E3G

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POLITICAL ECONOMY MAPPING OF ADAPTATION AND CLIMATE RESILIENCE IN GLASGOW CITY REGION

PILOT STUDY FINDINGS

This paper presents the results of a pilot study on political economy mapping of regional resilience in Glasgow City Region, conducted by E3G as part of the EIT Climate-KIC Deep Demonstration project "Forging resilience in some of Europe's most vulnerable regions". The findings are preliminary and intended for use by EIT Climate-KIC Deep Demonstration partners as well as stakeholders in Glasgow City Region. More work would be required to finalise the methodology and apply it to other regions.

Context and objectives

Together with EIT Climate-KIC and other cross-cutting partners, E3G is contributing to the co-design of a Deep Demonstration project in the area of "Forging resilience in some of Europe's most vulnerable regions".

E3G's core contribution to the project is the development and pilot testing of an adapted framework based on our Political Economy Mapping Methodology (PEMM) to assess the political economy of regional climate resilience. The definition we use for climate resilience is the ability to prosper in the face of shocks and stresses brought on directly or indirectly from a range of climate change temperature and policy scenarios, including both physical and transition related risks. We include policies or strategies designed to improve a region's ability to adapt to climate change impacts within the scope of this definition. The political economy mapping of climate resilience has been done in addition to, not in place of, our standard PEMM assessment of whether political economy conditions are supportive or opposed to the low carbon transition. We have pilot tested the framework with Glasgow City Region (GCR).

The objective was to use the pilot test to determine whether it is possible to complete an assessment of the political economy of climate resilience in a region without first completing a national level assessment and to determine if enough information is likely to be available at

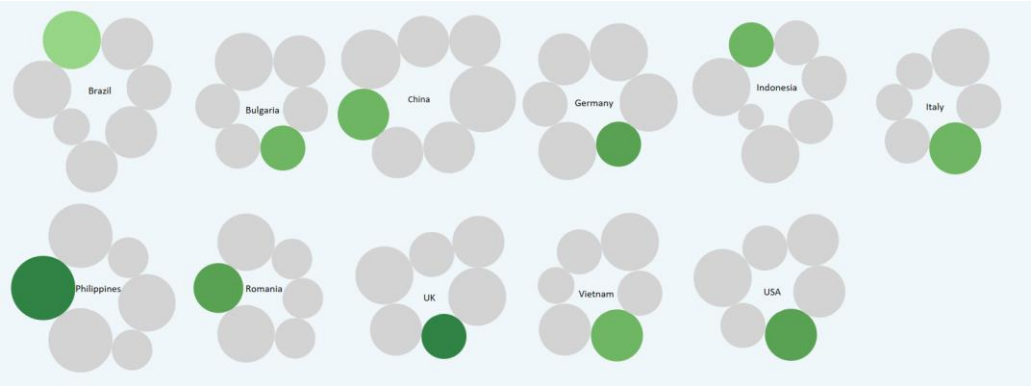
the regional level. We have taken several key lessons from the pilot that will allow us to further refine the PEMM for assessing regional climate resilience so that it can be rolled out at scale in other regions in future. **We have been unable to make a definitive general assessment of the region due to lack of data or information in one or more components of each of the three dimensions. Our indicative finding is that, while important action is already taking place including through the Climate Ready Clyde initiative, climate resilience is not seen as a priority by most stakeholders and is therefore neutral. However, more research is needed before coming to a final conclusion.**

Introduction to the Political Economy Mapping Methodology

E3G's Political Economy Mapping Methodology (PEMM) is an analytical tool developed to assess threats and opportunities to countries or regions presented by the low carbon transition. The three-dimensional assessment of **national conditions[1], political system and external projection** helps to determine what constructs a country's core national interest and identify key national and international interventions which could help to increase domestic climate ambition and enable progress on the low carbon transition. The PEMM takes an iterative approach and combines hard analytical data, intelligence gathering, in-country testing and informed judgement.

One of the key insights from E3G's political economy mapping to date is that understanding of the risks of climate change is supportive of the low carbon transition in every country we have researched. This is illustrated by the green climate risk bubbles in the figure below – a full PEMM assessment for the UK with an overview of all 7 of the national conditions can be found on page 4. This does not however, translate to political action. The political system in all these countries is either opposed or divided to the transition. The lack of institutions that would have responsibility for climate risk and allow for a more robust approach to climate resilience governance inhibits action. This finding is one of the reasons we were interested in adapting the PEMM to focus on climate resilience.

Assessment of climate risk across countries



[1] In this case, we have based our pilot study of regional conditions on a Political Economy Mapping of the United Kingdom that was completed in 2018. We have not done an assessment of Scotland at the national level.

The key questions covered in the national-level PEMM are:

National conditions:

What constitutes the national interest, is it supporting or hindering the low-carbon and resilient transition and how mature is the debate on the transition?

Political system:

Which actors in the political system are more powerful and are they supporting or hindering a low carbon and resilient transition?

External projection:

How engaged is a country in climate diplomacy and broader foreign policy, is this supporting or hindering a low-carbon transition, and how mature is the debate on the transition at this level? Are foreign policy and climate diplomacy aligning or diverging?

An overview of the questions we have included as part of our regional climate resilience PEMM is included in Annex 3.

Political economy assessment of the United Kingdom

In 2018, E3G completed a national-level assessment for the United Kingdom, which we are including here as a point of comparison (we have not done a national assessment of Scotland). This was a standard PEMM assessment focusing on the low carbon transition, where climate risk is one of the national conditions that is included in the evaluation. The figure below is the three-dimensional assessment across national conditions, political system and external projection. The findings of the UK PEMM were:

National conditions

The UK's national conditions are divided on the low carbon transition; however there are many opportunities to deepen the transition, such as leveraging growing climate risks related to flooding, the public value placed on health and air quality, leadership on green finance and high technology and innovation capabilities.

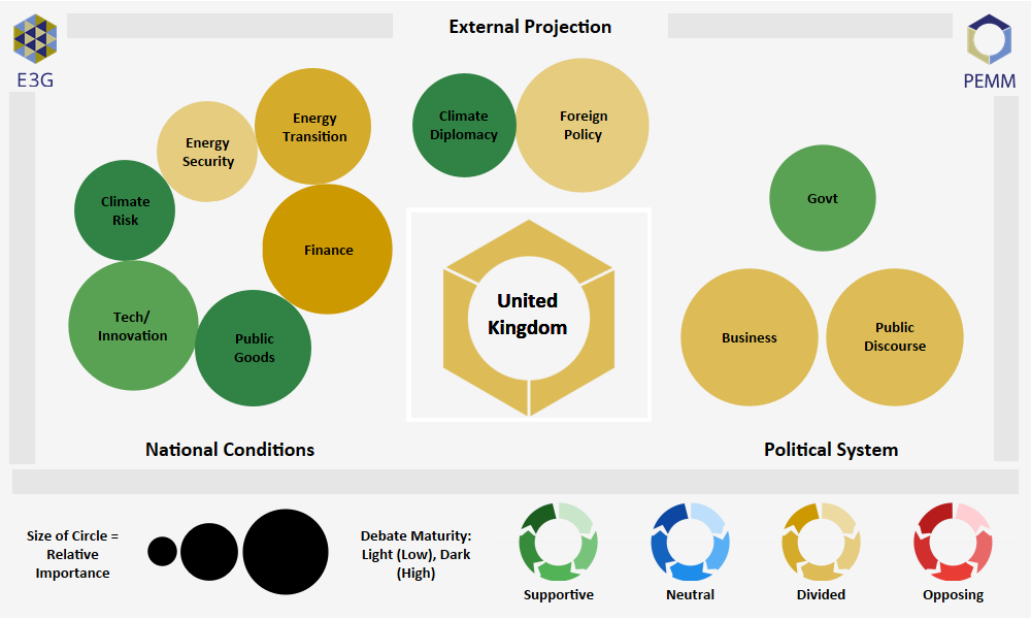
Political System

Business and public discourse, particularly media, are the most influential actors in the UK's political system and are divided on the low carbon transition. While central government and civil service are strong advocates of the transition, the recent Brexit decision is distracting these actors from implementing the reforms needed to deepen the low carbon transition.

External projection

The UK's decision to leave the EU has led to a refocusing on trade relations and Brexit, and has reduced their broader influence in the world. On climate diplomacy, the UK continues to maintain a strong leadership role, though this could quickly change post Brexit.

Political Economy Assessment of the United Kingdom for the low carbon transition



Adapting the PEMM to assess regional climate resilience

The PEMM is most often used to assess the political economy of low carbon transition across multiple criteria at country level, as shown above in the example of the UK. In order to assess the political economy of climate resilience in the Glasgow City Region, the PEMM methodology was adjusted. To reflect the dynamics of decision making around climate resilience at a regional level, the quantitative indicators were expanded, and we have tailored the qualitative analysis to ensure that it is appropriate to the regional dynamics. The intelligence gathering questions were modified from capturing country-level decisions to regional level, and we have also adapted the questions on national conditions to focus on linkages to climate resilience, including adaptation. The aim was to develop a new set of questions across the three dimensions of the PEMM:

Regional conditions (includes 6 areas: climate risk, energy security, energy transition, finance, public goods, technology and innovation. Note that since the completion of the UK PEMM we have added a 7th area, Land use, Biodiversity and Marine.)

> What constitutes the regional interest, is it supporting or hindering the low carbon and climate resilient transition, and how mature is the debate on the transition?

Political System (includes 3 areas: business, government, public discourse)

> How is decision making shared between the national, country level, devolved powers and local authorities regarding climate adaptation? Which actors in the political system are more powerful and are they supporting or hindering a low carbon and climate resilient transition?

External Projection (regional projection within the country, including two areas: climate diplomacy and foreign policy)

> How engaged is the region in shaping the narrative on climate resilience, and how is the region projecting itself at the Scottish, UK, European and global level; is this supporting or hindering a low-carbon, climate resilient transition; and how mature is the debate on the transition at this level?

Methodological Challenges

Working at a sub-national level presents several unique challenges regarding access to information and how that information is used in the PEMM framework compared to a national level assessment. A summary of the key challenges and the implications for scaling up this research is shown below.

> Many statistics are prepared at the national level, with regional data only available in ad hoc reports. In this instance, Climate Ready Clyde (CRC) was able to provide data from its Climate Risk and Opportunity Assessment. In cases where regional data is not available the regional comparison will be more qualitative.

> In a regional analysis, there is a greater reliance on local partners to provide introductions to a wide range of different stakeholders. In cases where local partners have limited capacity to engage, more time and resources are likely to be needed to cultivate relationships and build trust before doing the mapping. In this case, the project team was also unable to meet with certain local stakeholders who could have provided additional information – for example Clydeplan, the Strategic Development Planning Authority on land use planning issues.

> The below table highlights the areas analyzed in the PEMM and the challenges in adapting it for the regional level.

PEMM Area	Challenges of delivering a regional PEMM	Learning for future regional PEMMs	National PEMM needed?
Regional conditions			
Climate Risk	Regional data is often lacking and is highly reliant on analysis by actors in the region.	Work closely with local partners. In the case of Glasgow City Region for example the climate risk assessment was very useful for the research. Understanding the different coalitions responsible for resilience is essential.	No
Energy Transition	Dependent on data available but can be applied to the regional/city level. Particularly interesting when looking at transport, heating requirements and industry in the region.		No
Energy Security	Energy security is often formulated at the national level. Whilst issues such as energy poverty are important in a region, it's hard to assess energy security without considering the national picture.	Leave this section blank or only analyse the impact of national level energy security on the region.	Yes
Technology & Innovation	Availability of data is the main constraint.	Greater emphasis on qualitative analysis, this requires closer working with local partners.	No
Finance & Investment	Monetary and fiscal policy is predominantly shaped at the national, data on flows of investment are difficult to ascertain for a region	Focus on impact of national level policy on a region and the size of financial sector in a region.	Yes
Public Goods	This area is well informed by interviews in the region. Local government has a good understanding of issues facing a region and what is most important to the population.		No
Land use, Biodiversity & Marine	Data availability is the main constraint. In this case we were unable to meet with the Glasgow and Clyde Valley Strategic Development Planning Authority (Clydeplan) which does have data which is not reflected in this report.	Greater emphasis on qualitative analysis, this requires closer working with local partners.	No

Political System			
Government (Local & National)	Information on local government is readily available from interviews. However, national government often has greater influence over decision making, particularly for climate resilience.	Undertake a PEMM at the national level.	Yes
Public Discourse	Delineating between national and regional public discourse is difficult in areas such as the media, unions and academia.	Understanding the national actors in public discourse would be useful.	Maybe
Business	Delineating between important actors at the regional and national level can be difficult.	Engaging with chamber of commerce and understanding the role of utilities and transport is essential for climate resilience.	Maybe
External Projection			
Climate Diplomacy	The capacity of a region to undertake climate diplomacy is small. Diplomacy is under the control of the national government.	Understand how a region can showcase itself on mitigation and climate resilience.	Yes
Foreign Policy (projection nationally)	The capacity of a region to project outwards is small. Foreign policy is usually under the control of the national government.	Understand what national foreign policy means for the region. Determine whether regional politics are aligned with the national government.	Yes

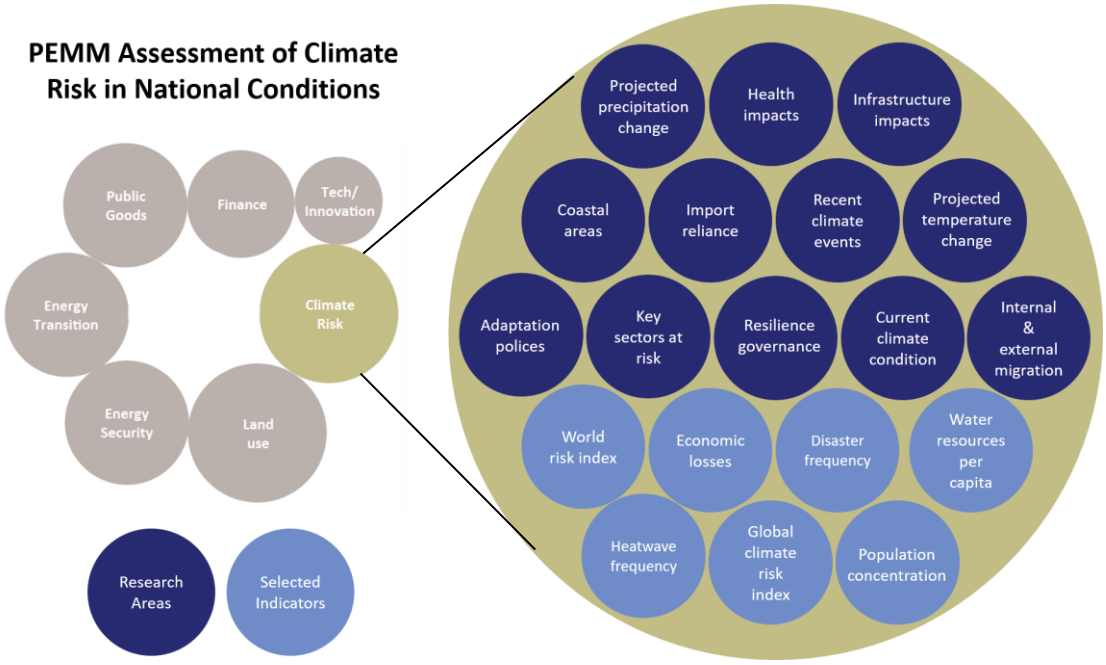
Colour Key	Hard to deliver regional PEMM	Constraints in delivering a regional PEMM	No difficulty delivering a regional PEMM

The figure below zooms in on some of the research areas and indicators used for climate risk that are normally assessed at the national level. For the deep dive assessment of climate resilience required in this project, a greater focus on climate resilience governance, adaptation policies and current climate conditions has been required to understand how this aligns with the other areas of economy assessed in the National Conditions. These can be seen in the chain of circles in the left of the figure. Challenges for adapting climate risk to the sub-national level were:

> Not being be able to use indicators such as the World Risk Index and Global Climate Risk Index because these are only available at the national level. Similarly, statistics on the economic losses from natural disasters for a region are piecemeal and are unlikely to be directly comparable with other regions.

> Understanding how national adaptation policies interact with policies and public bodies in local government proved challenging in some circumstances. The relationship is not always linear and in-depth questioning across a range of stakeholders is required.

Adapting the Climate Risk dimension in the PEMM



In addition to doing an expanded assessment for the climate risk condition we have also evaluated the state of play of each national condition area in relation to climate resilience. Our approach for this is explained below in the section on the Glasgow City Region PEMM three-dimensional assessment.

Background to Glasgow City Region

Glasgow City Region[2] is a voluntary partnership of 8 local authorities: East Dunbartonshire Council; East Renfrewshire Council; Glasgow City Council; Inverclyde Council; North Lanarkshire Council; Renfrewshire Council; South Lanarkshire Council; and West Dunbartonshire Council.

The catalyst for this partnership was the establishment of a **£1.13 billion Glasgow and Clyde Valley Infrastructure Fund**[3] in 2014. In order to deliver projects through this fund, coordination across councils was required. The council leaders of the eight local authorities within Glasgow City Region discussed this deal with the UK government who then approached the Scottish government about the **deal**[4]**.** The backdrop to these discussions was the politically charged 2014 Scottish independence referendum. In August 2014, the Scottish Government agreed to match the UK Government's funding of £500 million. At that time, the Scottish Government had not published any plans to introduce deals in Scotland. Local authorities provided the remaining £130 million.

This recent movement towards regionalisation must be placed within the historical context of the region. During our interviews, two pieces of background were used to partially explain the current situation in Glasgow City Region. This by no means provides a thorough explanation of the complexities that have shaped the political economy of the region, but rather aims to provide a snapshot of key historical trends.

Between 1975 to 1996, Scottish local government was divided into 12 regions. **Strathclyde regional council**[5]**,** encompassed the current Glasgow City Region and stretched to parts of the highlands. This council was responsible for close to 60% of the Scottish population.

In 1996, these 12 regions were replaced with 32 councils. Strathclyde regional council was viewed as a powerful body due to its size and was split into 12 councils. Remnants of the old Strathclyde structure exist today, such as the **Strathclyde Partnership for Transport**[6], which oversees transport in the Strathclyde area of Scotland, including Glasgow subway. However, the councils that incorporate Glasgow City Region mostly operate independently and especially so between 1996 and 2014. A **7.6% reduction**[7] in real terms government funding since 2013/14 and the city deal, has required councils to coordinate. The next phase of Glasgow City Region following the city deal offers the opportunity for **greater coordination**[8] across a wider range of issues such as child poverty and climate resilience. The Greater Manchester Combined Authority is an example of a sub-national body that allows for this kind

[2] http://www.glasgowcityregion.co.uk/article/7621/How-will-the-City-Deal-work

[3] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/346278/Glasgow_Clyde_Valley_City_Deal.pdf

[4] https://www.audit-scotland.gov.uk/uploads/docs/report/2020/nr_200116_city_deals.pdf

[5] https://www.undiscoveredscotland.co.uk/usfeatures/areas/strathclyde.html

[6] http://www.spt.co.uk/corporate/about/history-background/

[7] https://www.bbc.co.uk/news/uk-scotland-50812694

[8] https://www.audit-scotland.gov.uk/uploads/docs/report/2020/nr_200116_city_deals.pdf

of coordination, including on climate adaptation and resilience which is part of its **Five Year Environment Plan**[9] for 2019-2024.

Going back further to the 1950s, a socially selective New Town programme was implemented as a regional policy of the Scottish Office. This aimed to **relocate both industry and a section of the population**[10], normally young, skilled employed workers with families to new towns. This growth was across central Scotland, away from what had been designated a 'declining' city. Investment was prioritised in these new areas and was focused on attracting lighter industries. This policy was continued over subsequent decades despite awareness over the negative impacts for Glasgow. This helps partly explain the focus on employment and skills development alongside diversifying economic sectors in the current **Glasgow City Region economic action plan**[11]**.**

State of Play of Glasgow City Region's governance on climate resilience

The governance of the Glasgow City Region is a result of its origins: GCR came about in 2014 to implement the Glasgow City Deal which was designed to promote regional initiatives covering infrastructure and innovation with funding for the following 20 years. There is no permanent entity or legal governance structure – it is based on a partnership of eight local authorities with the issues that affect GCR divided into eight equitable portfolios, with one portfolio assigned to each local authority[12].

Many of the projects under the Glasgow City Deal are now progressing, meaning that the Glasgow City Region is currently reflecting on how this partnership can evolve going forward and whether further shared planning is required.

Although Land Use and Sustainability counts as one of the eight portfolios, there is no cross-cutting approach for tackling climate change. Flood risk management is arguably the most material climate risk in the region, and is the responsibility of individual local authorities, based on the legal framework for flood risk management (FRM) in place since 2009. The Scottish Environment Protection Agency (SEPA) is responsible for creating an FRM Strategy, which identifies areas particularly at risk at the national level and setting the amount of investment and coordinating public bodies. It then requires local authorities to develop surface water management plans and local FRM plans. However, it seems there is limited risk management in place for other climate risks (i.e. heatwaves).

Although there is no governance of adaptation and climate resilience at a regional level, Climate Ready Clyde has provided increased awareness of and coordination around some of the risks the region is facing. However, it sits outside the Glasgow City Region Deal and its

[9] **https://www.greatermanchester-ca.gov.uk/media/1986/5-year-plan-branded_3.pdf**

[10] **https://www.gcph.co.uk/assets/0000/5988/Excess_mortality_final_report_with_appendices.pdf**

[11] **http://www.glasgowcityregion.co.uk/CHttpHandler.ashx?id=19521&p=0**

[12] **The policy portfolios are: land use and sustainability, infrastructure and assets, inward investment and economic growth, tourism and destination marketing, transport and connectivity, enterprise, skills and employment, housing and equalities.**

membership is voluntary (although currently all eight local authorities concerned are members). It is also the first initiative with an adaptation focus at the regional level in Scotland.

At the national level, there is the potential for adaptation policy to become more integrated across Scotland, thanks to the proposed National Adaptation Forum. However, the results of this process are uncertain. One successful example of collaboration between local authorities within Glasgow City Region is the Drainage partnership – however this doesn't include all the local authorities within Glasgow City Region.

Glasgow City Region PEMM: Three-dimensional assessment

This section presents the results of our political economy mapping of the low carbon transition and climate resilience in Glasgow City Region. It is based on E3G's extensive desk-based research, as well as intelligence gathered by E3G's political economy team from December 2019 to February 2020, including in-region meetings with stakeholders representing government, business and civil society in Glasgow.

A high-level visualization of the state of play of GCR's political economy in relation to the low carbon transition, with a focus on climate resilience, is shown below. The main blocks of colour represent the national conditions, the political system and the regions' external projection with respect to the low carbon transition. The coloured outlines (or rings around the circles) visualise the state of play of each component in relation to climate resilience. Transparent (or grey) bubbles signify areas where a lack of data or information prevented a formal assessment.

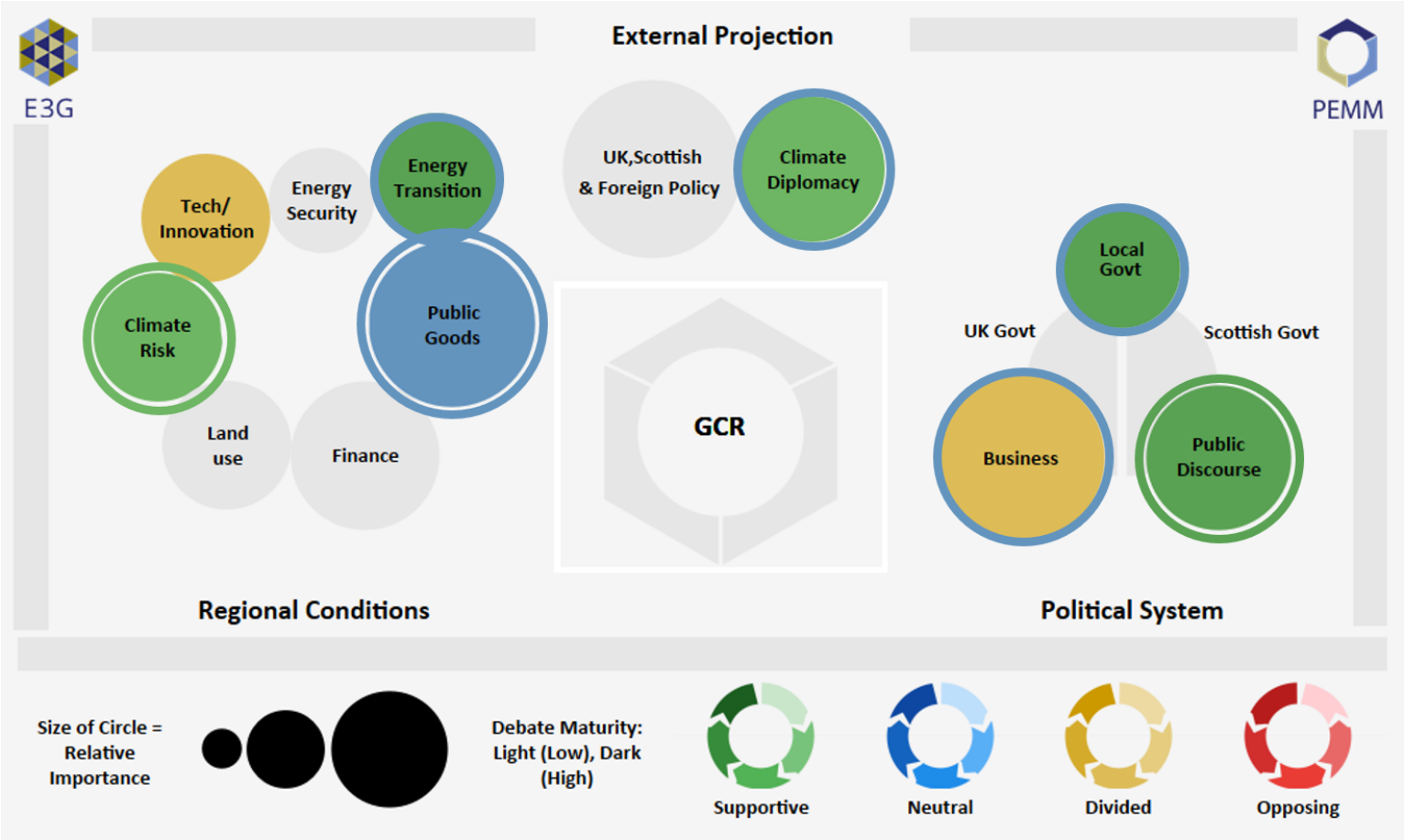
As explained in the introduction, this was an attempt to apply the PEMM assessment of low carbon conditions at the regional level, and to further adapt the methodology to account for conditions as they relate to climate resilience. One of our key findings is that we have been unable to make a definitive general assessment of the region due to lack of data or information in one or more components of each of the three dimensions. However, we have included an indicative assessment based on the information that is available, that conditions in GCR are neutral towards climate resilience.

For the national conditions, we encountered challenges in evaluating energy security and the financial system at the regional level. These are likely to be difficult to assess for any given region given the strong influence of national conditions on these sectors. We were also unable to assess the low carbon transition under land use, but it is supportive for climate resilience.

For the political system, we have assessed each of the three components with local government being supportive of the low carbon transition and neutral on climate resilience, and public discourse being supportive of both low carbon transition and climate resilience. Business is assessed as divided on low carbon and neutral on climate resilience. However, through conducting the pilot study it became clear that this would also require an assessment of the UK and Scottish governments given their influence on local decision-making, which would require additional time and resource for future climate resilience PEMMs.

GCR's external projection on climate diplomacy is divided on both low carbon transition and climate resilience. We were unable to assess the region's wider projection into UK or Scottish foreign policy.

Regional-level assessment of Glasgow City Region for the low carbon and climate resilient transition



Regional conditions implications for climate resilience

GCR is vulnerable to direct impacts from climate change and major weather events have already resulted in significant economic impacts in recent years. Flooding is the predominant climate risk for GCR. There are strong links between flood risk and social vulnerability as socially vulnerable neighbourhoods are over-represented in areas prone to flooding. GCR could also has high levels of social vulnerability to heat, particularly in Glasgow, West Dunbartonshire, Inverclyde and North Lanarkshire.

Biodiversity, land and marine ecosystems are important sectors for GCR which is strongly supportive of a climate resilience agenda. Agricultural land comprises 60% of the Glasgow & Clyde Valley City Region's land area. Employing 4,000 people, this industry is likely to be highly exposed to climate change impacts. Acidification, occurring at faster rates in seas around the UK, threatens the Clyde fishing industry mainly due to shellfish accounting for 90% of sea fish landed in the Clyde region and a significant portion of aquaculture production.

With respect to public goods, local authorities in the region have large disparities in deprivation. Glasgow City for example has almost 50% of areas in the bottom quintile of deprivation for Scotland. This likely contributes to a disparity in priorities for each council. Improving air quality is a priority for the population in GCR which could be at the expense of greater concern for resilience to climate impacts. However, there are recent examples of public protests in favour of climate action including concern about flood risk. There will be growing pressure to increase spending on social care and health due to increases in the proportion of the pensionable population in the city region.

GCR has an opportunity to benefit from a low carbon energy transition, due to its vast renewable resources as well as the potential from industries like financial services and engineering. GCR accounts for 15% of renewable electricity generation in Scotland. The local authority of South Lanarkshire in GCR accounts for over two thirds of this and is the 2nd highest renewable electricity generator in Scotland. However, lack of data on regional employment in high carbon industries does not allow for a full evaluation. Regional data or targets for indicators like carbon intensity and energy efficiency would also be useful in this context.

GCR has strengths in technology and innovation that could be mobilized to accelerate progress on climate resilience including universities with strong scientific specialisations, particularly in engineering, physics and chemistry. Both University of Strathclyde and University of Glasgow have masters level courses on adaptation. Glasgow has been ranked as the most competitive city in Scotland by the Global Competitiveness Index and hosts the Offshore Renewable Energy Catapult, aimed at increasing innovation in this space.

While finance is an important industry for GCR we could not find enough data to evaluate whether activity in the sector is currently accelerating or inhibiting progress on climate

resilience. We have not evaluated energy security due to its strong ties to national conditions – although it is worth noting that 570 utility assets (particularly electricity substations) face surface water flooding risk in GCR.

Climate Risk: How exposed and susceptible is the region to climate change and what is the level of adaptive capacity?

Increased flooding is the predominant climate risk in GCR – it was the most frequently cited out of 54 risks identified. Also, strong ties to vulnerability as socially vulnerable neighborhoods totaling 62,250 people are over-represented in areas prone to flooding. GCR also has high levels of social vulnerability to heat, particularly in Glasgow, West Dunbartonshire, Inverclyde and North Lanarkshire[13]. The Flood Re scheme, designed to reduce premiums of homes at risk of flooding, operates in Scotland and covers 90% of the home insurance market[14]. However, Flood Re doesn't address the underlying issues of building on floodplains. Glasgow City Region is strongly influenced by the Gulf Stream. This brings high levels of rainfall, exposure to wind and storms and milder temperature differentials between summer and winter[15].

Climate risk supports action on resilience in Glasgow City Region. Past events highlight the need to ensure that both existing and new infrastructure must be prepared for future climate impacts. However, the understanding of future risks and the governance required to address these future risks is still in an early stage.

Significance to regional interest: medium
Alignment with action on resilience: green
Maturity of the debate on resilience: low

Energy Transition: Is there any evidence that awareness of physical climate risk is driving ambition on low carbon energy policy? What sort of transition risks does the region face from the shift to clean energy?

The Glasgow City Region accounts for 15% of renewable electricity generation in Scotland. The local authority of South Lanarkshire in GCR accounts for over two thirds of this and is the second highest renewable electricity generator in Scotland. The Highlands account for over 25% of Scotland's total renewable energy generation[16].

Scotland has the lowest percentage of heating and cooling consumption from renewables in the EU, at 6%. The UK stands at 7% and the EU average is 20%. There are large differences between average household gas consumption in GCR local authorities. Glasgow City and West

[13] https://static1.squarespace.com/static/5ba0fb199f8770be65438008/t/5c7016f31905f45f6624db1c/1550849807364/23+CRC+Climate+Risk+-+technical.pdf

[14] https://www.floodre.co.uk/flood-re-marks-one-year-making-flood-insurance-affordable-scotland/

[15] https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/weather/learn-about/uk-past-events/regional-climates/western-scotland_-climate---met-office.pdf

[16] https://www2.gov.scot/Topics/Statistics/Browse/Business/Energy/Database

Dunbartonshire are amongst the lowest gas consuming households in Scotland, whilst East Dunbartonshire and East Renfrewshire have the highest household gas consumption[17].

Glasgow City Region, in parallel with Scotland as a whole, has made good progress on renewables in electricity generation. The commitment to net zero targets by several local authorities in Glasgow City Region demonstrates that transitioning to a low carbon energy system is a significant regional interest[18]. Ascertaining how this aligns with action climate resilience, and the extent to which the energy transition is being climate-proofed, was difficult due to a lack of information.

Significance to regional interest: medium
Alignment with action on resilience: neutral
Maturity of the debate on resilience: low

Energy Security: What are the region's critical concerns around energy security? What are the region's main energy sources and how will they be impacted by climate risks?

570 utility assets (particularly electricity substations) face surface water flooding risk[19]. Over a quarter of homes in Glasgow City Region are in fuel poverty (heating costs over 10% of household income). All councils except Inverclyde are below the Scottish average of 34%. When extreme fuel poverty is considered (fuel costs exceed 20% of income), Glasgow City, East Renfrewshire, Inverclyde and Renfrewshire are all near the Scottish average of 9%. Increased temperatures could reduce this risk[20].

Wider energy security policies, however, are mostly formulated at the Scottish and UK government level and therefore does not play as large a role as the energy transition at the regional level. Information regarding how energy security aligns with action on climate resilience was lacking.

Significance to regional interest: low
Alignment with action on resilience: transparent / not evaluated
Maturity of the debate: low

Technology and Innovation: Is there innovation capacity in relation to adaptation and resilience and technological, government policy and business models for market transformation)?

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[17] **https://www2.gov.scot/Topics/Statistics/Browse/Business/Energy/Database**

[18] **https://www.glasgow.gov.uk/article/25066/Council-Sets-Target-Of-Carbon-Neutral-Glasgow-by-2030**

[19] **https://static1.squarespace.com/static/5ba0fb199f8770be65438008/t/5c7016f31905f45f6624db1c/1550849807364/23+CRC+Climate+Risk+-+technical.pdf**

[20] **https://www.gov.scot/publications/latest-estimates-fuel-poverty-extreme-fuel-poverty-under-proposed-new-definition-following-stage-2-fuel-poverty-targets-definition-strategy-scotland-bill/pages/5/**

Glasgow is the most competitive Scottish city and 9th most competitive UK city[21] according to the Global Urban Competitiveness Index. Glasgow City Region has universities with strong scientific specialisations particularly in engineering, physics and chemistry[22]. Glasgow hosts the Offshore Renewable Energy Catapult, aimed at increasing innovation in this space. Glasgow is behind only Edinburgh in attracting levels of Foreign Direct Investments in 2017[23]. 6,000 HE students from the EU are enrolled in the Glasgow City Region[24].

Increasing employment in Glasgow City Region is predicated on leveraging the strong scientific specialisations of the universities and its role as a business hub of Scotland. It is unclear whether this is being utilised for addressing climate risk in Glasgow City Region.

Significance to regional interest: medium
Alignment with action on resilience: transparent
Maturity of the debate: low

Biodiversity, land use and marine: How significant are these sectors for the region? How vulnerable are they to climate risks?

The Clyde is important for biodiversity. The Inner Clyde Estuary is a Special Protection Area under the EC Wild Birds Directive and as a RAMSAR site under international designation. Agricultural land comprises 60% of the Glasgow and Clyde Valley City Region's land area. Employing 4,000 people, this industry is likely to be highly exposed to climate change impacts. The majority of GCR land is suitable for rough grazing and cattle/dairy farming (86% of land area), rather than arable farming. Snow and heavy rain in 2018 led to the creation of an assistance fund to support livestock losses for farms[25]. The UK is only 60% self-sufficient in food. The impact of climate change on required food imports is unclear for the region and more broadly[26].

Risk of soil erosion due to intense or prolonged rainfall is highest on the edges of the city region, such as Inverclyde, West Dunbartonshire, East Dunbartonshire, North Lanarkshire and South Lanarkshire. West Scotland also has some of the UK's most carbon rich soils, and a warming climate represents a risk for this carbon sink.

Acidification, occurring at faster rates in seas around the UK, threatens the Clyde fishing industry, mainly due to shellfish accounting for 90% of sea fish landed in the Clyde region and a significant portion of aquaculture production[27].

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[21] https://multimedia.scmp.com/infographics/business/article/3041676/urban-competitiveness/index.html
[22] http://glasgoweconomicleadership.com/wp-content/uploads/GEL-SIA-main-report-FINAL-201708.pdf
[23] https://assets.ey.com/content/dam/ey-sites/ey-com/en_uk/topics/attractiveness/ey-scotland-attractiveness-survey-2019.pdf?download
[24] http://glasgoweconomicleadership.com/wp-content/uploads/GEL-SIA-main-report-FINAL-201708.pdf
[25] https://static1.squarespace.com/static/5ba0fb199f8770be65438008/t/5c7016f31905f45f6624db1c/1550849807364/23+CRC+Climate+Risk+-+technical.pdf
[26] https://www.nfus.org.uk/farming-facts/farming-and-the-food-supply-chain.aspx
[27] https://static1.squarespace.com/static/5ba0fb199f8770be65438008/t/5c7016f31905f45f6624db1c/1550849807364/23+CRC+Climate+Risk+-+technical.pdf

Significance to regional interest: low/medium
Alignment with action on resilience: transparent
Maturity of the debate on resilience: medium

Finance and Investment: Is finance available to support climate adaptation and resilience in the region?

Finance is an important sector for the region and innovative financial mechanisms will be critical for enhancing resilience. There was not enough data to complete a full evaluation. However, councils indicated that finance is difficult to access for adaptation projects. Ring fenced expenditure reduces a council's ability to invest in these areas. Furthermore, creating a business case for attracting the private sector into climate resilience has been raised as a difficulty, due to the size of projects and the required rate of return the private sector requires. Furthermore, Glasgow is also a large financial centre[28] and specializes in general insurance. It has the largest number of people employed in insurance in Scotland. It is unclear what level of exposure they have to Glasgow City Region. 24 of the Association of British Insurers members are based in Glasgow[29] – the second-highest concentration (along with Manchester) of insurers outside London.

Significance to regional interest: high
Alignment with action on resilience: transparent
Maturity of the debate on resilience: low

Public Goods: Is there public concern about climate impacts at the regional level?

The local authorities in Glasgow City Region have large disparities in deprivation, this is likely to cause differing priorities for each council. Glasgow City for example has almost 50% of areas in the bottom quintile of deprivation for Scotland[30]. Improving air quality is a priority for the population in Glasgow City Region which could be at the expense of greater concern for resilience to climate impacts. There will be growing pressure to increase spending on social care and health due to increases in the proportion of the pensionable population in the city region[31]. While we were unable to find local polling data on issues related to climate impacts, there are recent examples of **public protests**[32] in favour of climate action, including concern about growing **flood risk**[33].

Significance to regional interest: high
Alignment with action on resilience: neutral
Maturity of the debate on resilience: low

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[28] https://www.thecityuk.com/assets/2018/Reports-PDF/b408b7220a/Enabling-growth-across-the-UK-2018.pdf

[29] https://www.insurancebusinessmag.com/uk/news/breaking-news/abi-tips-glasgow-as-a-major-british-insurance-centre-72715.aspx

[30] https://www.gov.scot/publications/scottish-index-of-multiple-deprivation-2020-local-and-national-share-calculator-2/

[31] https://www.nrscotland.gov.uk/files//statistics/rgar/2018/rgar18.pdf

[32] https://www.glasgowlive.co.uk/news/glasgow-news/glasgow-climate-action-global-strikers-16954263

[33] https://www.bbc.com/news/uk-scotland-glasgow-west-51690867

Political system implications for climate resilience

Glasgow City Region's political system is supportive of the net zero agenda but is rated as neutral on the climate resilience agenda. This mirrors the devolved and national powers priorities.

Local authorities are supportive of the climate agenda but prioritise poverty reduction given limited resources. Business and public discourse dominates the political system due to the absence of a single central political authority for the region. Voluntary cooperation on resilience governance between local authorities and civil society takes the place of a permanent government body.

Civil society is active and supports local authority action on climate change. Businesses in Glasgow City Region represent the economic powerhouse of Scotland and are broadly neutral to the climate resilience agenda.

Regional government

Level of power and influence (for resilience): Low

Alignment with action on resilience: Neutral (not actively opposed but poverty and mitigation are priorities)

Business

Level of power and influence: High

Alignment with action on resilience: Neutral**.** There is no indication that resilience is a priority for business writ large. Climate could benefit some sectors and will harm others. For example, Health and social work is largest employment sector and will suffer from climate risk, digital and innovation is likely to be supportive of resilience, tourism could benefit, and agricultural productivity could fall. Glasgow City Region's businesses are vital for the Scottish economy and are highly concentrated in Glasgow City. The Glasgow Chamber of Commerce represents the region and is more engaged with net zero than with resilience. It has strategic links to Zero Waste Scotland and is supportive of circular economy initiatives. GCR accounts for 25% of Scotland's adaptation sector, employing 8,390 people. It contributes £146m to Scotland's £604m in sales[34]. This is lower than GCRs overall contribution to Scottish GVA, which is around 33%[35].

Public discourse

Level of power and influence: Medium

Alignment with action on resilience: Supportive (active civil society in particular)

External projection

Glasgow City Region's external projection and choice is neutral to the net zero transition and resilience agenda.

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[34] **https://static1.squarespace.com/static/5ba0fb199f8770be65438008/t/5c6e82bd652deaa4dc1a7ade/1550746306718/09+Technical+-+Economy.pdf**

[35] **https://www.skillsdevelopmentscotland.co.uk/media/44992/rsa_glasgow-city-region.pdf**

Glasgow City Region's external projection reflects the dynamics of the devolved Scottish government. The UK retains exclusive power over foreign policy, but Brexit is pushing Scotland to have a more active role of engagement within Europe and in key jurisdictions driven by economic opportunities. It is worth noting that the Convention of Scottish Local Authorities (COSLA) engages at the European level. As it is not a permanent governmental entity it is difficult for GCR to project its interests at the national level.

As a key centre of economic and soft power within Scotland, Glasgow City participates in different initiatives within Europe on adaptation and resilience issues. Glasgow City, Newcastle and Leicester have voluntarily signed up to Mayors Adapt, or the Covenant of Mayors on Climate and Energy, committing to report progress on adaptation every two years across the breadth of activity in their cities.

COP 26 in Glasgow is an important opportunity for the region to engage at the national level, with the UK government and internationally. Scotland's Powerhouse is hosting COP 26, an opportunity to raise agenda on climate resilience at regional level. But political disagreements and lack of coordination between UK and Scottish governments is a significant impediment.

Foreign policy: Transparent
Climate diplomacy:
Level of engagement: Low
Alignment with action on low carbon: Green
Alignment with action on resilience: Neutral
Maturity of the debate: Low

Barriers and opportunities to strengthening climate resilience in Glasgow City Region

The analysis has not identified any blockers to boosting climate resilience in Glasgow City Region. That is, there do not seem to be any actors or institutions actively working to prevent a stronger climate resilience agenda. Several other types of barriers were identified and are listed in the table below. A general challenge relates to the governance of Glasgow City Region and its relationship both with Holyrood and Westminster, as well as a limited awareness of the importance of resilience as a response to rising climate risk.

There are however multiple opportunities to mainstream climate resilience into decision-making processes in GCR. For example, there is a strong focus in the region on social justice and linking this to resilience and adaptation could resonate with local authorities' priorities. Climate resilience is highly relevant to several of the policy portfolios beyond land use and sustainability, including infrastructure, transport and housing. Planning assumptions for investments in these sectors will need to be robust to various future temperature scenarios and climate impacts. There are also several important initiatives underway within the Glasgow City Region within which resilience could be integrated. Below we summarise our findings.

Barriers and Opportunities

Glasgow City Region	Regional Conditions	Political System	External Projection
Barriers	• **Intention to achieve net zero carbon emissions dominates the agenda**, both at the national and local level. This is perceived to be at the expense of climate resilience. • **Low awareness of climate impacts.** Flood risk management is in place, but other future impacts are not receiving much attention (e.g. heatwaves). The last major flood was in 2002. • **Long term climate risks are not included in the GCR project pipeline**. Prioritization of infrastructure investment in instead based on traditional GVA metrics.	• **GCR is a voluntary partnership**, requiring a consensus-based governance, which can slow action. • **Portfolio responsibility in GCR has been contorted to allocate a share of ownership to each council, making cross-cutting action on climate resilience harder,** due to areas such as housing and land use being in different portfolios. • **Lack of dedicated permanent public body** at a regional level focusing on resilience, as work from Climate Ready Clyde is yet to be integrated into GCR. • **GCR relies on Glasgow City as other LAs lack resources** which constrains the region's capacity. • **Council tax is driving approval of housing in flood plains,** as it is the only	• **Disconnect with the wider urgency and policymaking at the national level** as LAs focus on service delivery.

Glasgow City Region	Regional Conditions	Political System	External Projection
		source of Local Authority income not controlled by government.	
Blockers	NA	NA	• Political divergence between Scottish and UK government.
Opportunities	• **Link climate adaptation to social issues and inclusive growth**. Climate Justice is high on the Scottish agenda, more can be done at the local level. • Programme for the government - Green City Accelerator to embed mitigation and adaptation together. • Circular economy – integration of adaptation. • **Scheme to promote new affordable homes** can embed climate resilience into new housing development.	• **Glasgow City Region Cabinet partnership has already built trust** – could be a forum for decisions on resilience and adaption as a regional issue. The partnership is also a good target for knowledge and capacity building on climate risk and resilience. • **Greening Glasgow City Region as Phase 2** could unlock funding for ongoing regional approach. • Glasgow City Development Plan • **Broadening CRC messaging to embed solutions with a socio-economic focus**. GCR is socio-economically diverse and	• Peer-to-Peer exchange. Other cities and regions within the UK, Europe and elsewhere have launched resilience initiatives and engage in knowledge exchanges.

Glasgow City Region	Regional Conditions	Political System	External Projection
		resilience approaches will need to reflect this.	
Levers	• **Strathclyde University,** Glasgow City Innovation Districts merge adaptation and mitigation opportunities. First-of-its-kind, and scalable.	• **Trade Unions working on just transition** – focus mostly around mitigation, but adaptation could be embedded in the discussion. • **National Adaption Forum** set up at the national level could give more guidance at the local level. • **Glasgow Chamber of Commerce** - link CRC risk assessment to better understand climate proofing businesses, and economic opportunities. • **Glasgow City Council** (Sustainable Glasgow)	• **CDP and the Covenant of Mayors on Climate and Energy -** Glasgow City Council is already a member of the Covenant of Mayors – the GCR could leverage this. • **Scotland's Powerhouse is hosting COP26**, opportunity to raise agenda on climate resilience at regional level.

Key lessons from the pilot study for developing a regional climate resilience PEMM

In applying the adapted PEMM methodology to Glasgow City Region as part of the pilot study, we were able to make an assessment across most of the dimensions of the national conditions, political system and external projection. We also feel confident that we have identified several important barriers and opportunities for interventions in the region to improve the prospects for stronger governance of climate resilience in the region.

As explained above, we were unable to make an assessment across several of the dimensions of the PEMM even after adapting the methodology. We explain this further below and include several recommendations for addressing these issues in future iterations of a regional climate resilience PEMM.

Some of the national conditions may need to be excluded from a regional assessment: For example, energy security and finance and investment are very difficult to evaluate at the regional level. This is due in part to lack of data but also the fact that both sectors are tied very strongly with the national level conditions. In some regions with clear energy security concerns or large financial sectors this assessment may be possible. We would propose taking a similar approach as we have done in the pilot study and including them as transparent where data is unavailable.

The national government should be included in the mapping of the regional political system: Because authority and responsibility for climate resilience is shared between local and national governmental bodies, we have determined that it would be necessary to include an assessment of the national government as a fourth bubble in the political system alongside regional government, business and public discourse. In the case of GCR this is further complicated by the distinction between the Scottish and UK governments.

Additional resources may be required to assess regional projection into national foreign policy. Many regions lack the capacity to influence the foreign policy of their national governments. In cases where they do have such capacity, it is very difficult to determine how that influence is being exerted and which priorities are being targeted. An additional challenge for Glasgow City Region is that it does not represent a single governmental entity. It will be important to map how regions are attempting to influence national foreign policy, but this is likely to require additional resources.

ANNEX 1: GLASGOW CITY REGION POLITICAL REPRESENTATION

The figure below shows the political representation for each local authority at all levels of government. This includes representation at Westminster, Holyrood and at the local authority level. Scotland uses the **Additional Member System** for its elections, in order to increase proportionality. Scotland has 73 constituencies and each constituency elects one MSP by 'first past the post' and are known as constituency MSPs. This is the elector's 'first vote'.

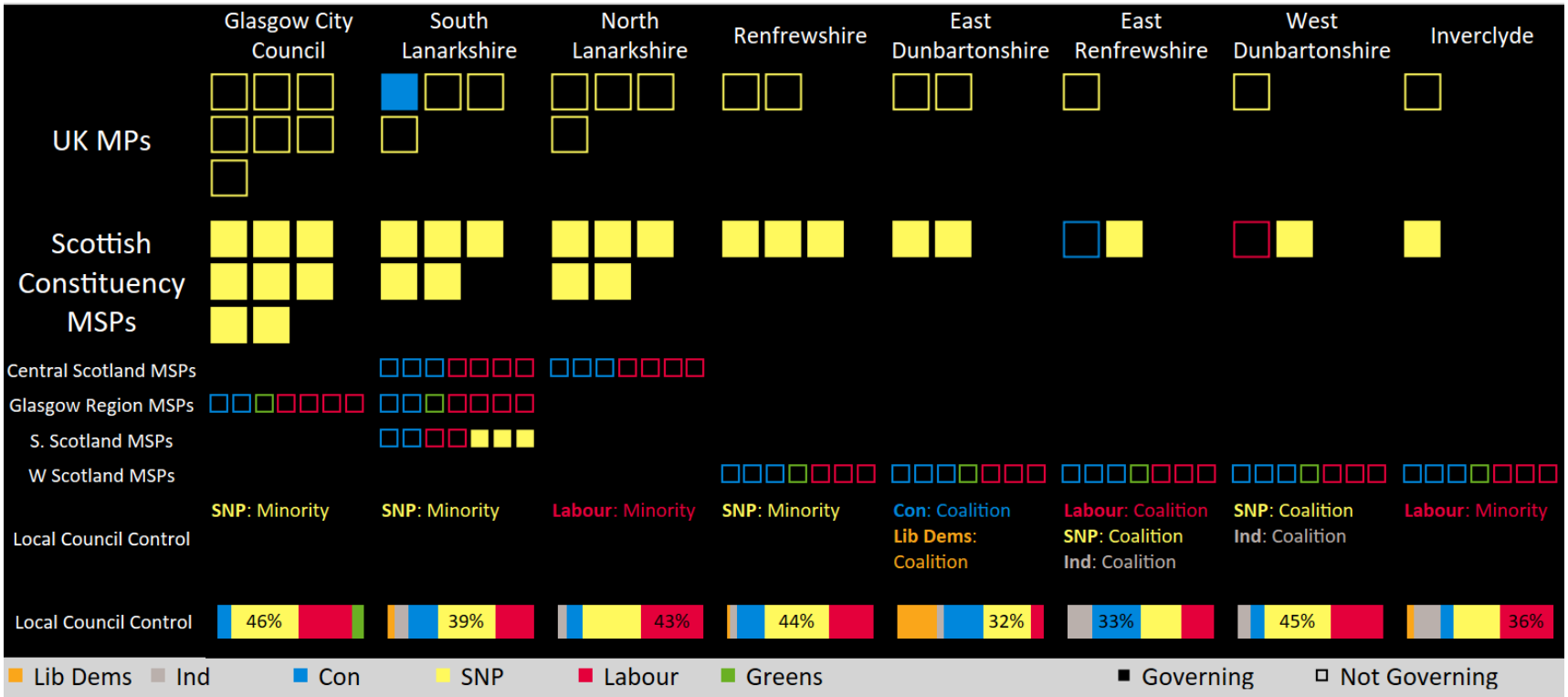
The 'second vote' is used to elect 56 additional members. Scotland is divided into 8 parliamentary Regions and each region elects 7 regional MSPs. Each eligible voter in Scotland is therefore represented by one constituency and seven regional MSPs but a local authority can be in more than one of the 8 parliamentary regions. South Lanarkshire is covered by three of these regions. The regional seats are calculated by dividing the number of regional votes cast for each entity divided by the number of constituency and regional seats gained in that region, plus one. This is repeated for each of the 7 seats and explains why the SNP has less regional MSPs compared to constituency MSPs.

> **The Scottish National Party secured 48 of 59 Westminster seats in the 2019 election,** pushing Scottish independence to the fore. GCR mirrors the Scottish picture, with the SNP securing 20 of the 21 seats represented, conservatives control the remaining one.

> **The Glasgow City Region is predominantly represented at Holyrood by the SNP, the governing party**. Regional MSPs that represent the local authorities are broadly split between Labour & Conservatives.

> **No council has one party with majority control in GCR.** Five local authorities have minority control & three have coalitions. Notably, the Conservatives and Liberal Democrats formed a coalition to prevent the SNP having control in East Dunbartonshire. Whilst, Labour, SNP and Independents joined forces in East Renfrewshire to prevent Conservative control. When focussed on delivering city deal projects, these councils have worked effectively. Further integration, in areas such as climate resilience planning could highlight tensions between councils with differing political colours.

Political composition of different levels of government for the local authorities in Glasgow City Region.



A square represents one seat, a solid square indicates that the seat is held by the governing party for that level of government. For example, there is one conservative seat at Westminster across Glasgow City Region. The local authorities' percentage is calculated by the number of seats each party holds. Source: Graphic produced by E3G.

ANNEX 2. STAKEHOLDER LIST

The table below details the stakeholders that E3G have conducted meetings with for this project.

Name	Position	Organisation	Date of Meeting
Gavin Templeton	Head of Sustainable Finance	Green Investment Group	09/01/2020
Duncan Booker	Head of Sustainable Glasgow	Glasgow City Council	14/01/2020
Steve McFadden	Project Director - City Deal	Renfrewshire Council	14/01/2020
Kit England	Climate Ready Clyde Project Manager	Climate Ready Clyde	14/01/2020
Roddy Yarr	Assistant Director, Sustainability	University of Strathclyde	15/01/2020
James Curran	Independent Chair	Climate Ready Clyde	15/01/2020
Stuart Patrick	Chief Executive	Glasgow Chamber of Commerce	16/01/2020
Gerry Cornes	Chief Executive	East Dunbartonshire Council / GCR Land Use & Sustainability Portfolio	16/01/2020
Janette Webb	Commissioner	Infrastructure Commission	21/01/2020
Anna Richardson	City Convener for Sustainability & Carbon Reduction	Glasgow City Council	06/02/2020
George Tarvit	Director	Sustainable Scotland Network	27/01/2020
Martha Waldrop	Councillor	Glasgow City Council	27/01/2020

ANNEX 3: ADDITIONAL CLIMATE RESILIENCE QUESTIONS COMPLEMENTING PEMM RESEARCH QUESTIONS

Dimension / sphere	General PEMM questions	Climate resilient questions
National Conditions: What constitutes the national interest, is it supporting or hindering the low-carbon and resilient transition and how mature is the debate on the transition?		
Climate Risk	How exposed and susceptible is the country to climate change and what is the level of adaptive capacity? What are the existing natural hazards? Does climate change exacerbate these hazards or create new threats? Are there geographical hotspots? Which sectors are most affected and what is the extent of damage? How is the country responding to its climate vulnerability and is it sufficient?	How exposed and susceptible is the region to climate change and what is the level of adaptive capacity? What are the existing natural hazards? Does climate change exacerbate these hazards or create new threats? Are there geographical hotspots within the region? Which sectors are most affected and what is the extent of damage? How is the region responding to its climate vulnerability and is it enough? Is there an adaptation strategy at the regional level?
Energy Transition	What progress has been made on the transition to a low carbon energy system? Is a transition taking place, and if so, how is it characterized (focus areas, magnitude and direction)? Are there national energy targets, and if so what progress has been made? Is the low carbon and renewable energy sector (LCRE) growing? How dependent is the country on high carbon energy sources? How much investment is going to fossil fuels versus renewable or low carbon energy sources, including energy efficiency?	Is there any evidence that awareness of physical climate risk is driving ambition on low carbon energy policy? What sort of transition risks does the region face from the shift to clean energy? What is the level of understanding of these risks?
Energy Security	What are the country's key energy security concerns and how is it responding? Is the country able to meet its energy demand? Does it have sufficient domestic energy reserves? Are energy imports required and if so how much and which types? Do low and/ or high carbon energy sources play a role in solving energy security concerns? Are there issues around energy access and affordability?	What are the region's critical concerns around energy security? What are the region's main energy sources and how will they be impacted by climate risks? How much climate proofing has been considered in the design of the current and future energy system?
Technology and Innovation	How advanced are technology and innovation capabilities and how is it characterised? Does the country have enabling conditions for technology development and innovation? Are	Is there innovation capacity in relation to adaptation and resilience (technological, government policy and business models for market transformation)? What are the key

	they leaders in low and/ or high carbon technologies? Do they have capacity for innovation at the national, regional or international level?	businesses and sectors? Is it enabled by government, and if so, how? Are there research institutes that focus on resilience?
Finance & Investment	How developed is the finance sector and how aligned is it with green and/ or sustainable finance initiatives? How important is the finance sector to the economy? Does the country host major banks, stock exchanges? Are there existing governance frameworks on climate disclosure? What progress has been made on green finance? What is the extent of fossil fuel revenues in both private and public finance (stock exchange and tax base)?	Is finance available to support climate adaptation and resilience in the region? Who is providing it, i.e. public vs private? Are there areas of adaptation to which is finance is not flowing? Are physical climate risks impacting the financial sector? How? Is the financial sector responding to climate risk? How?
Public Goods	How are 'public goods' perceived in the country and what does the public value the most? How much is public spending on social protection (social benefits, health, education etc.). What issues are the public most concerned about/ spur protest? Is the population exposed to high levels of environmental pollution? Are they satisfied with the management of their natural resources? What is the level of climate awareness and action?	Is there public concern about climate impacts = at the regional level? What kind of impacts? Does concern differ within the region? Is the public satisfied with the climate risk management in the region? Is there any approach at the regional level?
Government, business and public: Which actors in the political system are more powerful and are they supporting or hindering a low carbon and resilient transition?		
Government and Civil Service	What are the key dynamics within government and its position on climate change and/ or the low carbon transition? How is the government structured? Who leads and what are their top priorities? What is the level of support for climate policy, and level of stability, coherence and influence (e.g. extent of crossparty consensus, position of national government)? Do they have the ability to hold the executive branch to account: status of climate legislation, oversight functions, ability of judiciary to mount challenges? What characterises the civil service characterised, and does it have the ability to deliver climate change policy (e.g. frameworks, level of integration across ministries, level of prioritisation). What is the level of ideological entrenchment for/against climate policy?	What are the relevant entities with responsibilities for climate adaptation and increasing resilience at the national level? How is this responsibility divided amongst the national, devolved powers and local authorities? What is the dynamic amongst these actors? How is the regional government structured? What is the capacity and capability for local authorities to carry out their responsibilities on climate adaptation and resilience issues?
Business	Balance of political engagement of high and low carbon industry within the economy. Fiscal dependence on high carbon sector for tax receipts/ employment/ GDP. Dependence of business sectors on government support.	What is the level of awareness of climate risk within climate vulnerable sectors e.g. agriculture, infrastructure and tourism industries? Which businesses within the region are likely to gain or lose for increasing adaptation? What is their

	Political ties between business sectors and government, and ability to organise/ influence government. Level of awareness within climate vulnerable private sector, e.g. agriculture, infrastructure and tourism industries. Influence of the climate vulnerable private sector upon the economy and political regime	public position and what arguments are they making? Are they considering adaptation within their business plans? Are supply chains likely to be disrupted and are there plans to mitigate this?
Public discourse	Ability of traditional and new media to influence the political system. Nature of the media (e.g. open, diverse, elite etc.), ownership and independence. Assessment of mainstream media positioning on climate change. Role of civil society organisations in determining the public narrative and influencing government policy (e.g. professional NGOs, social movements, trade unions, academics and thinktanks). The informal expression of public views, e.g. protests, polling results, letter pages, interinstitutional conversations.	Who are (potential) champions (e.g. professional NGOs, social movements, trade unions, academics and thinktanks) in relation to climate adaptation in the realm of public discourse? What do they say; what platforms are they using to say it? What platforms are used by the public to express their views? How much influence do they have on the government, businesses, and public in general?
External Projection	How engaged is a country in climate diplomacy and broader foreign policy, is this supporting or hindering a low-carbon transition, and how mature is the debate on the transition at this level? Are foreign policy and climate diplomacy aligning or diverging?	How engaged is the region in shaping the narrative on climate resilience, and how is the region projecting itself at the Scottish, UK, European and global level? Is this supporting or hindering a low-carbon and resilient transition; and how mature is the debate on the transition at this level? What initiatives on adaptation or resilience is the region involved in, both at the national and international level?

About E3G

E3G is an independent climate change think tank operating to accelerate the global transition to a low carbon economy. E3G builds cross-sectoral coalitions to achieve carefully defined outcomes, chosen for their capacity to leverage change. E3G works closely with like-minded partners in government, politics, business, civil society, science, the media, public interest foundations and elsewhere. In 2016, E3G was ranked the number one environmental think tank in the UK.

More information is available at **www.e3g.org**

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