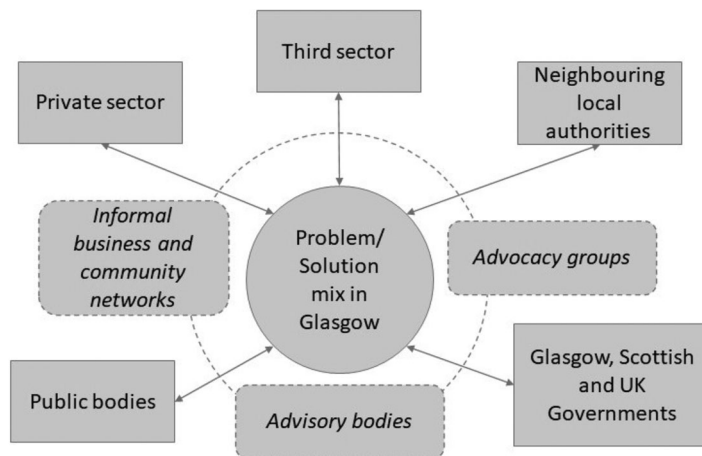


Figure 2. Stakeholder groups contributing to solution identification.

bodies such as Transport Scotland (2020) and Strathclyde Partnership for Transport (2008) as the regional transport partnership covering the west of Scotland.

Across these strategies and organizations there is a valid filtering role for different communities, advocacy groups and advisory bodies in supporting the identification of appropriate problems and solutions in the city. Private sector firms have also set out their ambitions, including large local employers, such as Scottish Power (2020) while plans for activities such as tourism – with knock-on implications for travel – are set out in Glasgow Tourism Partnership (2017).

4. Discussion

What can we learn from the conceptualization of ‘missions’ in the extant literature, now having examined the Glasgow-specific climate mission approach (with a focus in particular on transport emissions)?

As Wanzenböck et al. (2020) highlight, a pathway through such a wicked problem is not straightforward; rather a hybrid of problem-led and solution-led changes is likely to be required (also see Head, 2019; Termeer et al., 2019). While Glasgow’s mission is well captured in a wickedness-sensitized mission framework, the nature of the challenge facing city policymakers (concerned with transport) suggests three further dimensions should come into view.

4.1. Agency

A first issue is that of agency. As highlighted, wicked problems require multiple agents to be involved. Often these agents exist across distinct institutional settings: policymakers, businesses, households, third-sector organizations, etc. But securing a significant reduction in carbon emissions, whilst ensuring a just transition and improved productivity, involves a complex web of agents not just across different institutions and networks (arguably on an unprecedented scale) but also *within* them (Head, 2019). Crucial is where agency to make change, or influence change (including from other actors), rests. For example, the broader Glasgow economic region comprises eight local authorities, with transport policy shared between local, devolved, and national policymakers (see Figure 2).

From the perspective of a city government, the challenge of agency is particularly acute and perhaps more so than other ‘missions’ typically cited in the literature. This multi-agency framework will accentuate uncertainties not least over who are the key agents of change and their relative significance. To what extent does the owner of the ‘mission’ – in our case Glasgow City Council – know who the key agents of change in transport emissions are? Levels of contestation will be added to by debates over who controls the levers to make change

and how each different tier of government is influenced by (or can influence) another tier of government. Political scientists have talked of ‘self-rule’ as the responsibilities and outcomes within a city government’s direct sphere of influence and ‘shared-rule’ where their influence is more marginal, with influence limited to seeking to shape (or lobby) national policymakers (Marks et al., 2008). The complexity of multiple agents, each having a role and voice in shaping how the problem is framed and transport solutions are debated, trialled, and then implemented, should not be underestimated. Coupled with this, of course, are important issues of politics and political economy.

In the context of transport, alongside city policymakers, a wide range of stakeholders from the UK and Scottish governments, through to regional bodies such as Strathclyde Partnership for Transport and the Glasgow Connectivity Commission, have various roles. This includes day-to-day operations through to regulation, advocacy and funding (Termeer et al., 2019). Road networks are a case in point. Trunk roads – which carry nearly half of road traffic in the city (Transport Scotland, 2021) – are the responsibility of the devolved Scottish Government not the city. Pricing policy for such roads – e.g. motorway tolls – lies outside the control of city policymakers. Fuel tax and road tax (paid on the use and ownership of vehicles, respectively) are the responsibility of the UK Government. The city council is only responsible for local roads, including possible congesting charging (Williams, 2018) and workplace parking levies (City Administration Committee, 2018). A similar mix of complex responsibilities exists in public transport, where the local rail network is overseen by the newly-nationalized Scottish Government-owned ScotRail, but the regulation of buses is the responsibility of Glasgow City Council.

Such a fragmented structure can pose challenges for the mission. For example, Glasgow does not have an integrated single payment system covering the city’s public transport because of complexities in coordinating across different agencies and their ownership. This complexity also poses challenges for the prioritization and investment requirements for solutions. As in other countries, we see different actors in the transport policy space lobbying for interventions, whether that be to prioritize a particular investment or to create links to wider economic and social policies. Funding is crucial too. Glasgow City Council, receives around 80% of its annual budget from Scottish Government grants (Glasgow City Council, 2020), acting as a constraint on policy choices for net zero. The opportunities to raise local revenues at scale, either to fund additional spending or to act as collateral on borrowing, are strictly limited.

These issues of fragmentation and complexity are not just evident between tiers of government, but also among relationships with other actors too. The creation of a Low Emissions Zone in Glasgow is a good example of a practical intervention that faces challenges in walking the line between local capacities to regulate (Glasgow City Council, 2022a), the need for aligned national policy investments in public transport (and wider initiatives such as support for homeworking) on the one hand, and changes in private sector behaviours on the other. At the same time, there are also national ambitions on emission reductions and (or at least acknowledging) the interests of car drivers (Docherty, 2019). Another consideration is families, whose choice of location to live-and-work (or be educated and maintain social and family networks) may have been predicated on an expectation of access to existing transport options.

4.2. Boundaries

A second issue is that of boundaries (or externalities), i.e. the interactions between actions to reduce emissions alongside wider policy ambitions. One of the strengths of the mission approach is the recognition of the need for a system-wide approach. It aims to be all-encompassing and requires many different elements of policy to be targeted to achieving a stated aim. But the breadth of the net zero mission means that spill-over effects will be complex, leading to possible conflict between objectives. For example, a rise in transport costs – perhaps through the use of workplace parking levies as proposed in Glasgow – might reduce the use of car travel but could lead to a rise in inequality (e.g. instances where car travel remains the best option for people to access job opportunities within the city) (Docherty, 2019). This will therefore counteract the ‘just’ element of any transition.

There are also uncertainties over these spillovers, in their nature, their scale and how to respond. External events will all have an impact that will change their effects over time. Rising energy prices, as observed recently,

will impact the deliverability of policy in all manner of transport domains. There is also contestation over the evidence of such spill-over effects, including 'who pays' and who should be compensated. Contestation includes a degree of regional contestation too, particularly where there are close links between neighbouring areas. Complexity is also evident in the timing and ordering of different policy interventions.

Such spillovers are not uncommon in 'wicked' problems but their prominence in the context of a city seeking to reduce GHG emissions is likely to be heightened. In seeking to secure convergence – either through a problem-led or solution-led pathway – policymakers need to be open about challenges across the space of uncertainty, contestation and complexity if they are to succeed (Noordegraaf et al., 2019).

In the Glasgow-transport context, these boundary considerations find expression in several domains. First, in terms of a just transition, issues of access to public and active travel are prominent concerns (and are linked to issues such as forced car ownership). One in ten households in Glasgow reported not being able to apply for, or take up, a job due to an inability to travel to work and only 53% of households within the city have access to a car (Glasgow City Council, 2022b). At the same time, concerns have been expressed over potential loss of economic competitiveness, should costs on businesses rise relative to other cities, at least in the transition phase.

Geographic spillovers are notable in terms of commuting patterns across the economic region. Nearby localities, such as East Dunbartonshire and East Renfrewshire, have large portions of their working-age residents commuting to Glasgow City for work (Glasgow City Council, n.d.). Glasgow Airport – the destination for 28% of the 7.1 million air passengers in Scottish airports in 2020 (Transport Scotland, 2022) – is another source of emissions linked to the city stemming from inter-regional and international connectivity as this is used by a wider population in west-central Scotland and northern England. Emissions from air travel (international or domestic) or shipping are not included in local authorities' emissions baselines or targets, however they are included in national inventories (DBEIS, 2021a).

4.3. Intertemporal

The third issue is the intertemporal nature of solving a 'wicked problem' such as net zero. Glasgow's target is to achieve net zero by 2030, just over a decade from when the commitment was made. Such a transformational change will require investment at a pace not seen before.

But setting out a mission is one thing; delivery is another. Uncertainty exists over what technologies, changes in behaviour and investments will be most effective (Head, 2019; Termeer et al., 2019). Changes in the form of solutions will take time to appraise, design and implement (particularly if legislation or behaviour change is involved) and evaluated. Contestation will also likely emerge within the context of delivering change over time, not least in terms of the choreography of decision-making. This intertemporal challenge is also seen in changes in emissions, as shown in Figure 1, where the technological benefits of de-carbonising electricity generation are already secured, and there is a limited role to date played by reductions in transport emissions.

Again, transport provides a useful example of the practical challenges involved. Any decision over disincentivising private (petrol/diesel) car use, for example, is likely to require major alignment with efforts to boost public transport provision and support homeworking. But this will also require a change in people's attitudes. Indeed in 2019, Glasgow residents identified road maintenance as more of a priority than public transport (Ipsos MORI, 2019).

Complexity is likely to be added to, in part due to uncertainties of when investment benefits/costs are realized. For example, Glasgow's Connectivity Commission (2019) recommended a new light rail system as a crucial part of the delivery of Glasgow's net zero ambitions. But Scotland's Transport Minister has estimated that it will cost 'somewhere between £11 billion and £16 billion' with a 'timescale of 25–35 years to completion' (Scottish Parliament, 2022). For context, the timescales are at least three times longer than the time remaining on the city's net zero target. Moreover, this is a significant cost: the Scottish Government's entire capital budget, including for schools, hospitals and all other public services across Scotland, was just £3.5 billion in 2020/21 (Scottish Government, 2020).

At the same time, there are wider issues – both economic and social – outside of the control of policymakers that will impact upon the timing of progress on a mission approach. The Covid-19 pandemic for example,

presented a context where road trips were curtailed, providing a window into what a low transport emissions' environment might look like. But what might be the long-term effects of such a change in transport? On the one hand, some of the change to working from home reduced transport demand (Marsden & Docherty, 2021). But on the other, concerns over public health seem to be shifting attitudes away from public transport causing stress on industry business models (ICE, 2022). Research for the Scottish Government's Just Transition Commission for example, found that 1 in 5 people feel that 'They will use public transport less, even after the pandemic' (Just Transition Commission, 2020).

This time dimension makes navigating along the problem/solution-led pathway more difficult than other wicked problems where there can be a long lag between when a decision is made and the outcome – or at least evidence of progress toward an outcome.

5. Conclusions

The trajectory of urban emissions will be critical for meeting global emissions reductions targets. Urban areas are key sites where emissions are produced but also places where interventions to reduce emissions are being trialled and implemented. Adopting a mission perspective is, on the face of it, attractive in drawing attention to the challenges inherent in this complex transition and supporting actor alignment toward a common purpose. We contend, however, that the application of a mission lens is complicated by Wanzenböck et al.'s (2020) notion of the 'wickedness' of a net zero mission. Our analysis of the case of transport emissions in Glasgow (a mid-sized city) shows the merit of considering issues around 'agency', 'boundaries' and 'inter-temporality'. These three points show that core issues of wickedness – uncertainty, contestation and complexity – can be amplified in local and multi-layered policy making contexts.

The upshot for policymakers is that there are thorny challenges requiring the convening of a wide set of actors and the managing of parallel objectives that shape practical policy action. The transport example also highlights the time it takes to achieve change: it is easy to set out the end point of a mission, but much harder to scaffold the steps toward it. Nevertheless, the Glasgow case suggests a positive convening role for local authorities that are most closely connected to the intervention context. This analysis points to an important policy point around data and traceability of policy success. Complexities will quickly make it difficult to develop the necessary (sectorally and geographically detailed) data sets to monitor progress towards targets and to attribute responsibility for observed emissions reductions to specific policy interventions.

In further developing the case study lens for policy insights (not just in transport but for other sectors or emission sources), we propose a three-pronged approach. First, a sketch of how other mid-size cities are pursuing net zero objectives – under what political motivations and with what tools etc. – will provide comparative insights. Second, within a mid-size city context, map out the institutional landscape, building on [Figure 2](#), to gauge where interest-group powers, capacities and joint ownership of the mission is likely to rest. Third, look at the level of intervention likely to be required, and explore how particular projects in transport (or other domains) are incorporating net zero objectives into theories of change.

Lessons from our Glasgow focus – and the issues of pursuing a net zero transition – may be instructive for subnational and city authorities. They shed light on the nature of emissions, the impact of policy choices in mid-size cities, and the opportunities for better and closer cooperation and working between organizations intertwined with a city's future.

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