

## Glasgow City Region Climate Adaptation Strategy and Action Plan

### Annex 3: Resource Mobilisation Plan

## Resilient Regions: Clyde Rebuilt

Resilient Regions: Clyde Rebuilt is a project seeking to catalyse a transformational approach to addressing the impacts of climate change in Glasgow City Region. It is led by Climate Ready Clyde (CRC), a regional climate initiative made up of stakeholders from the City Region, with technical, cultural, economic and governance expertise from Sniffer which supports CRC. It also has cultural expertise and understanding of creative arts in sustainability from charity Creative Carbon Scotland, specialist climate change and economic expertise from research consultancy Paul Watkiss Associates and EIT Climate-KIC. The project is funded by Climate Ready Clyde's fifteen members and EIT Climate-KIC, Europe's leading climate innovation initiative. The project developed Glasgow City Region's Adaptation Strategy and a transformational adaptation portfolio blueprint.

Copyright: Resilient Regions: Clyde Rebuilt, 2020. Climate Ready Clyde, c/o City Chambers East, Floor 2, Room 29, Glasgow, G1 1JLT: 0141 229 7738 E: [climatereadyclde@sniffer.org.uk](mailto:climatereadyclde@sniffer.org.uk)  
Website: [www.sniffer.org.uk/climatereadyclde](http://www.sniffer.org.uk/climatereadyclde)

Funded and produced on behalf of the following organisations:



Produced by:



## EIT Climate-KIC's Deep Demonstrations

Unprecedented systemic crises threaten existing communities and future generations and will require urgent global action and collaboration. Regions are often responsible for (decentralised) resilience and adaptation planning and implementation, but they face multiple climate related shocks and stresses which affect their communities, landscapes and economies in different ways.

The need for climate adaptation and resilience strategies to address ongoing challenges, change the status-quo of 'reactive' climate measures and cope with more and increasing climate-related disasters, has given rise to the opportunity to focus on enabling and investing in climate resilience holistically.

EIT Climate-KIC's Deep Demonstrations accelerates learning about how to change the world in the context of urgency, diversity and radical uncertainty. They are inspirational examples of what's possible, have been designed to create a transformative impact and ultimately seek to achieve rapid systemic change, for the benefit of all citizens.

The *Forging Resilient Regions Deep Demonstration* works to accelerate the transition from climate-vulnerable to climate-resilient regions, where people, communities, and systems are able to withstand shocks and slow-onset stresses and transform into flourishing communities.

Contending that 'Business as usual' innovation is not delivering climate action fast enough, Deep Demonstrations use systems innovation to generate options and pathways for radical transformations. It starts with a demand-led approach, working with regional governments committed to fundamental transformation to a net-zero emissions, resilient future. It offers a fresh approach to innovation, combining research, entrepreneurship, education, policy, technology and sustainability, to maximise the potential for change in places and across value chains.

Deep Demonstrations involve an iterative, non-linear four-phase process of Intent, Frame, Portfolio and Intelligence.



# The Deep Demonstration iterative process

In Intent, we listen to understand local or sectoral challenges and current commitments with regard to resilience and decarbonisation. We collaboratively develop the regional transformation vision through deep listening activities, workshops and interviews with government bodies, businesses and communities. By bringing together as wide an array of stakeholders as possible, we learn about what creates the fastest pathways to change in regions.

In Frame, we map out the relevant systems (which we want to transform) to identify where and how innovation can play a role in catalysing change. The outcome is a Portfolio Blueprint, with a series of leverage points that can address barriers and opportunities through innovation.

In Portfolio, we build and manage a portfolio of connected innovations designed to address the leverage points identified in earlier stages.

In Intelligence, we generate actionable insights and intelligence to inform decision-makers, provide feedback loops and accelerate learning about how to achieve transformation at scale.

# Contents

<b>Introduction, and background</b>	<b>8</b>
Introduction to the project	9
Background	10
<b>Method and Approach</b>	<b>12</b>
<b>Adaptation Finance Landscape for Glasgow City Region</b>	<b>15</b>
Challenges to financing adaptation	18
Types of adaptation and financing opportunities	22
Mapping of existing funding and finance sources	23
Increasing the suitability of existing finance sources for adaptation	25
<b>Framing of Adaptation Finance for Clyde Rebuilt</b>	<b>27</b>
Categorising finance needs for the Adaptation Strategy and Innovation Portfolio	28
Priorities for conventional funding of transformational adaptation	34
Priorities for transformative finance	36
Applying system thinking and identifying the system (and actors) for transformative finance	38
Delivery approach for mobilising resources	40
<b>Mapping and Mobilising Finance for the Adaptation Strategy and Innovation Portfolio</b>	<b>42</b>
Emerging and potential additional public funds and finance	43
Private sector finance	46
Mapping the Adaptation Strategy Interventions to sources of finance	46
<b>Developing a Portfolio of New Transformative Finance for Adaptation</b>	<b>48</b>
Green infrastructure blended finance lending facility	50
Clyde climate forest fund	52
Placemaking crowdfunded climate bond	54
Adaptation infrastructure including green and sustainable urban drainage systems solutions	56
Climate risk reduction partnership	58
Revolving fund to transfer climate benefits to adaptation	60
Glasgow City Region climate adaptation innovation fund	62
Discussion of financing options	64
<b>Recommendations and Next Steps</b>	<b>66</b>
<b>Annex A: Public Funding Sources for Adaptation in Glasgow City Region</b>	<b>69</b>

# Introduction

The Resource Mobilisation Plan is an analysis of funding sources and mapping of pipeline propositions to potential investors/funders for adaptation, including an Innovation Portfolio, for Glasgow City Region. It builds on previous background work on the potential sources of finance, and a prior mapping of finance to emerging adaptation interventions for Glasgow City Region’s Adaptation Strategy and Portfolio Blueprint. The three-step approach to preparing the Resource Mobilisation Plan is provided below.

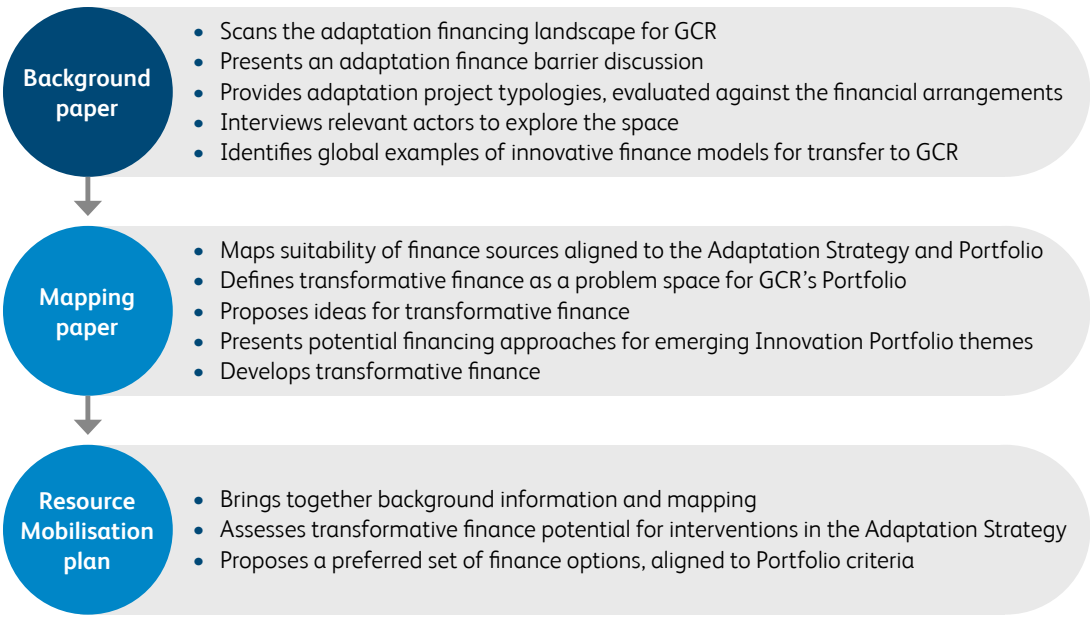


Figure 1. Approach.

## Background

At the global level, finance flows for adaptation are increasing and were estimated at US\$30 billion/year in 2017–18 in developing countries, most of which was from the public sector (CPI 2019).<sup>1</sup> However, this is much lower than for mitigation, where global flows in developing countries are >\$500 billion/year and are dominated by the private sector. This reflects a number of differences in the ease of financing of mitigation versus adaptation, most notably that it is harder to generate revenue streams for adaptation. As climate change impacts continue to accelerate, it also means there is likely to be a large gap between the adaptation finance needs and the available public finance, at the global, national and local level (UNEP 2018).<sup>2</sup> These same general findings also apply to OECD adaptation, including Scotland and Glasgow City Region, i.e. adaptation financing needs are large, and will require additional sources to public finance, but securing this finance will be challenging.

1 Climate Policy Initiative (2019). Global Landscape of Climate Finance 2019 [Barbara Buchner, Alex Clark, Angela Falconer, Rob Macquarie, Chavi Meattle, Rowena Tolentino, Cooper Wetherbee]. Climate Policy Initiative, London. Available at: <https://climatepolicyinitiative.org/publication/global-climate-finance-2019/>

2 UNEP (2018). Adaptation Gap Report. Published by United Nations Environment Programme, Nairobi <https://www.unenvironment.org/resources/adaptation-gap-report>

The current impacts of weather-related extremes, and the potential impacts of climate change, have been identified for Scotland in the UK Climate Change Risk Assessment<sup>3</sup> and at the regional level in the Glasgow City Region Climate Risk and Opportunity Assessment (GCR-CROA) (Climate Ready Clyde 2018).<sup>4</sup> The GCR-CROA also estimated the potential economic costs of climate change in Glasgow City Region, estimating these could total hundreds of millions/year by mid-century. Whilst there are many risks from climate change in Glasgow City Region, the report also identifies potential opportunities, which include economic benefits: these arise from the warmer climate and reduced costs on average (e.g. warmer temperatures and reduced winter heating, reduced frost days, etc).

The Scottish Government’s Programme for Government 2020–2021 sets out the economy-wide actions for the long-term, which includes plans to address the global challenges that Scotland faces from climate change (mitigation and adaptation) and Brexit. It provides further backing for the ‘Green New Deal’, which includes committing £500 million for transformational infrastructure, £100 million for a green jobs fund and £150 million for flood defence.<sup>5</sup>

## Existing sources of funds

The adaptation financing landscape in Scotland, and specifically for Glasgow City Region, is diverse but is dominated by grant-based public funding. The overlay of COVID-19 economic recovery packages makes this landscape more dynamic and sensitive to fluctuations in the short- and medium-term. At the same time, there is a chance to ‘build back better’ including ‘greening’ of any recovery package – an aspiration already set out in Glasgow City Region’s own economic recovery plan, presenting a clear opportunity to address climate resilience and innovation.<sup>6</sup> The project has mapped existing public and private sources of finance for Glasgow City Region, shown below. Flows are dominated by public finance currently and include local authorities, other public bodies and agencies, as well as national government, UK government and/or the European Union. These potential sources of finance have been mapped to different types of adaptation intervention, recognising certain forms of funding might be more suitable than others for each.

To meet aspirations and interventions contained in Glasgow City Region’s Adaptation Strategy and the Innovation Portfolio, public funds will need to be scaled up and used in more strategic ways, including to mobilise private investments to meet Glasgow City Region adaptation needs. Doing this requires the private, public and third sectors to design a process for mobilising public and private resources for innovation, making a broader range of financing instruments and models accessible, as well as developing long-term transformative financing solutions that are aligned to the different interests and requirements of the public and private sectors.

To help this, the study has developed a typology of financing types. This recognises that resource mobilisation is needed to finance both incremental and transformational adaptation, using both conventional and transformative adaptation financing approaches. This is shown in the matrix below. All four areas are needed, for example, there is some conventional finance (left hand column) that will be needed for core adaptation actions, and this type of funding can also help test innovative actions or scale up. However, new financing approaches (right hand column) will also be needed.

3 UK Government (2017). UK Climate Change Risk Assessment

4 Climate Ready Clyde (2018). Glasgow City Region Climate Risk and Opportunity Assessment (Glasgow City RegionCROA). <http://climatereadyclyde.org.uk/climate-risk-and-opportunity-assessment-for-glasgow-city-region-key-findings/>

5 Scottish Government (2019). Protecting Scotland’s Future: The Government’s Programme for Scotland 2020-21

6 Glasgow City Region (2020) Recover, Rebuild, Renew: Glasgow City Region’s Economic Recovery Plan in response to COVID-19. <http://www.glasgowcityregion.co.uk/CHttpHandler.ashx?id=26580&p=0>

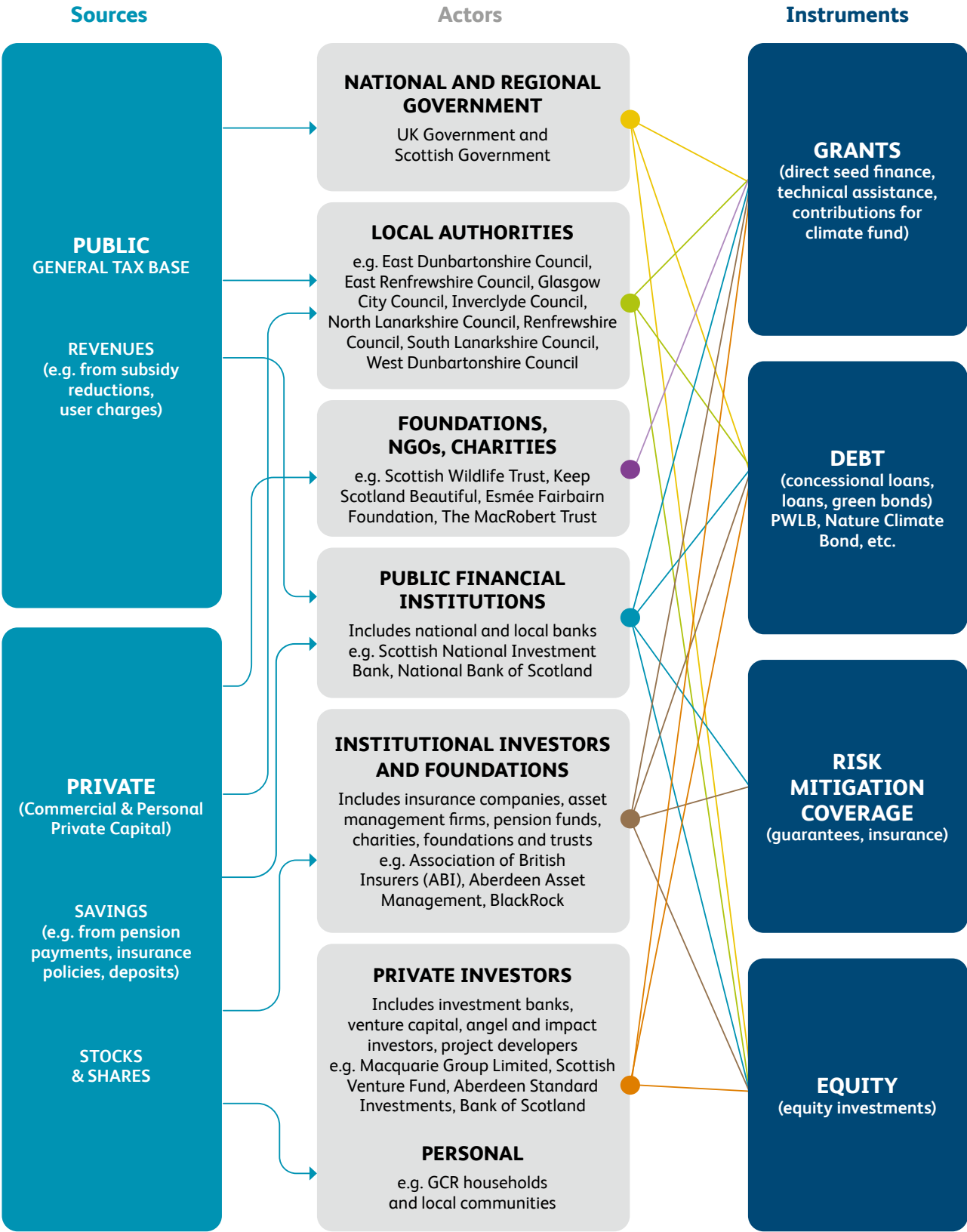


Figure 2. Mapping of existing sources of adaptation funding and finance for Glasgow City Region.

The types of finance most suited to the range of Interventions in Glasgow City Region’s Adaptation Strategy and the Innovation Portfolio have been mapped against this matrix. A high-level delivery structure for adaptation which includes transformative finance in Glasgow City Region is proposed in this paper (Figure 4 below). The approach sets out the sources of potential finance at the top, and then shows how we propose to match the Interventions in the Adaptation Strategy – including more innovative elements that will be taken forward in the Portfolio Blueprint – to existing and new finance. To support delivery of transformative finance, appropriate financing mechanisms will be put in place, including more targeted use of public funds. This may involve reallocating government-based capital into adaptation solutions. However, this can only work if there is a supply of effective and desirable investment opportunities. The delivery structure has considerable strengths in that it allows Glasgow City Region to cross-subsidise between new financing structures and traditional adaptation finance for the Strategy and the Innovation Portfolio, to help accelerate action.

		Type of Finance	
		Conventional finance	Transformative finance
Type of Adaptation	Incremental adaptation	Public sector funds using grants, i.e. business as usual	New instruments or financing models to scale-up adaptation
	Transformational adaptation	Public sector funds for new innovative adaptation or delivering at scale	New instruments/ financing models for innovative and systemic adaptation

Figure 3. The Adaptation Finance Matrix (typology).

To complement traditional financing, some innovative models and approaches have been considered for Glasgow City Region. These are also presented in this paper and are listed below. For each of the financing options, their suitability for Glasgow City Region has been evaluated based on their potential for revenue stream generation, alignment with the emerging portfolio, replicability potential, innovation and their ability to be used as a blended finance vehicle. The seven solutions are:

- 1. Green Infrastructure Blended Finance Lending Facility
- 2. Clyde Climate Forest Fund
- 3. Placemaking Crowdfunded Climate Bond
- 4. Adaptation infrastructure including green and sustainable urban drainage systems solutions
- 5. Climate Risk Reduction Public Private Partnership
- 6. Glasgow City Region Climate Adaptation Fund
- 7. Revolving fund to transfer climate benefits to adaptation

It is observed for Glasgow City Region that while public funds are available, they are currently mainly used as direct financing instruments for individual project activities. Alongside continuing to do this, it is strongly suggested that Clyde Rebuilt takes a more commercial focus, where public funds are used to create mechanisms designed to either raise additional adaptation finance or to increase private sector investment in adaptation. The type of mechanism used will depend on the underlying opportunity. Where public funds are used directly, they should be strategically channelled towards, for example, early-stage innovation and, research and development as mentioned above.

To conclude, successfully unlocking the finance for Glasgow City Region’s Adaptation Strategy and Innovation Portfolio, and more broadly, bridging the finance gap is likely to require three strategies, in partnership with local, national and UK actors.

- 1. Increasing the proportion of direct grants and creating the conditions for adaptation. There are some adaptation activities and investments that require (and justify) public intervention, notably because of market failures, or because they involve investments or changes where there is limited private sector interest. In these cases, public investment can support core adaptation, but there are opportunities to also use public funds to create the enabling environment for actions by the private sector and others.
- 2. Encouraging public organisations operating in Glasgow City Region to move a more commercial mindset. There are opportunities to use public funds or assets to support public-private sector partnerships or unlock investment from the private sector for adaptation. These opportunities could be very significant and can help to address the adaptation finance gap.
- 3. Developing innovation for adaptation. There are many emerging opportunities for adaptation and these can be developed through a cycle of innovation. This pilot can demonstrate new approaches with new actors. This can be developed through partnerships including local research institutions and national and European research funders, local, Scottish and UK government, and the private sector. This would also position Glasgow City Region as an innovation hub for the emerging adaptation economy, i.e. for new adaptation goods services.

Finally, a set of recommendations are included to help progress these three strategic areas. Taken together, these three can help to deliver the Glasgow City Region’s Adaptation Strategy and achieve the vision for a region that flourishes in the future climate. It could also establish the region as a frontrunner and could deliver important economic opportunities.

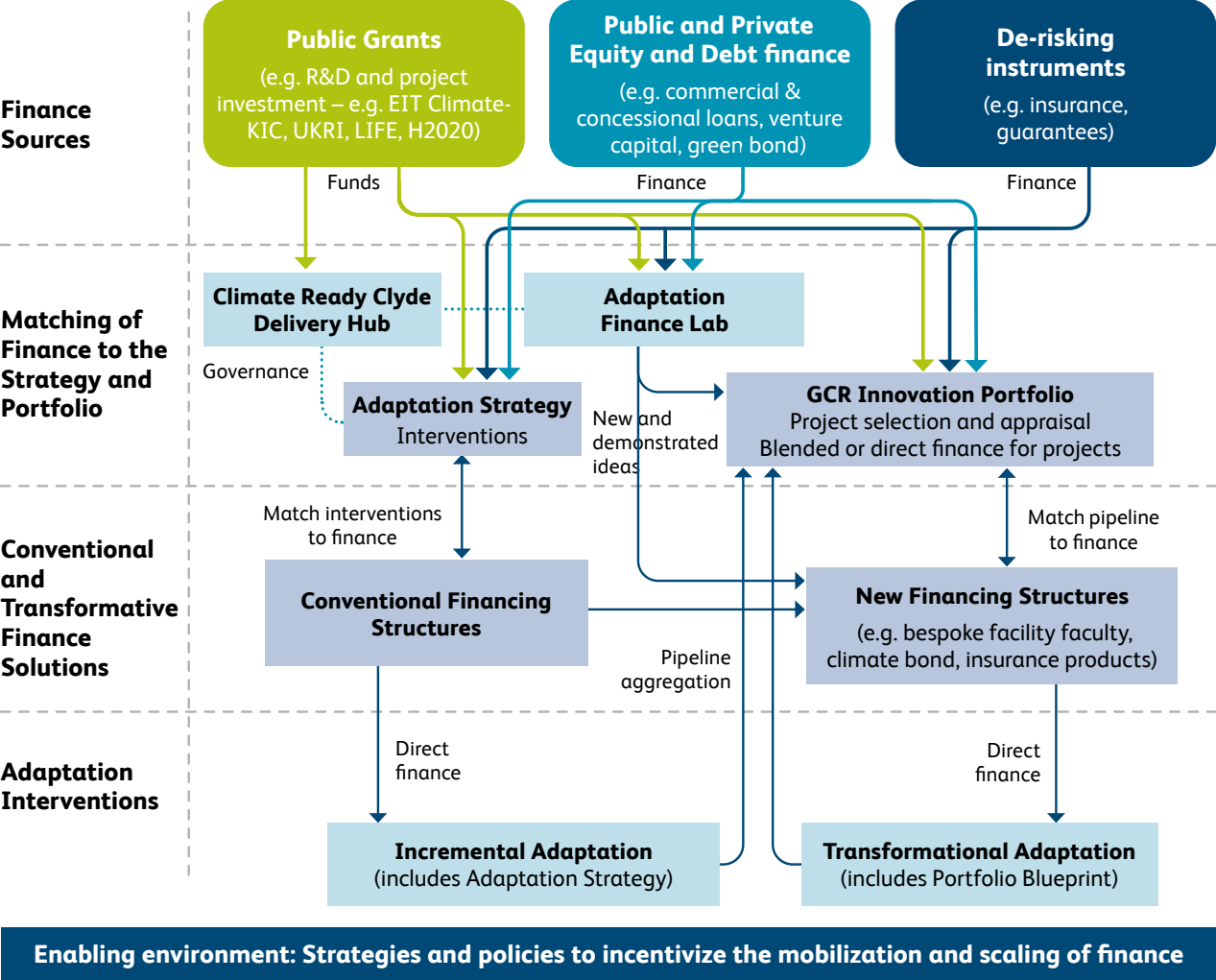


Figure 4: Delivery structure for adaptation, including transformative finance.



# Introduction, and background

## Introduction to the project

Resilient Regions: Clyde Rebuilt is a project seeking to catalyse a transformational approach to addressing the impacts of climate change in Glasgow City Region. It is led by Climate Ready Clyde, a regional climate initiative, with support from Sniffer, Creative Carbon Scotland, Paul Watkiss Associates and EIT Climate-KIC. The project is funded by Climate Ready Clyde's 15 members and Europe's leading climate innovation initiative, EIT Climate-KIC. The project developed Glasgow City Region's Adaptation Strategy and Action Plan and also a transformational adaptation Portfolio Blueprint. The project recognises that current incremental adaptation is not delivering at the scale and pace needed to address the climate challenge. This requires a new urgency and there is a need to consider more fundamental shifts to new approaches and systems.

The project has four key aims, which are to:

- develop a Theory of Change for Adaptation in the City Region
- develop Glasgow City Region's Adaptation Strategy and a transformative adaptation portfolio blueprint
- develop an adaptation solutions portfolio
- develop a portfolio of bankable projects and look to scale-up with potential investors.

One of the deliverables from the project (DEL06) is to develop a Resource Mobilisation Plan. This is an analysis of funding sources and mapping of pipeline propositions of potential investors/funders.

To support the deliverable, two background papers on climate adaptation finance were prepared. The first was a background review on adaptation finance sources and actors for Glasgow City Region. The second was a mapping of potential finance to the Adaptation Strategy and Innovation Portfolio. The content from these two papers have been brought together in this Resource Mobilisation Plan.

## Glasgow City Region and the Clyde

Glasgow City Region is home to one third of Scotland's population and its economy. It is defined by the basin of the great River Clyde and includes the commercial and cultural Glasgow city centre as well as surrounding post-industrial, suburban and rural areas. Clyde: Rebuilt is so named after the City Region's remarkable history of periods of transformation built upon innovation and world-renowned quality, including industrial, cultural and commercial waves of invention and re-invention.

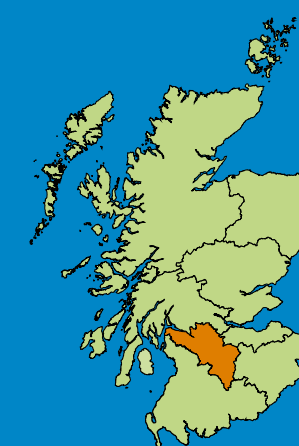


Figure 5. Glasgow City Region and the Clyde.

# Background

The current impacts of weather-related extremes, and the potential impacts of climate change, have been identified for Scotland in the UK Climate Change Risk Assessment<sup>7</sup> and at the regional level in Glasgow City Region's Climate Risk and Opportunity assessment (GCR-CROA)(Climate Ready Clyde 2018).<sup>8</sup> The GCR-CROA also estimated the potential economic costs of climate change in Glasgow City Region, estimating these could total hundreds of millions/year by mid-century. Whilst there are many risks from climate change in Glasgow City Region, the report also identified potential opportunities, which include economic benefits: these arise from the warmer climate and reduced costs on average (e.g. warmer temperatures and reduced winter heating, reduced frost days, etc).

At the national level, an initial response to challenges of climate change was set out in the second Scottish Climate Change Adaptation Programme (SCCAP) (Scottish Government 2019)<sup>9</sup>, which lays out proposals to adapt to climate change. At the local level, Glasgow City Region has developed a regional Adaptation Strategy and Action Plan as part of the Clyde Rebuilt project. A key success factor for the implementation of SCCAP and Glasgow City Region's Adaptation Strategy will be the availability of finance.

In August 2019, the Climate Emergency Response Group (CERG) launched a 12-point action plan in response to the Climate Emergency in Scotland (CERG 2019)<sup>10</sup>, which was adopted by the Scottish Government as part of its programme. More recently in July 2020, the CERG published its 'right policy packages' for Scotland's green recovery. It outlines priority areas and strategies, which includes unlocking private investment with greater policy certainty.<sup>11</sup> The previous year's Programme for Government had already put in place a 'Green New Deal', harnessing the power of the Scottish National Investment Bank (launched in 2020), a £3 billion Green Investment Portfolio and a Green Growth Accelerator – referred to by the CERG as a 'Green City Deal' – to attract green finance to Scotland, though to date it has predominantly focused on mitigation and Scotland's pathway to net-zero by 2045 (Scottish Government 2019).<sup>12</sup>

The Scottish Government's Programme for Government 2020–2021 sets out economy-wide actions for the long-term to address global challenges that Scotland faces from climate change (mitigation and adaptation) and Brexit. It provides further backing for the 'Green New Deal' (see above). New measures include committing £500 million for transformational infrastructure, £100 million for a green jobs fund and £150 million for flood defence.<sup>13</sup> However, most of these measures are mitigation focused and target the transition to net-zero by 2045, and the Green Recovery.

At the global level, finance flows for adaptation are increasing and were estimated at US\$30 billion/year in 2017–18 in developing countries, most of which was from the public sector (CPI 2019).<sup>14</sup> However, this is much lower than for mitigation, where global flows in developing countries are >\$500 billion/year and are dominated by the private sector. This reflects a number of differences in the ease of financing of mitigation

versus adaptation. As climate change impacts continue to accelerate, it also means there is likely to be a large gap between the adaptation finance needs and the available public finance, at the global, national and local level (UNEP 2018).<sup>15</sup> These same general findings also apply to OECD adaptation, including Scotland and Glasgow City Region, i.e. adaptation financing needs are large and will require additional sources to public finance, but securing this finance will be challenging.

What this means for Glasgow City Region is that whilst public sector funds are currently a primary source of financing for adaptation in the region, the mobilisation of other sources of finance, including private sector finance, households or other sources, through new financing structures is essential to increase the scale of available finance. This includes making a broader range of financing instruments accessible and predictable, as well as developing long-term financing solutions that are aligned to the different interests and requirements of the public and private sector.

The issues above provide the background to the adaptation finance work in Clyde Rebuilt and this Resource Mobilisation Plan. The document is set out as follows:

- method and approach used for the study
- findings of the background analysis of the adaptation finance landscape
- investigates the Interventions identified in Glasgow City Region's Adaptation Strategy and maps sources of finance for these
- looks at the potential for innovative finance, i.e. transformative adaptation finance, to help address the adaptation gap
- concludes with a set of possible finance options and the supporting enabling actions.

<sup>7</sup> UK Government (2017). UK Climate Change Risk Assessment

<sup>8</sup> Climate Ready Clyde (2018). Glasgow City Region Climate Risk and Opportunity Assessment (Glasgow City RegionCROA). <http://climatereadyclyde.org.uk/climate-risk-and-opportunity-assessment-for-glasgow-city-region-key-findings/>

<sup>9</sup> Scottish Government, 2019. Climate Ready Scotland: Second Scottish Climate Change Adaptation Programme

<sup>10</sup> The Climate Emergency Response Group (CERG) (2019). 12 immediate actions for Scotland's response to the Climate Emergency

<sup>11</sup> The Climate Emergency Response Group (CERG) (2020). Eight policy packages for Scotland's Green Recovery

<sup>12</sup> Scottish Government (2019). Protecting Scotland's Future: The Government's Programme for Scotland 2019-20

<sup>13</sup> Scottish Government (2019). Protecting Scotland's Future: The Government's Programme for Scotland 2020-21

<sup>14</sup> Climate Policy Initiative (2019). Global Landscape of Climate Finance 2019 [Barbara Buchner, Alex Clark, Angela Falconer, Rob Macquarie, Chavi Meattle, Rowena Tolentino, Cooper Wetherbee]. Climate Policy Initiative, London. Available at: <https://climatepolicyinitiative.org/publication/global-climate-finance-2019/>

<sup>15</sup> UNEP (2018). Adaptation Gap Report. Published by United Nations Environment Programme, Nairobi <https://www.unenvironment.org/resources/adaptation-gap-report>



# Method and Approach

A three-step approach was applied to prepare the Resource Mobilisation Plan for Glasgow City Region. This was based around a series of investigations, which are summarised below.



Figure 6: Approach

The analysis covered under each step are:

- 1. Background paper:** This involved a scan of the financing landscape (public and private sources of finance) for adaptation in the region, and an assessment of financing barriers to adaptation, including issues around the bankability of opportunities. Potential project typologies were then evaluated in a matrix against the existing finance sources. In addition, transferrable global examples of innovative financing mechanisms were sought and their potential transferability to the region considered. Interviews were held with key finance actors including from Scottish Government, including the teams involved with capital investment and green finance; financial institutions, including commercial banks and other institutional investors; and thinktanks, including organisations involved with innovation for climate change adaptation.
- 2. Mapping paper:** This undertook an assessment of the suitability of possible models to finance emerging themes for the Adaptation Strategy and Innovation Portfolio and included a definition of transformative finance. It brought this together with previous work on adaptation funding opportunities in Scotland and globally, to undertake a high-level mapping of potential financing sources to the strategy interventions. For the Innovation Portfolio, it also explored the potential use of innovative funding models that could be piloted.
- 3. Resource Mobilisation Plan:** This brings together key outcomes of the first two papers, aligned to emerging options for the portfolio.

# Adaptation Finance Landscape for Glasgow City Region

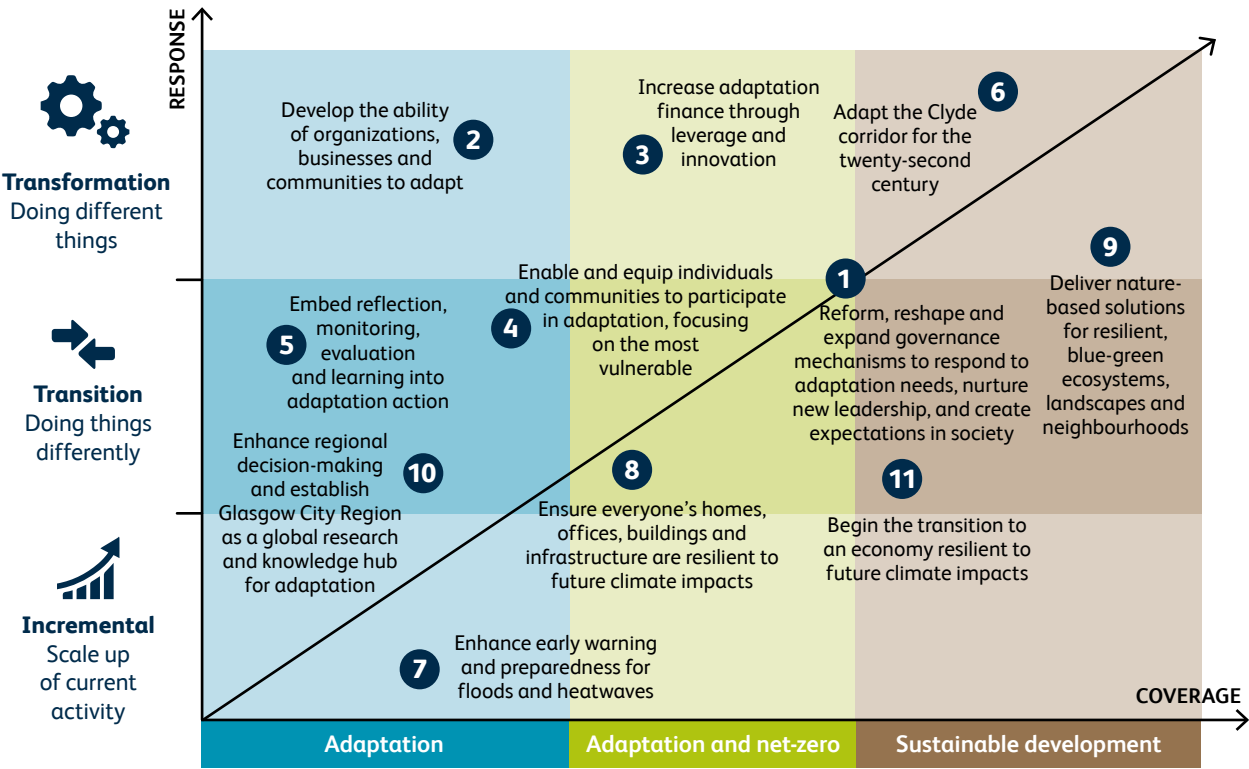


Figure 7. Spectrum of Glasgow City Region Adaptation Strategy Intervention areas.

As part of the Clyde Rebuilt project, Glasgow City Region’s Adaptation Strategy (2020–2030) has been produced (Climate Ready Clyde 2020).<sup>16</sup> The vision for this strategy is for a Glasgow City Region that flourishes in the future climate, i.e. that is climate ready.

The strategy sets out eleven Intervention areas, shown in Figure 7. This plots the Interventions in terms of the type of adaptation, from incremental to transformational (on the y-axis), and the coverage (on the x-axis), i.e. whether Interventions are focused only on adaptation, cover adaptation and mitigation, or deliver broader sustainable development. Some Interventions in the Strategy take a proactive but **incremental** approach to adaptation (bottom left of the figure). In such cases, the aim is to improve the climate resilience of existing systems and actions. This often involves mainstreaming climate change into policies, programmes and plans. In other areas, however, this incremental approach will not be sufficient to address the scale of future risks. In such cases, a different form of adaptation is needed, involving more **transformational** adaptation. These responses often overlap with wider transformations, such as the net-zero agenda and wider sustainable development in the Region. To complement and accelerate the Interventions in the Strategy and increase the pace and scale of change for adaptation, the Clyde Rebuilt project is employing systems thinking to develop larger-scale innovation.

Each of the eleven Interventions will require financing, but there is also a cross-cutting Intervention (3) on adaptation finance. The work in this paper – and the background and mapping papers – provides the context for this Intervention and sets out some key areas for focus as it will be taken forward.

The initial review of the climate landscape for Glasgow City Region found that public sector funds are the main source of financing for adaptation to date, primarily involving grant-based financing. However, to meet aspirations contained in the Glasgow City Region Adaptation Strategy, public funds will need to be scaled up and used in more strategic ways, including to mobilise private investments, and also new approaches or instruments for adaptation financing will be needed to move beyond the use of public funds.

Doing this requires the private, public and third sectors to be involved in a process of mobilising public and private resources for adaptation, including a broader range of financing instruments and models, as well as developing long-term financing solutions that are aligned to the different interests and requirements of the public and private sector.

Because of this, Clyde Rebuilt has identified adaptation finance as a problem space in its own right, that is, an area where there is a systemic challenge and innovation is needed. We term this **transformative finance**. This is taken forward in the Clyde Rebuilt Deep Demonstration work, as part of the Portfolio Blueprint.

Taken together, Glasgow City Region’s Adaptation Strategy requires resource mobilisation activities to deliver the financing of incremental and transformational adaptation, using both conventional and transformative adaptation financing approaches. This is shown in the matrix below (see Figure 8). All four areas are needed to deliver the Adaptation Strategy. This will include the bottom left-hand cell, i.e. to use public finance to test innovative actions, but also deliver public finance at scale. It also includes the innovation activities in the Clyde Rebuilt project and the Portfolio Blueprint, related to the position space of transformative finance, which is the focus of the right-hand column.

		Type of Finance	
		Conventional finance	Transformative finance
Type of Adaptation	Incremental adaptation	Public sector funds using grants, i.e. business as usual	New instruments or financing models to scale-up adaptation
	Transformational adaptation	Public sector funds for new innovative adaptation or delivering at scale	New instruments/ financing models for innovative and systemic adaptation

Figure 8. The Adaptation Finance Matrix (typology).

16 Climate Ready Clyde (2020). Glasgow City Region Climate Adaptation Strategy 2020-2030: Choosing to flourish in our future climate. Consultation draft. November 2020. Published by Climate Ready Clyde.



# Challenges to financing adaptation

Several studies have tried to emphasise the benefits of adaptation, including the Global Commission on Adaptation (GCA 2019)<sup>17</sup> and the concept of the triple dividend for disaster risk reduction which can also apply to adaptation (Tanner et al. 2016)<sup>18</sup>, i.e. avoided losses, economic benefits and social and environmental benefits. These studies highlight that adaptation can generate a high economic rate of return, with benefit-cost ratios ranging from 2:1 to 10:1, and in some cases even higher. However, these figures are based on the economic return, i.e. for society overall and include the environment and social benefits. This differs to the financial return, i.e. the return to an investor, and these are different (see Box 1 for details). This can mean that even with the longer-term horizon of an adaptation project, it can make sense from an economic perspective (for society overall) but is still not financially viable (in terms of the private return to an investor).

There is a large body of evidence that finds that in practical terms, adaptation financing faces very considerable challenges, especially when looking for private sector financing of adaptation (OECD 2015<sup>19</sup>, UNEP 2018). These challenges include:

- **Generating income streams.** Adaptation interventions do not always generate an obvious income stream for investors, as they often involve public goods (e.g. information provision, public flood defences) or non-market sectors (e.g. health, natural environment). These investments – and the benefits they generate – are relevant for a public sector project as they have high economic benefits, but they are often irrelevant for a private sector rate of return and generate lower financial benefits (see Box 1). Furthermore, many adaptation investments are a defensive expenditure, i.e. they reduce the risks of future damages from climate change and generate avoided losses. However, these are benefits as compared to a no-adaptation future (in which hazards will be worse), not to today's situation, and thus they may not seem as real to investors. These avoided damages do not align to obvious revenue streams and are different in nature to investments associated with goods or services.

## Box 1. What is the difference between economics and finance?

Economic analysis is used in government appraisal and is based on the principles of welfare economics, that is, how the government can improve social welfare or well-being (HMT 2018).<sup>20</sup> It is therefore carried out from the perspective of society and includes the economic valuation of non-market areas, such as environmental or social benefits. Government economic appraisal also accepts a lower rate of return and takes a longer-term perspective, when considering costs and benefits of a policy or investment.

Financial analysis is carried out from the perspective of the investor and it considers the incremental cash flows (revenues and costs) generated, to assess the ability of the project to generate incremental cash flows, recover the financial costs and generate profits. Financial analysis requires much higher returns and is therefore more short-term, as compared to public economic appraisal, and excludes non-market environmental or social benefits.

- **Mismatch in the timing of costs and benefits.** There is often a mismatch between the timing of an adaptation investment (and its cost), which in the short-term, versus the time when the benefits are delivered, which are in the medium- or long-term. This reduces the attractiveness of adaptation because investors prefer returns now rather than in the future (or to put it in another way, investments that yield returns in the future are less attractive). Similar issues arise because of the high uncertainty associated with future climate change and in turn the benefits of adaptation. A return on an adaptation investment may only arise under certain climate futures, not all futures, or the level of return may be different.
- **Information and project development barriers.** Assessing future climate impacts and adaptation benefits is challenging and requires considerable information. It often requires a highly technical analysis. This means information can be a constraint to investors and it also increases project risk (as well as feasibility and design costs). This affects the risk appetite for investors. Climate risks are also inherently local, which means there are often new contexts and site-specific aspects to address, which limit the use of easily replicable models.
- **Higher transaction or opportunity costs.** In some cases, adaptation involves large numbers of individual actors (households or landowners) and thus the transaction costs are higher than with a large single investment as for mitigation (e.g. a wind turbine farm). Further, some adaptation options involve quite high opportunity costs, i.e. the potential benefits an investor misses out when choosing one alternative over another. For example, the land used by nature-based solutions in a city may have a high opportunity cost when compared to housing development.
- **Competition for available public finance resources.** Mitigation and adaptation will rarely compete for available resources or finance with each other, but there is more chance that adaptation will compete against other public policies (e.g. health) (Watkiss et al. 2015)<sup>21</sup>, especially when mainstreaming, which may make it more difficult to deliver due to competing priorities.

These barriers mean that even public sector financing of adaptation is difficult, especially for long-term transformational adaptation, as the latter involves larger scale change and thus potentially higher costs. They also mean that private sector financing of adaptation is particularly challenging. This has led to a focus on the 'bankability' of adaptation interventions, i.e. their suitability for financing, especially those looking to involve the private sector. Aside from profitability, the bankability of adaptation interventions can be impacted by a number of factors such as risks to the project, compliance and liability concerns, and financial stability of entities involved in the project. Some of these factors are general to all project opportunities, but others, such as project risk, they are usually higher for adaptation projects. As a result, **adaptation interventions have been funded primarily by public sector grants to date** and focus on activities to deliver direct benefits (for example providing flood protection to an urban residential area).

This also means that adaptation financing is very different to mitigation. For mitigation, many investments involve substitution of existing goods or services in an existing market, e.g. low carbon instead of fossil fuel intensive electricity, electric cars rather than petrol. In these cases, consumers already participate in an established market and there are obvious revenue streams. As highlighted above, for adaptation there is often no existing market (e.g. flood resilience) and adaptation is rarely associated with an existing good or service that people are used to paying for. There are also a set of mitigation options that generate savings which make them attractive to investors. For example, energy efficiency can pay for itself through fuel savings. There are far fewer such options for adaptation.

<sup>17</sup> Global Commission on Adaptation (2019). Adapt Now. Available online at [www.gca.org](http://www.gca.org).

<sup>18</sup> Tanner, T., Surminski, S., Wilkinson, E., et al. (2015) The triple dividend of resilience: realising development goals through the multiple benefits of disaster risk management. Washington DC: GFDRR and ODI ([www.odi.org/publications/9599-triple-dividend-resilience-development-goalsmultiple-benefits-disaster-risk-management](http://www.odi.org/publications/9599-triple-dividend-resilience-development-goalsmultiple-benefits-disaster-risk-management))

<sup>19</sup> OECD (2015), Climate Change Risks and Adaptation: Linking Policy and Economics, OECD Publishing, Paris. <http://dx.doi.org/10.1787/9789264234611-en>

<sup>20</sup> HMT (2018). The Green Book: Central Government Guidance on Appraisal and Evaluation. [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/685903/The\\_Green\\_Book.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/685903/The_Green_Book.pdf)

<sup>21</sup> Watkiss, P., Benzie, M., and Klein, R. J. T. (2015). The complementarity and comparability of climate change adaptation and mitigation. WIREs Clim Change 2015, 6:541–557. doi: 10.1002/wcc.368

There are also a number of further issues that are relevant for resource mobilisation of adaptation finance in Glasgow City Region.

The first is over who pays for adaptation, not just who finances it. In most cases there are potential adaptation solutions that could be introduced to reduce future climate impacts. However, these have a cost. As discussed above, there is no silver bullet to get the private sector to pay for adaptation. It is possible for national or local government to pay for this adaptation, but this would put pressure on the public finances and thus may require increased taxes or charges, or else reduced investment in other public goods and services. These same issues apply if (municipal) resilience bonds are used to provide funds for investment in adaptation, or public-private partnerships (PPPs) are used, although these may help raise finance and spread the costs over time.

It is also possible to pass adaptation costs through to households. As an example, the Copenhagen Cloudburst scheme invests in adaptation, with the costs passed through to households in the form of increased water charges. This is an option, but it reduces household expenditure and disposable income, and relies on local residents or businesses being willing to pay. This may affect the political feasibility of financing mechanisms.

The second is a particular barrier for Glasgow City Region, which is associated with leaving the EU. Brexit means that Glasgow City Region will not have access to a range of EU funds for adaptation. Whilst the UK will retain access to Horizon 2020, it will forgo access to the European Investment Bank and grants from LIFE and the European Regional Development Fund. The UK Government has pledged to set up a 'Shared Prosperity Fund' that will replace ERDF. However, details of the fund have not yet been decided, and it may be the case that such replacement funds can substitute for only some of the EU funds previously accessed. In addition, the UK Government has not committed to a replacement for LIFE. These issues are important because public funds are crucial to adaptation finance solutions, especially at the demonstration and pre-commercial stages. However, there are positive solutions to address many of these challenges.

It is possible to focus on some types of early adaptation that are known to have higher economic and even financial positive returns. These would have very high applicability for the ten-year period of the Adaptation Strategy (2020–2030). This thinking has been developed in the UK Climate Change Risk Assessment (CCRA) (Warren et al. 2016)<sup>22</sup>, and has also considered in early adaptation work in Glasgow City Region (Watkiss et al. 2019).<sup>23</sup> This prioritises three types of early investment:

- **Options that address current climate risks, as well as building future resilience.** These are likely to have a high economic and even financial return because benefits arise immediately. They are often called 'no-regret' or 'low-regret' adaptation.
- **Including adaptation in near-term decisions that have long lifetimes, such as major infrastructure developments, in order to avoid 'lock-in'.** This can help focus priorities – and resources – to where early action is needed most.
- **Fast-track early adaptive management activities,** especially for decisions that have long lead times or involve major future change, including planning, monitoring and research. This provides the building block for longer-term transformational adaptation thinking and does not involve high cost in the short-term.

22 Warren, R., Watkiss, P., Wilby, R.L., Humphrey, K., Ranger, N., Betts, R., Lowe, J., and Watts, G. (2016) UK Climate Change Risk Assessment Evidence Report: Chapter 2, Approach and Context. Report prepared for the Adaptation Sub-Committee of the Committee on Climate Change, London.

23 Watkiss, P. and Hunt, A. (2019). Economic Implications of Climate Change for Glasgow City Region: Adaptation Report. Report from Paul Watkiss Associates to Climate Ready Clyde. July 2019.

At the same time, there is a focus on trying to build financing structures that can capture the direct monetary benefits and wider social and environmental outcomes, involving the participation of both the public and private sector. This includes the nonbank financial institutions (NBFIs)<sup>24</sup> (WB 2020)<sup>25</sup> providing products and services that banks either cannot or are not suited to offer. These NBFI products and services have the potential to deliver other savings, investment and risk management tools, for example products offered by the insurance sector in Scotland.

Finally, it is also worth highlighting that views on adaptation are changing. There has been a recognition that climate change is a financial risk, from the physical risk of climate change itself. This has been advanced by the Task Force on Climate-related Financial Disclosure (TCFD)<sup>26</sup>, established by the G20's Financial Stability Board, and through the Network for Greening the Financial System.<sup>27</sup> This is helping to raise awareness and the requirement for assessing and reporting climate risks by financial institutions and potentially in the future from companies.<sup>28</sup> In the UK, regulation by the Prudential Regulation Authority (PRA) has made disclosure of such risks mandatory for all banks, building societies and insurers by 2025 and this is beginning to trickle down into the wider private sector. This is likely to incentivise private sector action, mobilising new actors and associated funds.

Similarly, the public perception of adaptation is changing. The climate emergency has highlighted the risks of climate change and the need for action, on adaptation as well as mitigation. Recent surveys find a shift in perceptions among the British public towards greater concern and a general willingness to support steps to address climate change, i.e. public beliefs have altered over recent years (Steentjes et al. 2020).<sup>29</sup> In particular, the Scottish Household Survey finds that 8 out of 10 people believe climate change will impact in Scotland.<sup>30</sup>

24 NBFIs are financial institutions that do not have a full banking license and cannot accept deposits from the public.

25 <https://www.worldbank.org/en/publication/gfdr/gfdr-2016/background/nonbank-financial-institution>

26 <https://www.fsb-tcfd.org>

27 NGFS, 2019. Network for Greening the Financial System. A call for action Climate change as a source of financial risk April 2019. [https://www.banque-france.fr/sites/default/files/media/2019/04/17/ngfs\\_first\\_comprehensive\\_report\\_-\\_17042019\\_0.pdf](https://www.banque-france.fr/sites/default/files/media/2019/04/17/ngfs_first_comprehensive_report_-_17042019_0.pdf)

28 <https://www.bankofengland.co.uk/climate-change>

29 Steentjes, K. et al. (2020). British public perceptions of climate risk, adaptation options and resilience (RESIL RISK): Topline findings of a GB survey conducted in October 2019. Project Report. Cardiff: Cardiff University.

30 Scottish Government (2020) Scottish Household Survey 2019 Data Explorer <https://scotland.shinyapps.io/sg-scottish-household-survey-data-explorer/>

# Types of adaptation and financing opportunities

In looking at the bankability of adaptation, it is important to consider the different types of adaptation. As identified in the previous section, these include incremental versus transformational adaptation, and conventional versus transformative adaptation finance.

It is stressed that nearly all climate adaptation finance to date has invested in incremental adaptation, though there is increasing recognition that financing for transformative adaptation will be needed in future.<sup>31</sup> Investment in transformational adaptation is likely to require a higher risk appetite, more akin to speculative investment, and is likely to be more difficult to quantify the exact benefits stemming from such interventions. This will either mean a greater focus on public financing, or for the private sector, a likely chance of a greater return. For example, a transformational governance arrangement for land-use development, which integrates both the vertical (local-national) and horizontal (across departments, municipalities and stakeholders) levels, to align policy, regulation and market incentives, could avoid future development on flood plains. Such an intervention could be funded with public funds. However, given that such a system could result in avoided long-term costs to the insurance sector, it could also incentivise their financial participation in its implementation.<sup>32</sup>

There is also a further element of the adaptation finance typology that is worth reporting. This is about the approach to programming adaptation and the associated delivery mechanisms and governance. This can include:

- **Mainstreaming adaptation.** This involves integrating (mainstreaming) adaptation in existing policies, programmes, plans and investments. For example, ensuring new roads are climate resilient. This is sometimes called climate-proofing. In this case, adaptation is a secondary objective. Critically, these usually involve incremental amounts of finance on top of existing investments or sector budgets. In such as case, adaptation finance is only needed for the incremental activities (the additionality) associated with the programme or project; it does not generally involve the financing of the underlying investment.
- **Adaptation programming.** This is where a policy or investment is directly targeting climate risks, i.e. where adaptation is the primary objective. For example, a new coastal wall to address sea-level rise or a health adaptation policy for heat. In this case, adaptation finance is needed for the entire investment.

There are major differences in the way that these two modalities should be approached. The first involves an established decision context, governance and investment landscape, and so any finance must align to this existing structure. It also means that the adaptation finance only needs to cover the additional funds required for the climate proofing (which is likely to be a much smaller). The second provides much greater freedom for financial innovation. However, the downside is finance is needed for the entire project or programme.

31 <https://www.e3g.org/publications/the-european-investment-bank-becoming-eu-climate-bank/>

32 Though even here, the challenge is that the long-term rewards from such a governance system are difficult to quantify for the insurance sector, and even if quantified, there is a high risk that the rewards would not accrue.

# Mapping of existing funding and finance sources

The adaptation financing landscape in Scotland, and specifically for Glasgow City Region, is diverse but is dominated by grant-based public funding. The emergence of COVID-19 economic recovery packages, makes this landscape more dynamic and sensitive to fluctuations in the short- and medium-term, especially if initiatives to 'build back better' including 'green recovery'. The Clyde Rebuilt project has investigated these in the paper *Delivering a Green New Deal post-COVID-19 – Opportunities and priorities for a Glasgow City Region response* (Clyde ReBuilt 2020)<sup>33</sup>, and some have been included in Glasgow City Region's recent Economic Recovery Plan.<sup>34</sup>

As part of Clyde Rebuilt, existing sources of finance for Glasgow City Region were identified. The results find that the public sector forms the backbone of adaptation funding sources for the region, including from local authorities, other public bodies and agencies, as well as national government, UK government and the European Union. A table summarising these public sources of adaptation funding is presented in Annex A.

The sources of funding and finance are linked to relevant actors and financing instruments in Figure 9. Whilst these provide a large set of potential options for the portfolio priorities, financing the Innovation Portfolio for Glasgow City Region will also require the development and application of new financing mechanisms. As highlighted above, the bottom line is that most current adaptation interventions do not generate income, making it difficult to receive any financing offer from private sector financial institutions.

Even for those adaptation interventions that have a good financial business case, access to private sector finance is likely to be a challenge due to the large upfront costs, relatively long payback times and uncertainty related to climate impacts. Mainstream commercial banks are generally risk-averse and unlikely to invest in these opportunities. Nevertheless, some commercial banks have begun to align their financing with 'green principles'. For example, Barclays has announced that it will align all its financing activities with the Paris Agreement and target at least £100 billion of green financing by 2030.<sup>35</sup> It also plans to invest £175 million over the next five years in 'environmental innovation' through a new Sustainable Impact Capital Initiative.<sup>36</sup> Therefore, while they are beginning to focus on avoiding physical risks to their investments in line with TCFD, most direct lending is likely to be for mitigation. Other private sector investors such as equity providers including venture capital investors, impact investors and angel investors, retail investors and institutional investors do exist, however they face similar challenges to the larger commercial banks.

One key way forward is therefore to consider blended finance approaches where public sector grant funding is used to address investment risks, for example by subsidising private sector investment or used to make the residual investment profitable for the private sector.

33 Clyde ReBuilt (2020). Delivering a Green Recovery/Green New Deal Post-COVID-19: Opportunities and priorities for a Glasgow City Region response. Scoping paper by the Resilient Regions: Clyde Re:Built Project for Climate Ready Clyde. Available at <http://climatereadyclyde.org.uk/delivering-a-green-new-deal-post-covid-19-opportunities-and-priorities-for-a-glasgow-city-region-response/>

34 Glasgow City Region (2020) Recover, Rebuild, Renew: Glasgow City Region's Economic Recovery Plan in response to COVID-19. <http://www.glasgowcityregion.co.uk/CHttpHandler.ashx?id=26580&p=0>

35 <https://www.glasgowtimes.co.uk/news/viralnews/18344267.barclays-proposes-net-zero-climate-change-plan/>

36 <https://home.barclays/news/press-releases/2020/04/barclays-makes-first-investment-under-new-sustainable-impact-cap/>



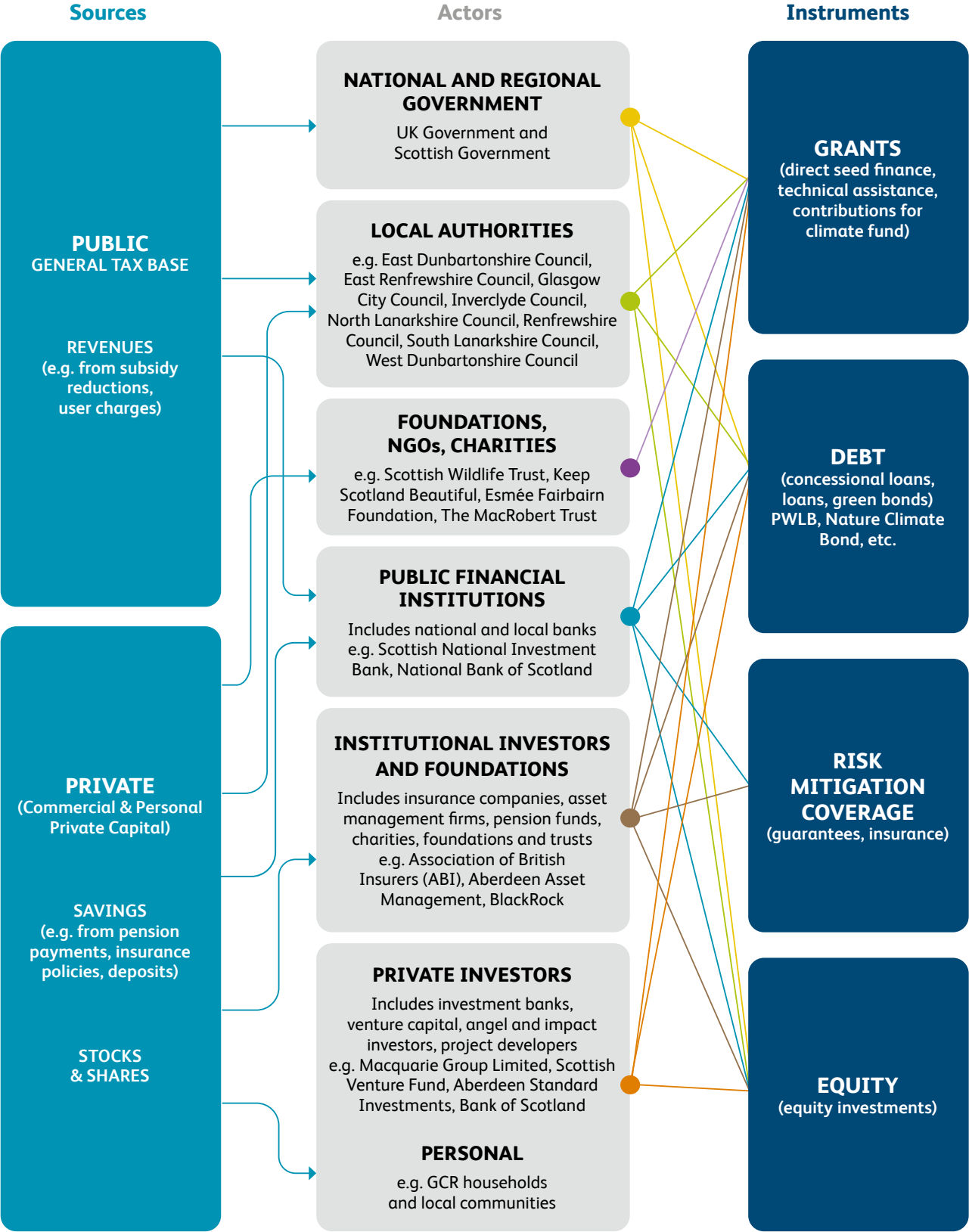


Figure 9. Mapping of existing sources of adaptation funding and finance for Glasgow City Region. Source: Adapted from CPI and CICERO, 2015

# Increasing the suitability of existing finance sources for adaptation

To succeed in mobilising the volume of finance required for adaptation measures in Glasgow City Region, a mix of financing instruments from various sources is needed. This will also require new approaches to fund more transformational interventions. To match this shift, the financing market will require a considerable degree of responsiveness to match investment demands.

As well as the general barriers to financing identified earlier, we have identified a number of additional local constraints at the city region level which might limit the ability to access funds, which need to be addressed:

Local Constraint	Methods for overcoming
<ul style="list-style-type: none"><li>Lack of credit rating for Glasgow City Region institutions, which could prohibit access to certain types of debt (e.g. bonds).</li></ul>	<ul style="list-style-type: none"><li>Glasgow City Council could obtain a credit rating for the city or on behalf of the wider City Region to allow access to long-term, large-scale, low-interest debt finance.</li></ul>
<ul style="list-style-type: none"><li>Uneven participation of the private sector, though there are many large national and multi-national companies in the region.</li></ul>	<ul style="list-style-type: none"><li>Become a TCFD supporter city, undertake analysis of key firms covered by PRA/Bank of England responsibilities and prioritise engagement.</li></ul>
<ul style="list-style-type: none"><li>Uncertainty around the impact on insurance affordability for housing markets post the expected withdrawal of Flood Re in 2039 and return to fully risk reflective pricing.<sup>37</sup></li></ul>	<ul style="list-style-type: none"><li>Continue to engage with Flood Re and ABI on insurance provider participation on adaptation action.</li></ul>

Table 1. Local constraints to adaptation finance and suggested solutions.

New, non-conventional financing instruments can also help overcome the general barriers to adaptation, as well as helping to address possible local constraints. The focus is likely to be on the use of public funds to address investment risks and crowd in private sector finance. There could also be opportunities within Glasgow City Region Portfolio which could be enablers of integrated action: for example nature-based solutions, which might offer possibilities to package adaptation interventions together to deliver a more transformative adaptation shift.

There are also ways to overcome investment constraints by developing new ways to structure the financing. One option is to combine mitigation-based revenue streams with longer-term adaptation outcomes. For example, the first wind turbines to be built on dykes are being erected near Eemshaven in the Netherlands. The dykes are the primary flood defences for the area. Wind power operators pay usage fees for their plants, contributing financially to the maintenance of the dykes. Another way could be to take a ‘cookie cutter’ approach to bundling adaptation project opportunities, which uses the same approach several times. This would work on the principle of reducing risks, and achieving scale, as the project was replicated, and has successfully been deployed in Greater Manchester, UK.<sup>38</sup> However, one downside of such an approach is that

<sup>37</sup> Scotland’s Living with Flooding Action Plan is starting to prepare for the transition from Flood Re with insurance companies and Flood Re involved with the Property Flood Resilience Delivery Group (Scottish Government, 2019b).  
<sup>38</sup> BITC (2019) Water Resilient Cities: The business case for investing in water resilience in Greater Manchester <https://www.bitc.org.uk/report/water-resilient-cities-the-business-case-for-investing-in-water-resilience-in-greater-manchester/>

not enough attention is paid to individual differences. Therefore, this approach would only work for highly transferable bundles, i.e. within Glasgow City Region where there were similar risk profiles and where there was enough regulatory certainty for replication. Providing public subsidies as part of the financing structure for such opportunities, especially for the first application, could be a way to make adaptation projects more financially viable.

At the same time, transformational adaptation interventions are likely to require funding through an innovation cycle, which is likely to require public funding (as is typical for innovation and demonstration steps). Support for such cycles in other sectors in the UK are well developed, with government providing public funding to de-risk investments to the point where the private sector, will begin to invest. Funding for adaptation innovation is perhaps more widespread in Europe, through both the Horizon 2020 and Horizon Europe programmes, but also through the Urban Innovation Actions – a stream of funding focusing on financing innovative, risky projects with the aim of developing them to commercialisation. There is UK funding in this area, such as through the research councils and UK Research and Innovation (UKRI), but there is likely to be increased demand for such activities post Brexit, and there will be a need to highlight the strategic need to include innovation for adaptation (and adaptation financing).

There is also need for a more commercial approach in the region, where public funds are used to create mechanisms to either raise additional adaptation finance or to increase private sector investment. The type of mechanism used will depend on the intervention and the opportunity. Where public funds are used directly, there may be more strategic value in channelling them towards, for example, early-stage innovation and demonstration, and to de-risk investments for the private sector.

# Framing of Adaptation Finance for Clyde Rebuilt

# Categorising finance needs for the Adaptation Strategy and Innovation Portfolio

This section looks at adaptation action in practice for Glasgow City Region, i.e. how to finance the Interventions in the Adaptation Strategy and the Portfolio Blueprint. This draws on the Clyde Rebuilt background finance papers and the Clyde Rebuilt literature review synthesis on what transformational adaptation looks like (Watkiss and Cimato 2020).<sup>39</sup> As a first step to mobilising resources for the Adaptation Strategy and Innovation Portfolio, Clyde Rebuilt has developed a matrix to categorise the adaptation and investment approaches, including incentivising transformational adaptation and transformative finance. This will serve to inform financing approaches for the Innovation Portfolio as well as help owners of actions in the forthcoming action plan to identify, explore and develop the funding and finance approaches needed.

## Using conventional finance for incremental adaptation

		Type of Finance	
		Conventional finance	Transformative finance
Type of Adaptation	Incremental adaptation	Public sector funds using grants, i.e. business as usual	
	Transformational adaptation		

The Adaptation Strategy involves a wide range of Interventions, with different levels of ambition, and some of these will be incremental in nature, and can best be taken forward with conventional public finance. These provide key foundational activities and are essential to address conventional hazards and build the foundation for subsequent more ambitious actions.

A good example in the Adaptation Strategy is the introduction of a Heat-Health Watch Service (HHWS) (PHE 2018)<sup>40</sup>, which would build on the existing model in England. This is focused on the provision of information (a public good) and actions by healthcare professionals (non-market sector) and thus this incremental action is best taken forward through a conventional grant-financed model.

39 Watkiss, P and Cimato, F (2020). What does transformational adaptation look like? Deliverable 10 of the Clyde ReBuilt project, Published by Climate Ready Clyde, Glasgow, 2020. Published by Clyde ReBuilt, Available at <http://climatereadyclyde.org.uk/literature-review-what-does-transformation-look-like/>

40 PHE/NHS England (2018). Heatwave plan for England. Protecting health and reducing harm from severe heat and heatwaves. Public Health England, NHS England, The Met Office and Local Government Association. <https://www.gov.uk/government/publications/heatwave-plan-for-england>.

## Using conventional finance for transformational adaptation

		Type of Finance	
		Conventional finance	Transformative finance
Type of Adaptation	Incremental adaptation		
	Transformational adaptation	Public sector funds for new innovative adaptation or delivering at scale	

The Clyde Rebuilt literature review identifies that transformational adaptation often involves a change in governance. There will be a need to use public finance to fund new governance arrangements (noting some of these may, in turn, help to incentivise private sector adaptation). As an example, this might include a new multi-agency land use planning unit to ensure climate resilient development in the region from land use allocation to receiving planning permission.

There will also be a need to use public finance to fund the innovation cycle for more transformational adaptation, e.g. for moving from research to demonstration for promising new adaptation solutions.

Alongside this, the literature review identifies that transformational adaptation is associated with implementation at scale and ideally at the system-level. There will be a need to deliver higher levels of public finance for adaptation. This might, for example, include a (green) resilience bond to raise the finance for delivering at scale.



Using transformative finance for incremental adaptation

		Type of Finance	
		Conventional finance	Transformative finance
Type of Adaptation	Incremental adaptation		New instruments or financing models to scale-up adaptation
	Transformational adaptation		

The second focus area is to develop new ways of financing adaptation, in particular to bring a stronger commercial perspective and leverage in private sector financing. Many of these are looking at the recent successes in the mitigation domain and seeing whether these are also transferable to adaptation. However, recognising that adaptation involves additional challenges for the private sector, it will need to go beyond this.

An example of such thinking is included in the recent World Bank transformative climate finance paper (World Bank 2020)<sup>41</sup>. This outlines eight barriers that restrain climate resilient development, and that if addressed, could unlock substantial additional spending from private and government sources.

In practical terms, this could include (WB 2020) the use of policy-based finance, which includes activities that help the enabling policy environment (such as subsidies to support adaptation interventions) at the same time as providing project-based lending. It could also include new financial instruments, such as results-based finance, equity finance and guarantees. It also means targeting available finance to areas that have the greatest potential to leverage additional funds from other sources. Alongside this, it can include funding of information and knowledge (public goods) that can address the market barrier of information, e.g. better risk information, to help the private sector to plan.

Similar calls have been made in respect to the European Investment Bank (EIB) as it transitions to becoming the EU’s Climate Bank, with a recent report by E3G (2020) highlighting that the bank should invest strategically to provide transformational impact at a systems level, as well as scaling.<sup>42</sup> While the mitigation domain is very different, there are also some potential lessons. In a study by the World Resources Institute (WRI 2014), transformational climate finance for low carbon energy development (mitigation) was considered, by assessing twenty case studies. It was concluded that finance is transformational in those cases where finance was used for ‘path-breaking’ development i.e. where there was a non-linear growth in renewable energy or energy efficiency, or where successes were scaled up and replicated.<sup>43</sup>

41 World Bank Group. 2020. Transformative Climate Finance: A New Approach for Climate Finance to Achieve Low-Carbon Resilient Development in Developing Countries. World Bank, Washington, DC. © World Bank.  
42 E3G (2020) EIB Becoming the EU Climate Bank [https://www.e3g.org/wp-content/uploads/09\\_07\\_20\\_E3G-EIB-Becoming-EU-Climate-Bank-report.pdf](https://www.e3g.org/wp-content/uploads/09_07_20_E3G-EIB-Becoming-EU-Climate-Bank-report.pdf)  
43 World Resources Institute (2014). Transformational Climate Finance: An Exploration of Low-Carbon Energy. by Michael I. Westphal and Joe Thwaites.

Using transformative finance for transformational adaptation

		Type of Finance	
		Conventional finance	Transformative finance
Type of Adaptation	Incremental adaptation		
	Transformational adaptation		New instruments/ financing models for innovative and systemic adaptation

The final focus area is the most ambitious. It involves doing some different things – both in terms of the type of adaptation and the type of finance. This is being promoted with an EIT Climate-KIC initiative (and white paper) on Transformation Capital (Hofstetter 2020).<sup>44</sup> This argues that the current financial system is flawed, in terms of its methods and allocation of capital, and will not be able to address the deep systemic change needed to address the climate challenge.

This is because the current financial system has a narrow notion of value, constraining financial mathematics, and a low sense of responsibility over social outcomes. The paper also concludes that sustainable finance initiatives (SFIs), while positive, can only deliver incremental change, because they act to preserve the structural fabric of capital markets, and thus existing financial orthodoxy and current wealth preservation. It concludes a radically new approach is needed: more details are presented in Box 2.

This involves investing with the explicit aim of systems transformation, deploying capital from a different perspective. This will involve different methods, structures, capabilities and decision-making frameworks. However, while this ambitious call for action would address the barriers to societal transformation, the question is on how to deliver such radical change in practice. This is particularly important as transformational adaptation solutions may significantly affect the bankability of adaptation interventions by amplifying some of the general challenges mentioned earlier on financing adaptation.

The initiative is covering a number of areas: around the circular economy, the just transition, clean and health cities, and net-zero, but it has not yet undertaken a deep dive into adaptation and resilience. It is possible that Glasgow City Region could therefore be a prototype for this area.

44 Hofstetter, D (2020). Transformation Capital – Systemic Investing for Sustainability. EIT Climate-KIC White Paper. Published by EIT Climate-KIC, August 2020. <https://www.climate-kic.org/programmes/transformation-capital/>

Box 2. Transformation Capital.

Transformation Capital (Hofstetter 2020) is an approach that seeks a new way for the deployment of capital for the purpose of catalysing sustainability transitions, at the same time as generating commensurate financial returns. It is defined as ‘an investment logic intending to deploy capital to catalyse directional transformative change of socio-technical systems to build low-carbon, climate-resilient, just and inclusive societies’. It moves beyond a focus on individual project investments (e.g. adaptation projects) to use systems thinking and sensemaking, in line with the EIT Climate KIC Deep Demonstrations method.

The Transformation Capital Initiative (TCI) – an EIT Climate-KIC initiative – sets out to develop, test and scale this type of systemic investment approach and build a pipeline of investment opportunities at the multi-billion-dollar scale. It is a vehicle for putting a wide range of theories and innovations into practice at all stages of the investment process. This will include new tools and methods, centred around a new design space shown in Figure 10 below.

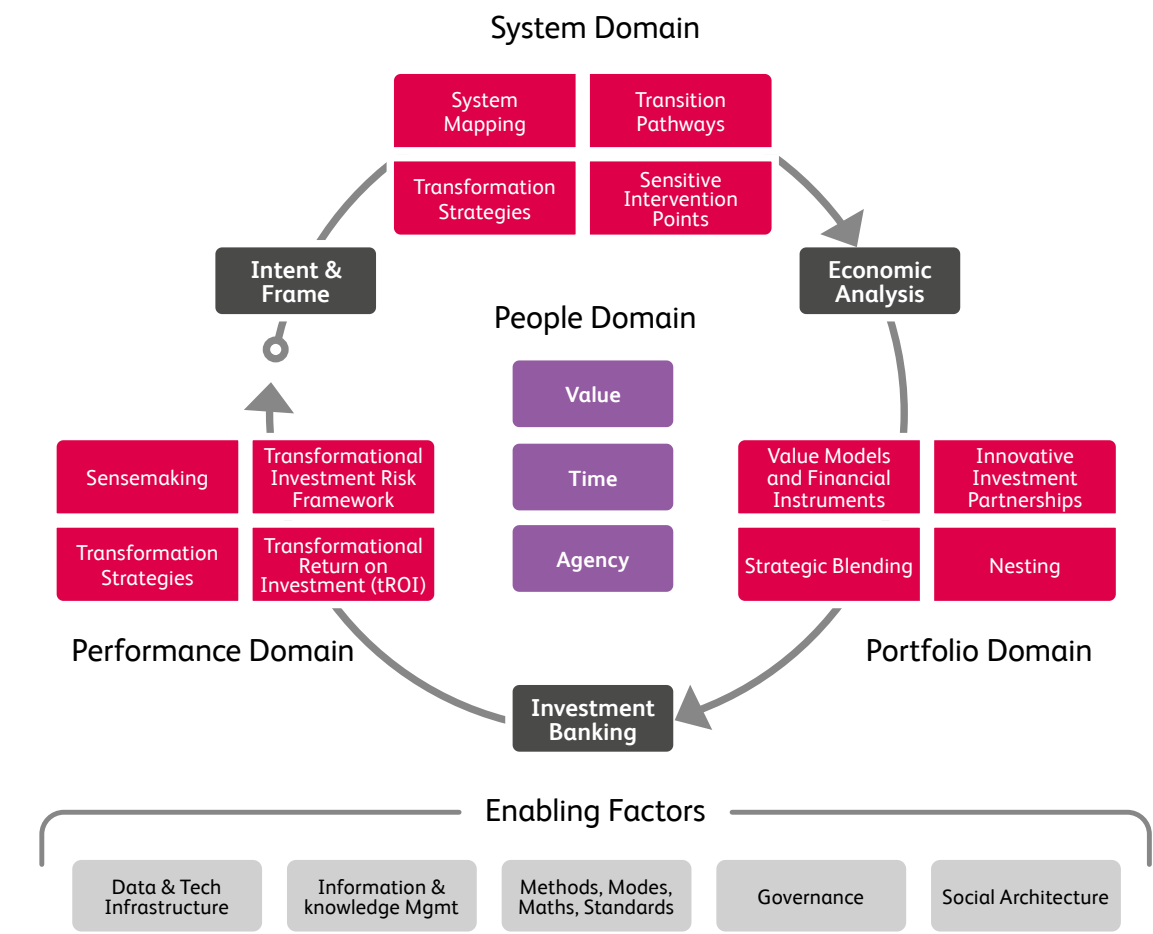


Figure 10. Transformation Capital Design Space (Source Hofstetter 2020).

Mapping the adaptation finance for the draft Adaptation Strategy

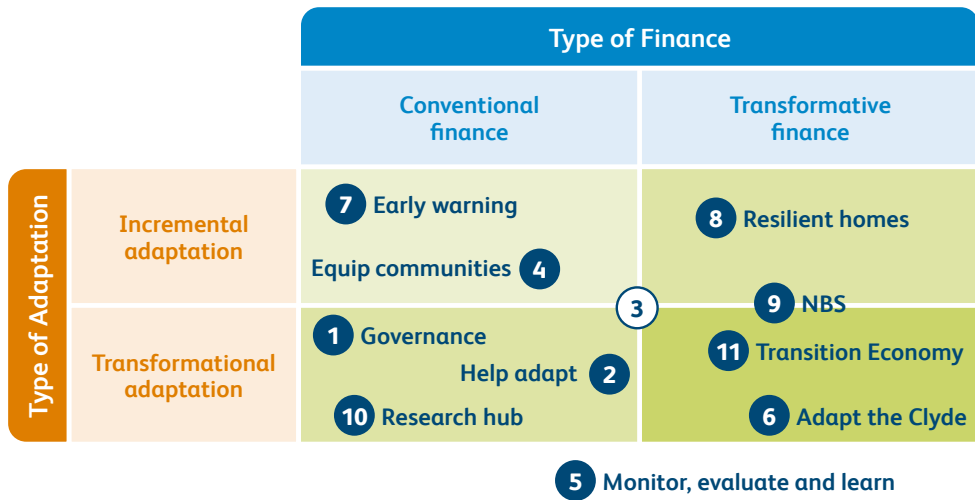


Figure 11. Mapping the Interventions of the Adaptation Strategy to the finance typology.

The eleven Interventions in the Adaptation Strategy are mapped to the different finance categories in Figure 11. It is stressed that in many cases, the Interventions are likely to involve a mix of adaptation finance types. The figure therefore plots the main focus for adaptation, but we highlight that there is considerable scope to go beyond these initial categorisations, especially with more innovative ideas for both adaptation interventions and their financing.

Some examples for each of the four areas of adaptation financing are shown below in Table 2.

Type of adaptation	Type of finance	
	Conventional finance	Transformative finance
Incremental adaptation	<ul style="list-style-type: none"><li>Public funded flood defence</li><li>Grant and/or concessional debt for nature-based solutions project</li></ul>	<ul style="list-style-type: none"><li>Blended project finance (public and private) for green infrastructure</li><li>Crowdfunding or new insurance for investment in flood defence</li></ul>
Transformational adaptation	<ul style="list-style-type: none"><li>New Shared Adaptation Planning Unit using shared public finance (governance)</li><li>Grant for innovation and demonstration of solutions</li><li>Major resilience bond for the region (scale)</li></ul>	<ul style="list-style-type: none"><li>System (regional) green densification strategy using blended finance</li><li>Green bond and public private partnerships for long-term Clyde corridor investment</li></ul>

Table 2. Examples for the Clyde Rebuilt adaptation finance typology.

# Priorities for conventional funding of transformational adaptation

There will be a need to deploy conventional finance for transformational adaptation and to scale up the level of incremental adaptation. This needs to target some of the barriers to adaptation (as identified in the Clyde Rebuilt transformational adaptation literature review), including various market and policy failures.

		Type of Finance	
		Conventional finance	Transformative finance
Type of Adaptation	Incremental adaptation		
	Transformational adaptation	Public sector funds for new innovative adaptation or delivering at scale	

The focus is on using public funds in specific ways:

- **To fund areas that are unsuitable for private sector finance or blended models.** There is a strong case for using public money for certain types of adaptation, notably where it is investing in information gaps and certain types of public goods investments. While some of these will be associated with incremental adaptation, some low-cost actions (and high benefits) could underpin transformational actions.
- **Creating the enabling environment for transformational adaptation.** There is also some need to create the enabling environment for adaptation that will require public investment, notably with the funding for the governance arrangements. These are low cost, but will require public funds, although this could use new models where finance is crowded in.
- **To provide public research, innovation and demonstration funding.** There is a well-established role for public finance to reduce the risks of innovative solutions. This is likely to be a continued focus for transformational adaptation solutions, although the potential for some innovative approaches with private finance are also a possibility.

Regarding the last point, support for innovation cycles in other sectors in the UK are well developed, with both UK and Scottish Governments providing public funding to de-risk investments to the point where the private sector, with varying degrees of risk appetite, will begin to invest. Such work is beginning to take place in Europe for adaptation, through both the Horizon 2020 and Horizon Europe programmes, but also the creation of Urban Innovation Actions – a stream of funding focusing on financing innovative, risky projects with the aim of developing them to commercialisation. Whilst the UK is prioritising research into climate mitigation following departure from the European Union, **no such parallel innovation process for climate resilience currently exists in the UK and this is highlighted as a strategic gap for the UK to close its adaptation gap.** These funds can also transfer through to innovative blended finance approaches.

Alongside this, **there may be the need to raise considerable public funds longer term, to fully address the scale of risks.** The transformational aspect here is on the scale of finance raised. This could, for example, involve new government funding similar to the City Deal in Glasgow City Region. The City Deal has involved over £1 billion investment for Glasgow City Region, with grant funding provided by the UK and Scottish Governments, with additional borrowing by local authorities.

**There could also the potential to raise finance through some form of resilience bond** (e.g. similar to a municipal bond), or to borrow from the European Investment Bank (or what will replace it in the finance landscape for Scotland and the broader UK) for a large urban resilience investment.

**There could also be opportunities to use utilities and market regulation/regulators to deliver adaptation at scale.** For example, in England, water companies are including adaptation in their 25-year Water Resources Management Plans (WRMPs), and many companies are including new measures to address risks, though these are ultimately passed back to customers in the price paid for water supply and treatment. A similar type of approach has been used in the Copenhagen Cloudburst scheme for flood management. Some further work to map the utility space and opportunities for Scotland, and thus for Glasgow City Region, is a priority, as this could be one way for large-scale adaptation revenue and delivery.

Finally, **there is the potential to deliver more system level adaptation through standards, especially for infrastructure.** This would then flow through to existing projects and financing levels. The best example is the use of climate uplifts in road design standards, which would then integrate climate into the project financing of all road projects. Similar opportunities exist for building codes and standards. These are again a potential focus area, although most standards are set at the national/UK level, and thus there is a need to discuss with the Scottish Government, though there may also be some potential to set standards and requirements in Glasgow City Region and broader public sector procurement policy.



# Priorities for transformative finance

While there is much that public finance can achieve, as highlighted above, there is a need to involve the private sector to address the size of the adaptation gap. This will require new instruments and approaches. Such transformative adaptation finance for Glasgow City Region aims to mobilise new finance, to develop innovative blended finance models, and create the enabling environments for both incremental and transformational and adaptation action.

The focus should be on using limited public funds more strategically to leverage private sector financing by:

- **Using a systems-based approach.** Widening the scope of existing adaptation interventions to address climate risks and impacts from a cross-sectoral perspective, allowing for more effective use of public funds to increase entry points for private sector investments.
- **Incorporating a broader set of financing options.** Moving away from the dominant grant-based funding for adaptation to consider other types of financing instruments including payment by results finance and de-risking instruments with a wider range of guarantees and insurance products.
- **Aligning with Scotland's 2045 net-zero emissions target.** Ensure that mitigation and adaptation finance are balanced and seek integrated solutions in financing where possible.
- **Considering digital solutions.** Linked to the discussion in the previous section, to bridge the information gap for adaptation by promoting the use of climate impact and vulnerability maps, systems such as GIS to overlay different sets of information across sectors, and models for long-term scenario simulation and planning, early warning technologies, spatial planning at a local level, etc. that will make it easier for the private sector and households to adapt.

While all of these have potential, the key focus for transformative finance for adaptation is to consider which options have revenue streams and which do not, with the spectrum of financing options that covers:

- adaptation interventions that are commercial
- adaptation interventions that have some commercial elements (or that can be tied to a larger commercial package, e.g. mitigation revenue streams)
- adaptation interventions that are purely public goods or in non-market sectors.

Therefore, two critical priorities are emerging to enable transformative finance. The first is the need to identify new sources of finance and to ensure that public funds are used tactically to attract private sector financing. This leverage effect will ensure that investments are effectively used but also sustainable. The second is to apply a systems approach to develop more transformational adaptation and really looks at doing different thing with different financial models. These two priorities are further discussed below.

**1. Identify new sources of finance and apply innovative blended finance models to leverage public funds.** By bringing in innovation into the design of adaptation interventions, including systems-thinking, Clyde Rebuilt can sieve out those adaptation opportunities that have accessible revenue streams with potential to attract private sector investments. This allows public sector funds used for adaptation to be spent more effectively to either lever in private finance or focus on adaptation interventions that do not present commercial opportunities.

As highlighted above, the Adaptation Strategy is combining incremental and transformational adaptation actions and there is a similar range of finance from existing to transformative. Figure 12 plots the type of financial approaches and instruments from current to transformative finance. Those towards the bottom left are more conventional – those towards the top right are more innovative.

Aside from new, non-conventional financing instruments to help overcome adaptation constraints and bring in private investments, grant based public finance for the early stages of innovation is essential. As highlighted in the previous section transformational adaptation interventions are most likely to go through an innovation cycle which requires public funding requirements.

**2. Package adaptation interventions as part of a broader set of initiatives, such as placemaking, allowing for participation from across the social network.** As mentioned above, most existing adaptation interventions do not generate income, making it difficult to receive any financing offer from private sector financial institutions. This may mean that adaptation investments need to be framed more as placemaking or other such initiatives, and 'sold' for adaptation on the co-benefits they deliver. This could also, for example, include the mitigation and recreational benefits of nature-based solutions. There is also the need to think differently, perhaps moving from a consideration of climate change as only a negative, to consider the positive opportunities, e.g. associated with some reductions in current costs (e.g. winter heating) and look to identify potential transfers to help finance adaptation.

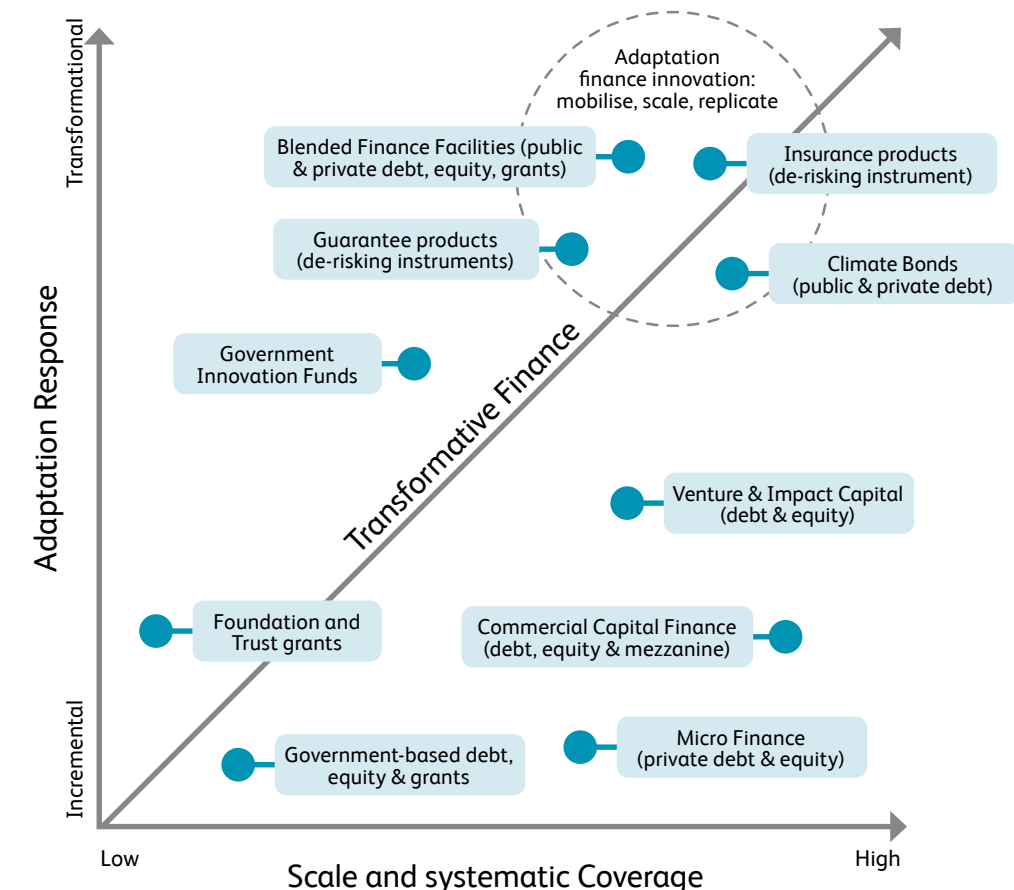


Figure 12. From current to transformative finance.

# Applying system thinking and identifying the system (and actors) for transformative finance

The EIT Climate-KIC Deep Demonstrations method seeks to apply system thinking. This has been applied to the transformative finance space for adaptation. To do this, public, private and third sector actors need to be identified and then actions taken to encourage them to interact and co-design financing solutions for adaptation. This may involve solutions that are embedded within existing frameworks – or it may require new ones.

In this context, the first action was to identify the system and to explore possible intervention points that could lead to systemic change for transformative finance. This requires understanding the perspectives of the human actors in the system and the governance arrangements around decisions (see Watkiss and Cimato 2020). A common tool for this is Social Network Analysis. This analyses social networks and institutional actors (organisations, individuals, interest groups, etc.) and their linkages (relationships) (Bharwani et al. 2013).<sup>45</sup> It can be subsequently used to explore socio-institutional processes, governance, etc., and help in identifying governance regimes or changes that can deliver more holistic and transformational solutions.

An initial social network map for finance in Glasgow City Region was developed, shown below. This draws out the potential interaction between public, private and third sector actors to finance adaptation. The closer the actor to the centre, the greater their role in adaptation finance and the greater likely ease of finance. This map is useful to understand which actors already play a strong role in financing adaptation and which ones need to be provided with incentives and enabling environments to encourage their participation. This could be an effective way to tease out combined mitigation-adaptation approaches to finance climate action or blending finance. Various initiatives have been recently launched and have been identified in the wider mapping work, e.g. the SEPA and Scottish Wildlife Trust in their £1 billion Challenge: these provide suggestions for a range of innovative financing. These could also provide existing initiatives to link to the Innovation Portfolio and Adaptation Strategy.

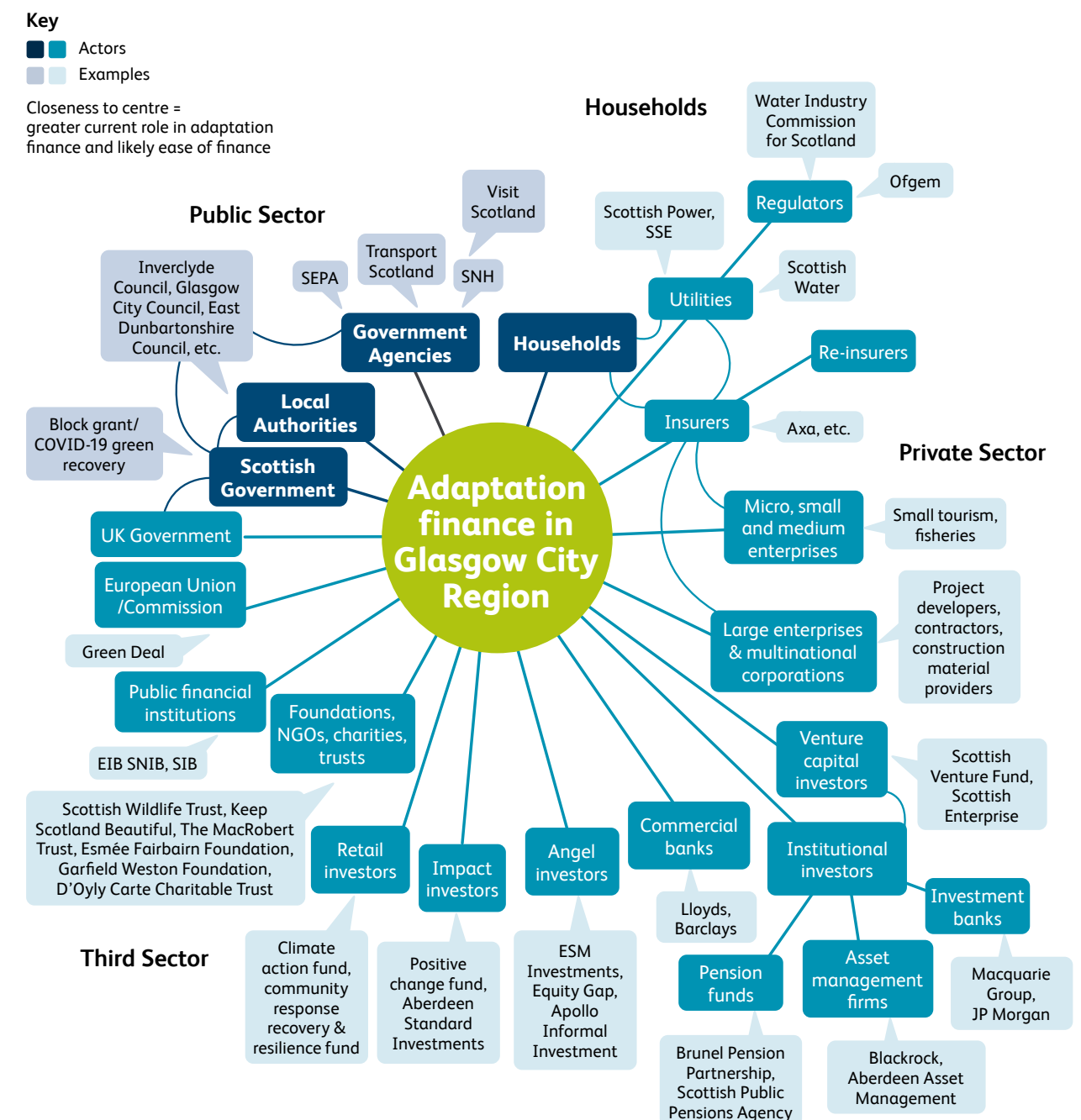


Figure 13. Adaptation Finance Social Network Map for Glasgow City Region.

<sup>45</sup> Bharwani, S., Downing, T.E., Varela-Ortega, C., Blanco, I., Esteve, P., Carmona, G., Taylor R., Devisscher, T., Coll Besa, M. Tainio, A., Ballard, D. and Watkiss, P. (2013). Social Network Analysis: Decision Support Methods for Adaptation, MEDIATION Project, Briefing Note 8.

# Delivery approach for mobilising resources

The analysis above has been used to develop an indicative delivery structure for mobilising the funds needed for the Innovation Portfolio and Adaptation Strategy, shown in Figure 14. The approach sets out the sources of potential finance at the top and then shows how they could be matched with the Interventions in the Adaptation Strategy – including more innovative elements that will be taken forward in the Portfolio Blueprint – to current and innovative finance. Glasgow City Region’s Innovation Portfolio will comprise of both transformational and incremental adaptation interventions. To support delivery, appropriate financing mechanisms will be put in place, including more targeted use of public funds. This may involve reallocating government-based capital into adaptation solutions. However, this can only work if there is a supply of effective and desirable investment opportunities. The use of innovative capital market instruments like green bonds (fixed income securities) can raise substantial amounts of capital for greener adaptation-based solutions by providing access to longer term capital. A blended finance approach could help bridge the gap between providers of capital and green assets (including nature-based ones), support governments to raise finance for projects to meet climate targets, and enable private investors to achieve sustainability and objectives related to the Task Force on Climate Related Disclosures.

The integrated finance approach will address the barriers and challenges identified earlier in this document, i.e. the lack of public funds, the need for blended finance and de-risking solutions, the required enabling environment for adaptation financing.

In effect, we are proposing the use of an integrated financing approach that shifts away from the traditional silo approach to financing. The intention is to use existing financial instruments in a complementary manner with more targeted financing solutions, including blended finance. This structure has considerable strengths in that it allows the region to cross-subsidise between new financing structures and use traditional adaptation finance for the Strategy and the Innovation Portfolio to help accelerate action. To help deliver this, there will be investment in the enabling environment, i.e. the supporting strategies and policies for the mobilisation and scaling of finance.

Alongside the possible portfolio offerings, there is a need to develop finance and governance architectures. This will act as an enabler of the Adaptation Strategy and Innovation Portfolio implementation, and for the finance component on this, we propose an Adaptation Finance Lab for Glasgow City Region. A broader Climate Ready Clyde Governance Hub has been discussed, which would connect with the lab. Specifics on the Climate Ready Clyde Hub are yet to be decided.

The Adaptation Finance Lab would have two roles. First, it would seek to identify and help coordinate governance across institutions. For example, to deploy the right vehicle – and right organisations – for delivering investments. In some cases, existing Glasgow City Region governance may be sufficient, whilst in others, separate legal entities such as special purpose vehicles may be required. It may also be possible to expand or evolve existing frameworks such as the Green Investment Portfolio used by Scottish Government.

The governance could be overseen by a multidisciplinary Steering Committee and include some board members from Climate Ready Clyde, to ensure alignment, as well as representatives from Scottish Government’s Green Finance directorate. In addition, it is suggested that the committee also includes private sector representatives (including SMEs) and communities.

The second aspect of the lab would be to create a platform to fund and encourage innovation in the Portfolio and to support its financing. The lab would incubate and develop innovative ideas to demonstration and provide a common ‘marketplace’ for potential actors to collaborate in a structured and coordinated way. This would build on existing City Finance Lab support from other initiatives such as EIT Climate-KIC, Covenant of Mayors or CPI, with longer term, more targeted support and a better understanding of local conditions.

For the lab to work, public funds will need to be committed as seed funding to take selected ideas to demonstration. However, the lab would also have a role to try and generate new sources of finance to help this innovation, i.e. it would directly undertake resource mobilisation activities to try and attract finance (e.g. public sector proposals, linking into research and innovation projects, seeking third sector funding, etc.).

The figure below is a schematic on how the Adaptation Finance Lab might look. The lab would include an advisory committee (including the private sector) to decide/approve ideas with the highest potential to innovate, scale and replicate across the region.

Whilst providing a robust initial overview of the delivery mechanism for mobilising resources in service of the Innovation Portfolio and Adaptation Strategy, the proposed finance and governance frameworks will need to be developed further in consultation with the government, private and third sectors.

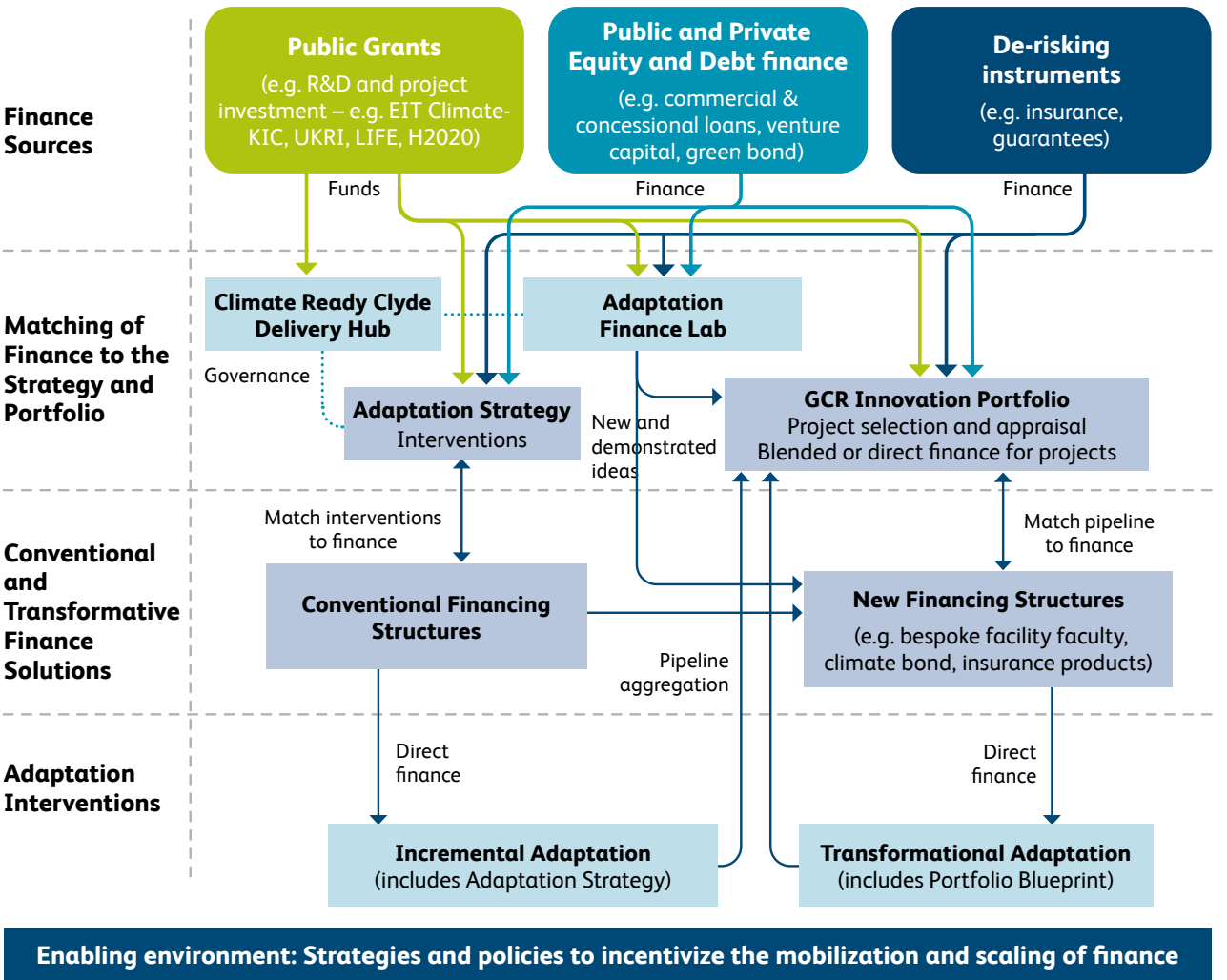


Figure 14. Delivery structure for transformative finance.

# Mapping and Mobilising Finance for the Adaptation Strategy and Innovation Portfolio

This final section sets out the resource mobilisation approach for adaptation finance for the Adaptation Strategy, including the Portfolio Blueprint. It starts with an overview of public sources of climate adaptation finance, which could be used across the matrix (whether to fund transformational adaptation or to blend with private sector finance), to fund both the strategy interventions and the Innovation Portfolio as outlined above.

## Emerging and potential additional public funds and finance

The earlier section – and Annex A – sets out the public funding sources for adaptation in Glasgow City Region as they currently stand. This section looks forward at the emerging and potential sources of additional public finance for adaptation, which could provide the foundation for the Adaptation Strategy.

The Scottish Government's Programme for Government 2020–2021 sets out the actions that will be taken in the coming year and beyond, and the legislative programme for the next parliamentary year to drive forward change across all levels of society. For 2020, it includes the actions across the economy to address global challenges that Scotland faces from climate change, as well as to address impacts caused by COVID-19. The focus is to tackle immediate concerns and to build back a better economy. The programme commits to creating 'new jobs, good jobs and green jobs', promoting health and well-being and promoting a just transition based on equality and that empowers the youth.

It includes government investments in resilience and climate change of an extra £150 million for flood risk management (in addition to providing £42 million annually to local authorities), £12 million for coastal change adaptation, a £100 million green jobs fund, to create a Supply Chains Development Programme across key sectors of the economy where there is scope for resilience interventions and economic growth, and to introduce a network of regional hubs to empower communities build local solutions for climate change. Several investments specific to sustainable development along the Clyde have been identified, including £25 million for zero carbon energy infrastructure and heat networks for residential and commercial premises along the river Clyde's path, and £25 million to support pioneering heat network projects on the River Clyde as part of Clyde Mission. The Scottish Government has already committed £10 million of funding for Clyde Mission projects this financial year (see Box 3).

As well as the Clyde Mission initiatives, several local councils and central government are working up additional investment plans, including Local Authorities in Glasgow City Region.<sup>46</sup> This includes conventional development investments. However, there is also discussion around how to reduce current and future flood risks, including even initial discussions around creating a tidal barrage, which includes new tidal power technologies.

There are also a series of place-based funding initiatives (see Box 3) also take centre-stage, building on the 20-minute neighbourhood, which highlights the importance of local places for people's health and well-being. The Scottish Government has released a Place Standard Tool that assesses places through criteria linked to a national performance framework. A Place Based Investment Programme of £275 million will be established linking and aligning all place-based funding initiatives to ensure a coherent approach, supporting ongoing work on the Clyde Gateway.

<sup>46</sup> Glasgow Commission for Economic Growth (June 2020). Glasgow Commission for Economic Growth: Submission to the Scottish Government's Advisory Group on Economic Recovery



### Box 3.

Clyde Mission is an ambitious new economic development initiative, developed in partnership between Scottish Government and Glasgow City Region, to use the Clyde to unlock sustainable and inclusive growth for the city, the region and for Scotland. It is using a mission-based approach, similar to the European Commission's Adaptation Mission, with a strong focus on zero carbon and climate resilience. As part of this, it is seeking to harness government appetite for big 'green' and 'blue' infrastructure spending, drawing together existing and possible elements of redeveloped land, green transport and renewable energy alongside community involvement and wealth building. The River Clyde area, from South Lanarkshire through to Inverclyde, is home to 115,000 people (i.e. who live within 500 metres of the river) and there are over 30,000 companies supporting around 160,000 jobs. However, it includes 250 sites of vacant and derelict land totalling over 400 hectares. Many sites in the area are at-risk of flooding.<sup>47</sup> SEPA and Glasgow City Council have already begun discussions around bespoke resilience standards as part of the River Clyde Strategic Development Framework, and discussions are ongoing between Glasgow City Region, Climate Ready Clyde, the MGSDP, SEPA and Scottish Government's Clyde Mission team on the development of a long-term adaptation pathway for the Clyde. In addition, Climate Ready Clyde have been working with the Scottish Association of Marine Science (SAMS) on a new piece of initial research exploring the potential for a green recovery and just transition to a climate-resilient, net-zero economy for coastal communities along the Clyde Corridor.

**Placemaking** as a concept is gaining traction in Scotland. It is essentially a multi-faceted approach to revitalise, plan, design and manage places, mostly as a community improvement initiative. The Place Standard tool outlines that the key elements can include improved low carbon transport options (e.g. new and improved cycle lanes), housing and community preservation of historic structures, recreation and green spaces. More recently, Sniffer has been working to ensure that climate resilience and adaptation is incorporated as a key feature. Scotland has begun to look at how placemaking can play a role in delivering the just transition towards a low carbon and resilient pathway. Much of placemaking uses a systems approach to converting spaces for communities as a new development model. The placemaking initiatives can be challenging to finance unless there are sufficient public funds or a revenue generating activity associated with one or more of the activities.

<sup>47</sup> <https://economicactionplan.mygov.scot/place/clyde-mission/>

As part of this programme, community led regeneration and town centre revitalisation will be supported, including the repurposing of buildings, maintenance and repairs, reallocating external space and community led land acquisition. The Clyde Gateway looks at waterfront regeneration along the Clyde and is also linked to the River Clyde Development Corridor.

The Glasgow & Clyde Valley Green Network (GCV Green Network) is building an integrated (system level) green network across the region which aims to provide well-connected, high quality, multi-use greenspaces throughout the region, from cycle paths to allotments, wildlife habitats to rain gardens. The ambitious plans are to be delivered over the next thirty-five years requiring an estimated £1.1 billion – equivalent to approximately £31 million per year. While it is focusing on sustainable travel and habitat connectivity, it does have a focus on green areas that will provide adaptation benefits, notably from new and improved green space (parks, gardens, woodlands and meadows) and from urban green infrastructure. It also includes a priority for greening vacant and derelict land. In particular, the Clyde Climate Forest includes canopy cover as an explicit strand to realise adaptation benefits.

There are some existing ways that Scotland is working to attract private sector financing in nature-based solutions. The Scottish Wildlife Trust and the Scottish Environment Protection Agency (SEPA) have partnered to try to unlock £1 billion of new investments for nature conservation in Scotland.<sup>48</sup> Nine investment opportunities have been formulated, that are aimed at attracting private sector investments in natural capital by delivering financial returns to investors. One of the investment opportunities, the Nature Climate Bond allows for cross-subsidisation of climate projects. The aim is for local authorities to issue a bond via a crowdfunding platform to the public, with the option of investments being as low as £5. The underlying projects would be from local authority pipelines that have a mix of projects that either produce long-term savings or income that would then be used to pay back investors. In addition, NatureScot are also considering further natural capital financing approaches for Scotland.

<sup>48</sup> <https://scottishwildlifetrust.org.uk/news/route-map-to-1-billion-for-nature-conservation-published/>

# Private sector finance

This shows a positive landscape is emerging. However, to leverage this committed investment and ongoing initiatives, it is essential to find ways to provide the investment platforms for private sector involvement. A stock take of private adaptation finance was included in the earlier mapping.

There is a need to understand the profile of potential private sector investors, and their scope and interest for investment. This needs to include investors, major companies, but also SMEs (as the latter is an important part of turnover in Scotland<sup>49</sup> and two thirds of these SMEs in Scotland want to be more environmentally sustainable (BoS 2019)<sup>50</sup>).

Private sector climate adaptation is also increasingly being incentivised by UK Government regulation that makes disclosures of climate-related risks mandatory by 2025. The disclosures need to be in line with the Task Force on Climate-related Financial Disclosure (TCFD) guidelines. This could present an opportunity to further engage with all of the private sector in Glasgow City Region. Climate Ready Clyde has been working with MSCI Carbon Delta to understand the common climate risks posed to various business sectors which would serve as the basis for individual business engagement and to aggregate opportunities for climate resilience interventions, either on a sector, or geographical basis.

# Mapping the Adaptation Strategy Interventions to sources of finance

Taking all of the above into account, the Clyde Rebuilt project has undertaken a first order mapping of Interventions identified in the Adaptation Strategy to existing public sector finance. This is presented in Table 3. As highlighted earlier, most of the eleven Interventions will need some degree of public funds for their implementation e.g. to establish Glasgow City Region as a global research and knowledge hub for adaptation, to build effective governance and leadership to drive change, and to build collective competencies to adapt through collaboration. However, even in these cases, the types of public funds and financing will need to broaden significantly, to move away from simple grants, to multi-year, larger scale debt financing, equity financing and user charges.

In addition, it is also unlikely that available public funds are sufficient to cover the entire adaptation strategy remit. This emphasises the need for available grant based public funds to be targeted at non-commercial essential public good and services and at those Interventions that can lever in new private sector investments creating further opportunities in the economy such as for green job creation.

Whilst the mapping serves as an indicative guide for Glasgow City Region, the proposed development of a Regional Adaptation Finance plan in the Adaptation Strategy would serve as the basis for a more detailed finance roadmap for Glasgow City Region.

Sources of public finance (indicative)	Government Capital Grants	Scottish Enterprise Innovation Grants	Clyde Mission Funding (capital funding – Grants)	Early Stage Growth Challenge Fund (grants, debt, equity)	The Climate Challenge Fund (grants and concessional debt)	Glasgow City Region City Deal (grants, debt and equity)	PWLB (concessional debt loans for capital expenditure)	Scottish Investment Bank (debt and equity)	Scottish National Investment Bank (debt and equity)	User charges (Scottish Water)	Tax Incremental Financing (TIF)	Non-Profit Distributing (NPD)
Funding/Finance instrument												
Grants	✓	✓	✓	✓	✓	✓						
Debt				✓	✓	✓	✓	✓	✓			
Equity								✓	✓			
Tax to raise debt (including user charges)										✓	✓	✓
Draft Adaptation Strategy Interventions												
1 Reform, reshape and expand governance mechanisms			✓			✓						
2 Develop the ability of organisations, businesses and communities to adapt		✓		✓	✓	✓						
3 Increase adaptation finance through leverage and innovation		✓	✓	✓	✓	✓		✓				
4 Enable and equip communities to participate in adaptation			✓			✓						
5 Embed reflection, monitoring, evaluation and learning into adaptation action						✓						
6 Adapt the Clyde Corridor for the twenty-second century	✓		✓			✓	✓	✓	✓			
7 Enhance early warning and preparedness for floods and heatwaves	✓	✓	✓									✓
8 Ensure our homes, offices, buildings and infrastructure are climate resilient	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
9 Deliver nature-based solutions for resilient, blue-green landscapes and neighbourhoods		✓	✓			✓	✓	✓	✓			
10 Establish Glasgow City Region as a global research and knowledge hub for adaptation		✓										
11 Begin the transition to a climate-resilient economy	✓	✓	✓	✓	✓	✓		✓	✓	✓		

Table 3. Mapping public finance sources to Glasgow City Region’s Adaptation Strategy Interventions.

49 <https://www.gov.scot/news/business-survey-2019/>  
50 <https://www.insider.co.uk/news/72-scottish-smes-become-greener-21200773>

# Developing a Portfolio of New Transformative Finance for Adaptation

In support of both problem spaces (heat, health and well-being, and transformative finance) set out in the Portfolio Blueprint, the Clyde Rebuilt project team have worked with stakeholders to develop a series of new propositions which illustrate the potential for transformative finance to unlock transformative change within Glasgow City Region. As highlighted throughout this paper, as well as needing to use existing finance mechanisms in support of the Adaptation Strategy and Innovation Portfolio, there also is a need to develop new types of financing of adaptation in service of transformation.

This set of options is presented as an initial list for discussion and further iteration. It is focused on seven early promising options:

1. Green Infrastructure Blended Finance Lending Facility
2. Clyde Climate Forest Fund
3. Placemaking Crowdfunded Climate Bond
4. Adaptation infrastructure including green and sustainable urban drainage systems solutions
5. Climate Risk Reduction Public Private Partnership
6. Glasgow City Region Climate Adaptation Fund
7. Revolving fund to transfer climate benefits to adaptation.

In addition to the list above, other financing options on insurance for flooding, a forest resilience bond and other nature-based solutions will be developed under Clyde Rebuilt, in consultation with relevant actors.

A set of criteria has been used to evaluate and prioritise these emerging financing options for Glasgow City Region. These are:

- the potential to generate a revenue stream
- whether there is a portfolio opportunity (i.e. potential to apply the option to existing opportunities in Glasgow City Region) to work with
- if any existing examples of similar financing solution have been designed and/or implemented
- the scope to apply innovation (i.e. how innovative the ideas are)
- the potential to use blended finance (to leverage available public sector funds to lever in private sector financing).

Each criteria is scored as a high, medium or low for each financing option, with a final aggregated score (see Table 4).

Finance Option	Evaluation criteria					SCORE
	Revenue stream potential	Portfolio opportunity	Existing examples (scope for replication and/or scaling)	Innovation scope	Blended finance	
Option	H/M/L	H/M/L	H/M/L	H/M/L	H/M/L	High: <b>3</b> Medium: <b>2</b> Low: <b>1</b>

Table 4. Example evaluation matrix.  
Note: The final score is aggregated across the criteria. A score between 11–15 is high; 6–10 is medium; 1–5 is low.

# Green infrastructure blended finance lending facility

Green infrastructure comprises natural or semi-natural schemes that are designed and managed to deliver a wide range of ecosystem services and quality of life benefits. This can include green spaces, but also schemes that are alternatives to engineered (grey) infrastructure such as sustainable drainage systems or green flood control management. It can include green infrastructure in new developments, upgrading of existing green infrastructure and retrofitting of new green infrastructure.

Green infrastructure is a form of natural capital and has a number of economic benefits (Matthews 2015).<sup>51</sup> These include: amenity value (recreational value); improved physical health and mental well-being (health); social cohesion; air quality improvements (environment); and CO<sub>2</sub> sequestration (mitigation). Particular types of green infrastructure may have other benefits, e.g. green roofs can reduce building energy demand for heating. They may also have adaptation benefits, for example by reducing urban heat island effects and controlling water runoff, thereby reducing flood risks. These benefits are often termed ecosystem services and are categorised into provisioning, regulating, cultural and supporting services. However, most of these benefits streams are non-market in nature and thus while green infrastructure has high economic benefits (from a societal perspective) the financial case is often not so strong (Watkiss et al. 2019)<sup>52</sup> and green infrastructure can also involve additional transaction or opportunity costs.

The financing approach for green infrastructure involves the identification of a value-added revenue stream, around which other non-revenue generating benefits can be realised. The value proposition embeds the costs and benefits of these nature-based solutions into the wider business case for ‘sustainable urban living’. Grey infrastructure, i.e. engineered infrastructure, can also be combined with nature-based solutions to create hybrid systems that improve resilience to climate impacts.

The study has identified a strong value proposition for the integration of nature-based solutions into urban property development for Glasgow City Region, potentially using the revenue streams generated from leasing of the real estate to finance other green infrastructure-based placemaking activities. The approach would require the identification of the urban (residential and/or retail) development areas, and vacant and derelict Land. These areas would be designated by the local authorities as ‘green zones’ with new, higher-level building standards (and building codes) and guidelines, which will be mandatory for the developer. The value this proposition delivers is through attracting developers and/or financiers that develop the land on behalf of the local authorities. Dedicated grant funding could be considered as part of the model to incentivise the use of integrated, nature-based solutions approach in these ‘green zones’. The value of the proposition is captured through the urban real estate value it can result in.

To allow this model to work, an enabling environment is required; with government driven decisions on ‘green zones’, establishing new advanced resilient building regulation policies and guidelines, and mandatory nature-based solutions. The policies and guidelines would include nature-based solutions such as ecosystem-based rainwater collection, natural flood protection (in coordination with SEPA and ongoing flood risk management strategies), green urban space to reduce heating, as well as integrated development that takes account of heating and cooling in the future climate, etc. There is also the possibility of the wider built environment being to be included in the scope, e.g. erosion control and flood protection.

51 Matthews T. et al. (2015). Reconceptualising green infrastructure for climate change adaptation: Barriers to adoption and drivers for uptake by spatial planners. Landscape and Urban Planning. Volume 138, June 2015, Pages 155-163.  
52 Watkiss, P., Cimato, F., Hunt, A. and Moxey, A. (2019). The Impacts of Climate Change on Meeting Government Outcomes in England. Report to the UK Climate Change Committee (CCC).

Finance option	1. Green infrastructure blended finance lending facility (Property development)					
Adaptation type	Incremental and Transformational					
Investor type	Public, corporates (infrastructure companies, insurance companies, other commercial companies), institutional investors					
Links to other Glasgow City Region programmes and policies	Glasgow & Clyde Valley Strategic Green Network, Regional Spatial Strategy, Local Plans, Open Space Strategies					
Evaluation matrix	Revenue stream	Portfolio opportunity	Existing example	Scope for innovation	Blended finance	SCORE
	High	High	Medium	Medium	High	13 High
Financing	<p>The financing model (see Figure 15) used to deliver the proposition will vary depending on the specific opportunities; however, it is most likely to include a vehicle to blend public and private sector finance. One option is to develop a dedicated Green Infrastructure Blended Finance Facility, which could be capitalised with a mix of funds from Scottish Government and Local Authorities, private foundations and/or private investors. A combination of concessional loans and grant funding would be provided for the green components. Commercial finance could be provided from a partner bank for the grey components. Loans would be paid back from the proceeds from sale of units and/or rent payments. There could be potential to consider funds such as from Clyde Mission as part of the grant finance component.</p> <pre>graph TD     PPF[Public and private finance Grants: Scottish Government + other sources of grant funding e.g. Foundations Concessional loans: Scottish Government / Local Government concessional loans] --&gt; DGF[<b>Dedicated Green Infrastructure Blended Finance Lending Facility</b>]     CB[Commercial Bank (e.g. SNIB)] -- "Debt lending at commercial rate for grey infrastructure components" --&gt; RED[Real estate developers – Land is owned privately and by local authorities]     DGF -- "Loan repayments through real estate rent revenue" --&gt; RED     RED --&gt; C[Contractors – Development of new built residential and commercial real estate using green infrastructure policy guidelines]     C --&gt; T[Tenants of residential and commercial real estate units]     T -- "Revenue from rental payments from tenants" --&gt; RED     RED -- "Additional benefits: Reduced heating costs due to improved building codes and green building standards" --&gt; B[Additional benefits: Reduced heating costs due to improved building codes and green building standards]</pre>					

Figure 15. Green infrastructure financing model.  
Source: Adapted from the EIB’s Natural Capital Finance Facility; Investing in Nature.



# Clyde climate forest fund

This is a new financing approach for the Clyde Climate Forest, a programme by the Glasgow and Clyde Valley Green Network Partnership, in partnership with the Woodland Trust and Glasgow City Region. This has three interlinked components:

- **Canopy.** To increase urban canopy cover across the Glasgow conurbation and through new tree planting, particularly in areas of deprivation and at-risk from the heat and flood-related impacts of climate change.
- **Connectivity.** To plant new woodland, making connections in existing habitat networks to provide a potential migration route for woodland species from the headwaters of the River Clyde through to the Loch Lomond and Trossachs National Park.
- **Carbon.** To deliver carbon sequestration opportunities, notably on land owned by public bodies which could be the focus of carbon off-setting tree planting to help deliver net-zero targets (but might also have a role in regional watersheds).

This initiative has multiple functions, including mitigation, and thus again has a range of ecosystem service benefits (see green investments), which includes some adaptation elements (though these could be strengthened as part of the development of this initiative).

Establishing a community forestry investment fund can help to capture the ecosystem service benefits of forestry and act as a funding mechanism to crowd in private investments. A similar approach is being explored in England for the Community Forest Fund. The Community Forests Fund could generate a predictable, secure and long-term funding stream to support the core forest-based activities for Local Authorities in Glasgow City Region. In collaboration with the emerging Clyde Climate Forest Programme Board, Scottish Forestry, communities and other existing relevant initiatives, target areas and associated activities can be developed. Activities would include tree planting, bringing woodland into management, opening up woods for visitors, building and maintaining visitor facilities (e.g. footpaths, cycleways) and educational and community initiatives. Revenue streams could be generated primarily from forest products/ charges for use of community forest areas by the local populations and tourists providing recreation, health and well-being benefits. If recreation activities and associated infrastructure are provided within the forested areas, e.g. rock-climbing facilities, restaurants, etc., user charges could be set by Local Authorities. Funds from the user charges could be used to develop and deliver verifiable pre-agreed activities for investors and communities (for example, planting and maintenance of woodlots).

For Glasgow City Region, specific opportunities will need to be assessed, including whether forest products (e.g. harvestable trees) can be produced and harvested, and how to ensure there is a suitable carbon credit certification scheme. The forestry-based asset would be owned by institutions and accrue financial benefits over a period of time. Anchor investors (particularly large quasi-public institutions with high carbon footprints that are difficult to reduce for net-zero [e.g. universities]) could provide the seed funding to crowd in private sector investments. To allow for aggregation and reduce set-up costs, local authorities across Glasgow City Region can work together to create a Community Forest Fund for the region. The concept being explored in England for the Community Forest Fund is service, not product based, however for Glasgow City Region it is suggested it should include the option of commercial forestry, e.g. orchards, to increase financial viability. For such a fund to work, sufficient revenues would need to be generated through the use charges.

Finance option	2. Clyde Climate Forest Fund					
Adaptation type	Transformational and Incremental					
Investor type	Public, impact investors (e.g. social investors), corporates (e.g. infrastructure companies and other commercial companies), institutional investors (e.g. pension funds, financial sector), philanthropy (e.g. trusts and foundations)					
Links to other Glasgow City Region programmes and policies	Glasgow & Clyde Valley Green Network Partnership's Clyde Climate Forest, Forestry and Woodland Strategy, Glasgow City Region Tourism Strategy					
Evaluation matrix	Revenue stream	Portfolio opportunity	Existing example	Scope for innovation	Blended finance	SCORE
	Medium	Medium	Medium	Medium	Medium	10 Medium
Financing	<p>The fund (see Figure 16) could be set-up as a multi-class fund holding the same portfolio for all classes and differ only in their surrounding fee structure. A technical assistance facility could be set up with donor funding (grant-based) from the Scottish Government and/or local authority budgets, and other private sector philanthropic foundations, could provide guidance and monitoring support for the forestry assets. Proceeds from these donors could also be used to set-up a Community Endowment Fund; capital that is invested for the longer-term, the annual income of which can be used to fund further community activities.</p> <div><div><div>Investors<ul style="list-style-type: none"><li>Anchor investor</li><li>Other private sector investors</li></ul></div><div><div>Share class A</div><div>Share class B</div><div>Community Fund endowment (Share class C)</div></div><div><div>Donors<ul style="list-style-type: none"><li>Scottish Government funding</li><li>Philanthropic Foundations</li></ul></div><div>Technical Assistance Facility</div></div><div>Key activities: Tree planting, bringing woodland into management, opening up woods for visitors, building and maintaining visitor facilities (e.g. footpaths, cycleways) and educational and community initiatives</div></div></div>					

Figure 16. Forest fund concept.Source: <https://cfl.southpole.com/solutions/communityForestTrust>

Note: Another approach could be to set up a Community Forestry Trust Fund into which any generated revenue streams would be channelled. The Trust Fund would then be used to maintain and expand the forestry-based activities. Potential revenue streams from carbon offsetting will need to be assessed, based on whether local authorities want to use the carbon sequestration potential to offset local carbon emissions or raise finance for other activities. In addition to the potential of forestry and/or woodlots to sequester carbon, the potential of peatland restoration in Glasgow City Region should be considered – both from a carbon sequestration potential and related adaptation resilience measures. An offset financing facility can also present another option to structure finance for carbon sequestration activities in Glasgow City Region.

# Placemaking crowdfunded climate bond

The crowdfunding concept is based on the creation of a platform on which the capital investment required for a portfolio of projects can be aggregated from individual investors, to allow these projects to be financed and to provide a return for the investors who support projects. The concept is closely connected to impact investing, which are investments made with the intention to generate measurable social and environmental impact alongside financial return. As the underlying portfolio of projects can be put together by the local authorities, a combination of innovative adaptation interventions alongside more conventional renewable energy projects could be bundled together to generate net positive aggregate revenue streams from which to pay back investors.

The concept of placemaking can be ‘sold’ and financed by local authorities through a crowdfunded bond concept. Placemaking essentially aims to transform urban spaces into people-focused places, providing high incentives for the public to invest in such a crowdfunded bond. Thus, the crowdfunding approach can create an efficient, scalable and cost-effective alternative to the more conventional public funding sources such as the Public Works Loan Board (PWLb). In addition, it offers a powerful and innovative way for local Authorities to engage with citizens as investors. Crowdfunded bonds use a Community Municipal Bond (CMB) structure, to be issued by a local authority direct to the public via a crowdfunding platform. Significant work has been undertaken by Abundance Investment in particular to reduce the barriers to this stream, through the development of standardised processes and procedures, and two initial crowdfunding bonds have successfully been issued in the UK.

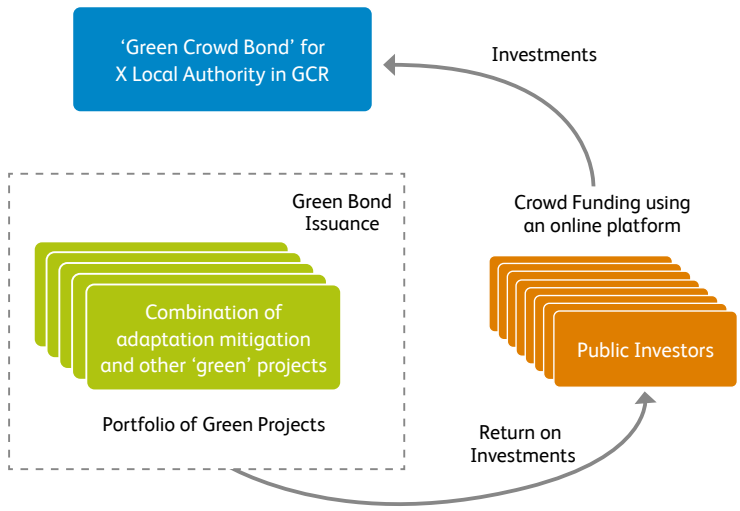
Finance option	3. Placemaking crowdfunded climate bond					
Adaptation type	Incremental (scaled up actions)					
Investor type	Public, impact investors (social investors), retail investors					
Links to other Glasgow City Region programmes and policies	Glasgow & Clyde Valley Green Network Partnership, local authority climate portfolios					
Evaluation matrix	Revenue stream	Portfolio opportunity	Existing example	Scope for innovation	Blended finance	SCORE
	High	High	High	High	High	15 High
Financing	<p>The UK’s first Community Municipal Investment Bond for West Berkshire Council was launched in June 2020, with an IRR of 1.2% over 5 years. It provides an excellent model against which to design a similar financial offering for local authorities in Glasgow City Region.<sup>53</sup> The bond is issued directly to the public in partnership with the online crowdfunding platform Abundance Investment. Individuals can invest from as little as £5 to support projects that align with the council’s plan to build a greener future for the district.</p> <p>This financing approach (see Figure 17) can be replicated for a number of adaptation measures that are struggling to secure finance. If well designed, the portfolio of projects could have the potential to be transformational whilst still providing a return on investment. The more the portfolio is linked to the health and well-being of the public, the more likely that the scale of investments will increase.</p> <p>Early work by Abundance Investment in other areas has highlighted that a good rule of thumb of the amount of private capital available in an area is roughly £2–£3bn per 100,000 adults. Of this, £1 billion is classed as being ‘more easily accessible’ – i.e. in ISAs or savings, compared to those locked in pension funds or other long-term investments. For Glasgow City Region, with an adult population of 1.47 million based on National Records of Scotland Data, this works out about £14–£15 billion of readily available capital which could potentially be accessed to fund projects.<sup>54</sup></p> 					

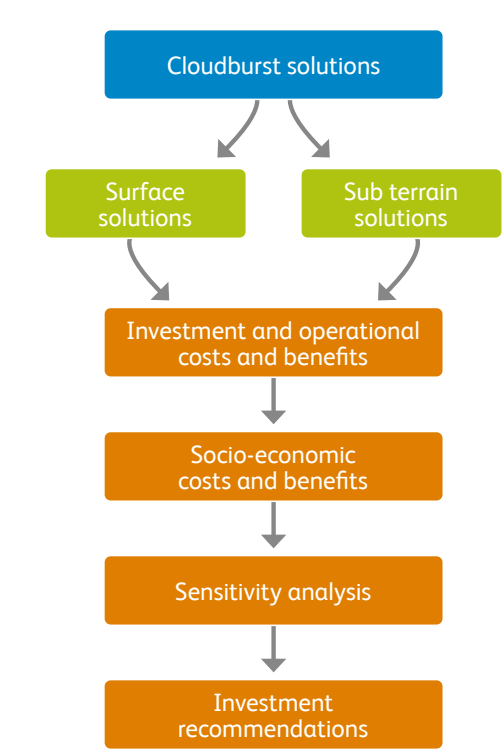
Figure 17. Crowdfunded bond concept. Source: <https://cfl.southpole.com/solutions/communityForestTrust>

53 <https://info.westberks.gov.uk/index.aspx?articleid=37060>

54 With thanks to Karl Harder; Abundance Investment; Joint Managing Director (Operations) and co-founder

# Adaptation infrastructure including green and sustainable urban drainage systems solutions

Household water charges can be used to co-fund adaptation interventions in cities, as an alternative or in combination with public funds. One recent example of a city administration funding adaptation is in Copenhagen. The scheme is a public-private finance model that was developed by the City of Copenhagen and Greater Copenhagen Utilities to mitigate the city’s high risk of flooding from cloud bursts.<sup>55</sup> The Cloudburst Scheme will fund 300 adaptation actions over 20 years. In addition to the traditional measures that drain water away through an expansion of the sewer network underground, additional adaptation actions are implementing surface solutions across the city. For example, stormwater roads will transport water to lakes and the harbour, retention areas will slow down and store water, green roads will hold back the water locally – typically in smaller side streets – and capacity will be increased in traditional stormwater pipes to carry excess water underground to lakes and to the harbour. Other surface water solutions place an emphasis on nature-based solutions which includes blue green infrastructure such as rain gardens, green walls, road swales and permeable paving. These solutions collectively are called sustainable urban drainage systems and are green infrastructure nature-based solutions.



For the Copenhagen Cloudburst Scheme, the main stormwater runoff infrastructure (underground storage, drainage system) is financed through the collected water charges (from citizens) by publicly owned water utility companies. The fees are controlled and regulated by the local government. The greening component linked to improvement of public space is paid for by the local government (primarily through collected taxes). New sources of finance might become available as Copenhagen is also lobbying the national government for a change in legislation. The remaining challenge is the finance of adaptation measures in privately owned buildings, for which incentives are being considered. Whilst this financing approach demonstrates it is possible to use such measures to fund adaptation, it is important to recognise that it is primarily households who pay for the adaptation through water charges. A recent precedent for this approach has been set in Scotland, with Scottish Water increasing user charges to fund net-zero ambitions for the company.

Figure 18. Methodology of the cost benefit analysis. Source: The Municipality of Copenhagen (2013). Cloudburst adaptation: a cost benefit analysis. Ramboll.

55 The City of Copenhagen (2012). Cloudburst Management Plan. Available at <https://climate-adapt.eea.europa.eu/metadata/case-studies/the-economics-of-managing-heavy-rains-and-stormwater-in-copenhagen-2013-the-cloudburst-management-plan>

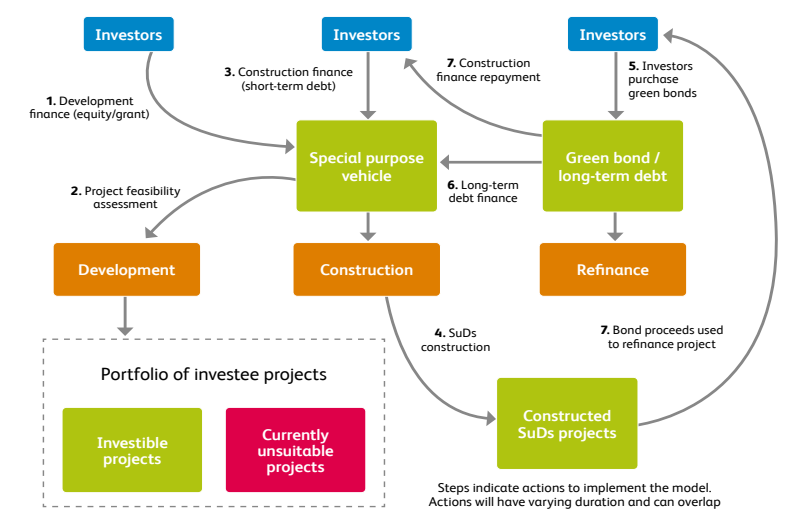
Finance option	4. Adaptation infrastructure including green and sustainable urban drainage systems solutions					
Adaptation type	Transformational and Incremental					
Investor type	Public, Corporates (e.g. water companies, insurance companies), Institutional investors (e.g. financial sector)					
Links to other Glasgow City Region programmes and policies	Glasgow & Clyde Valley Green Network Partnership, Scottish Government Green Jobs Fund, Scottish Water, SEPA, Local Authority flood risk management authority programmes, Metropolitan Glasgow Strategic Drainage Partnership					
Evaluation matrix	Revenue stream	Portfolio opportunity	Existing example	Scope for innovation	Blended finance	SCORE
	Medium	Medium	High	High	High	13 High
	Note: A combined evaluation has been done for water use charges and public, private and third sector partnerships					
Financing	<p>Other approaches to financing infrastructure (including green) for flood and drainage resilience in cities are provided by the Water Resilient Cities initiative, a public, private and third sector partnership. The financing approach demonstrates the potential to fund a programme of sustainable urban drainage systems (SuDs) based on future savings from reduced water charging bands. The model has been further elaborated for the Greater Manchester Natural Capital Investment Plan. It is based around three main phases of SuDS project delivery development, construction and operation which require different forms of capital based on the level of risk. The model proposes to set-up a single Special Purpose Vehicle to raise and deploy the appropriate form of capital for each phase over the project lifetime. The key requirement is that financing delivered is aligned to project lifetime cashflows, enabling overall financing to be leveraged as efficiently as possible.<sup>56</sup> The model was developed based on an assessment of potential SuDS pipelines associated with Manchester City Council, including an analysis of those that are investible. For such a model to be applied to Glasgow City Region, a similar pipeline assessment is required. However, in Scotland, as yet no such targeted charging bands exist and discussion would be needed with Scottish Government and Scottish Water to implement such changes. The model used for Manchester, developed by Environmental Finance, is given below in Figure 19, a version of which can be looked at for Glasgow City Region.</p> 					

Figure 19. SuDs finance model for Greater Manchester. Source: Eftec, Environmental Finance and Countryside (2019). Greater Manchester Natural Capital Investment Plan, Greater Manchester Combined Authority (GMCA)

56 Eftec, Environmental Finance and Countryside (2019). Greater Manchester Natural Capital Investment Plan, Greater Manchester Combined Authority (GMCA)

# Climate risk reduction partnership

This financing option is based on the approach taken by Disaster Risk Reduction Insurance (DERRIS) project for Italy and addresses climate risks for SMEs and municipalities. An opportunity was found to collectively tackle extreme weather events across Italy which impact SMEs, with a subsequent repercussion on economic stability in the country.

The DERRIS project (2015–18) aimed to increase the resilience of local economic communities by providing SMEs with the tools required to reduce disaster risks and manage emergencies. SMEs do not always have a sufficient understanding of climate risks, impacts to their businesses and measures to adapt. Even if they do, resources (including finance) are not readily available. The project designed an innovative partnership on climate change adaptation and resilience involving SMEs, public administrators and the insurance industry. The objective was to transfer climate and disaster risk management knowledge and experience from the insurance industry to SMEs and municipalities in order to create more resilient companies, strengthen local economies, and bring together effective local adaptation plans. To do this, a climate risk management tool was created for SMEs to improve risk awareness, assessment, prevention and reduction, both at the company and district levels. Support was then provided to help SMEs draw up a Company Adaptation Action Plan (CAAP). Two main challenges were encountered by the project; the first was a low level of awareness of climate change among SMEs and the second, the lack of available official climate data and vulnerability maps. The project was run as a pilot in Turin with 30 SMEs.<sup>57</sup>

Glasgow City Region has a large base of SMEs, which could benefit from this type of partnership approach to collectively assess vulnerability to climate risks and to implement adaptation measures. Aside from lowering potential costs of climate impacts through targeted adaptation measures, such a financing approach could also prepare SMEs to address UK Government regulation that will require mandatory risk disclosures by businesses from 2025 onwards.

Finance option	5. Climate risk reduction partnership					
Adaptation type	Incremental (at scale)					
Investor type	Scottish Government initiatives on green jobs creation, business diversification and supply chain development					
Links to other Glasgow City Region programmes and policies	Scottish Government initiatives on green jobs creation, business diversification and supply chain development, Regional Economic Strategy, Clyde Mission, Scottish Enterprise Business Support Programmes					
Evaluation matrix	Revenue stream	Portfolio opportunity	Existing example	Scope for innovation	Blended finance	SCORE
	Medium	Medium	Medium	Medium	Medium	10 Medium
Financing	<p>The DERRIS pilot was run on a total budget of €1,317,166. 60% was funded by the European Community (European Commission ‘LIFE’ Programme), amounting to €790,299 in grant funding. The remaining was funded by Unipol Gruppo S.P.A., a financial services company for insurance and banking. To facilitate the implementation of actions in the CAAPs, a loan based financial instrument for SMEs was released by Unipol Banca. Loans amounts had to be between €10,000–€100,000.</p> <p>Such a partnership model could be a potentially powerful way to encourage climate risk reduction in SMEs, there could be an opportunity for Glasgow City Region to design new financing instruments in partnership with insurance companies and financial institutions for the implementation of adaptation action in the SME sector.</p>					

57 UNIPOL GRUPPO S.P.A. (2018) Final Report to the European Commission on the DERRIS project.



# Revolving fund to transfer climate benefits to adaptation

There are likely to be major economic benefits from the changing climate in Glasgow City Region, notably from the reduced winter temperatures and associated reduced heating costs, which could potentially be monetised to create revenue streams for adaptation interventions. The aim would be to use the opportunity created by climate change and use the reduced stress on the public finances towards other public spending for resilience. While the focus here is on reduced winter heating, there would be other benefit streams, e.g. in terms of improved agricultural production, reduced burden on the NHS in winter, reduced winter related maintenance costs, etc. In some ways this replicates early-stage ‘invest-to-save’ mitigation activities undertaken in the UK’s public sector organisations. Using a number of large public organisations with a large number of buildings, with high heat loads and future climate risks as early adopters could support the model development and refinement before later being used to scale and crowd in wider private sector actors.

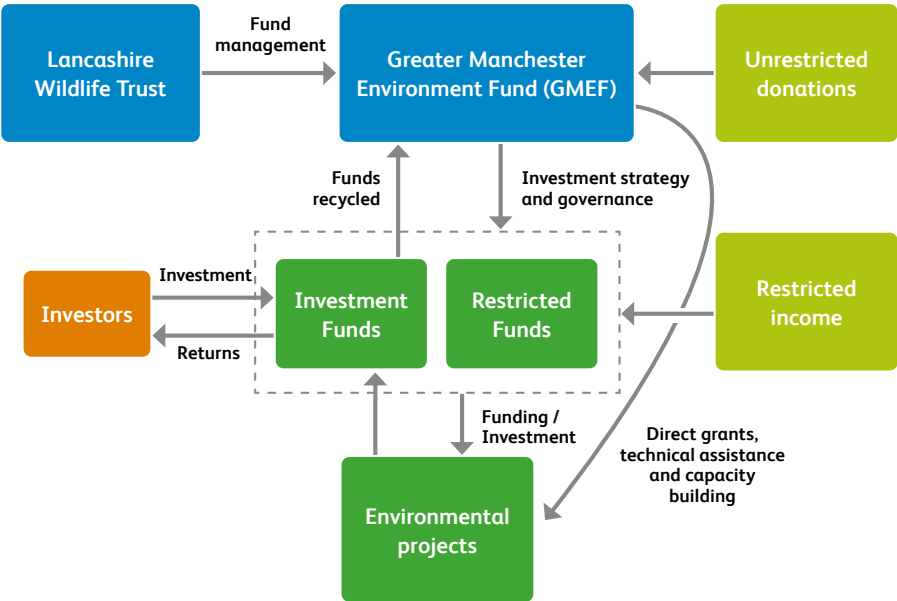
Finance option	6. Revolving fund to transfer climate benefits to adaptation					
Adaptation type	Transformational and Incremental					
Investor type	Public, philanthropy, impact investors					
Links to other Glasgow City Region programmes and policies	Infrastructure based programmes, Built Environment Programmes, Historic Environment Scotland Properties In Care, Glasgow City Region Economic Recovery Plan					
Evaluation matrix	Revenue stream	Portfolio opportunity	Existing example	Scope for innovation	Blended finance	SCORE
	Medium	Low	Low	Medium	Medium	8 Medium
Financing	<p>Provided below in Figure 20 is an indicative long-term revolving fund model for monetising climate change benefits. The revolving fund would be replenished with savings from climate change benefits. These funds could be channelled to a special purpose vehicle to be ‘blended’ with investments from the private sector thus adding the leverage factor. The finance would be used for a portfolio of adaptation (and possible mitigation) activities that would give a net positive cash flow. An adequate governance structure for the fund is essential to allow proper monitoring and transparent allocation of funds.</p> <pre>graph TD     Tools[Tools to assess savings] --&gt; Savings[Savings from climate related benefits&lt;br/&gt;e.g. from saved public building heating costs]     Savings --&gt; Other[Savings from other climate change related benefits]     Savings --&gt; RF((Revolving Fund))     Other --&gt; RF     RF -- Revenues --&gt; Investors[Investors]     RF -- Investment --&gt; SPV[Special Purpose Vehicle]     Investors -- Investment --&gt; SPV     SPV -- "Investment + grants" --&gt; Reinvest[Reinvestment into a portfolio of adaptation interventions with and without revenue streams]     Reinvest -- Revenues --&gt; RF     Reinvest -- "Indirect incentives from avoided energy costs" --&gt; RF</pre>					

Figure 20. Potential revolving fund structure.

# Glasgow City Region climate adaptation innovation fund

There could be an opportunity for Glasgow City Region to develop a dedicated investment vehicle for the region, that would work across climate action areas for adaptation. The vehicle would coordinate with bespoke financing instruments and vehicles, such as other finance options mentioned. The purpose of the fund would be to act as a regional aggregator of opportunities and as a platform through which public sector funds can be channelled to lever in private sector investments. The vehicle could also be a means by which to establish sovereign guarantees and targeted insurance products for high-risk adaptation interventions, including the transformational ones.

A similar proposal to set up a regional Environment Fund for Greater Manchester (GMEF) has been made by a partnership between Greater Manchester Combined Authority and Lancashire Wildlife Trust. A detailed assessment went into recommendations for setting up the fund, which is ready for launch along with a developed pipeline of near- and medium-term investment opportunities. Glasgow City Region and Greater Manchester share similar climate risks and impacts, and also challenges to attract finance. On the latter, these include limited public sector funds, a higher risk investment environment for resilience actions (including lack of obvious revenue streams), and fragmented landscape of potential opportunities. It is advisable to further look at the details of the GMEF and whether a tailored version for Glasgow City Region can be considered. To do this an assessment of the adaptation funding gap, pipeline opportunities and potential for aggregation, further assessment of finance barriers (including from project developers), etc. will need to be completed.

Finance option	7. Glasgow City Region climate adaptation innovation fund					
Adaptation type	Transformational and Incremental					
Investor type	Public, philanthropy, impact investors					
Links to other Glasgow City Region programmes and policies	Clyde Mission, River Clyde Development Corridor, Glasgow & Clyde Valley Green Network Partnership, Scottish Government Green Jobs Fund, Placemaking investment programme and other recently announced initiatives in the Programme for Government 2020–2021, Clyde Gateway, etc.					
Evaluation matrix	Revenue stream	Portfolio opportunity	Existing example	Scope for innovation	Blended finance	SCORE
	High	High	High	High	High	15 High
Financing	<p>Provided below in Figure 21 is the model upon which the GMEF was designed.<sup>58</sup> The fund is structured as a charitable body, with independence from Greater Manchester Combined Authority and with representation from public, private and third sector stakeholders. It will be managed by the Lancashire Wildlife Trust and provide technical assistance. Funds from both the public and philanthropic sources will be channelled to priority actions. There is potential for other financing vehicles to be created as offshoot – these would provide tailored finance and mobilise private sector investments.</p>  <p>Figure 21. Greater Manchester Environment Fund. Source: Environmental Finance, Greater Manchester Combined Authority, The Wildlife Trusts (September 2020). Greater Manchester Environment Fund Overview – presentation slides.</p>					

58 Environmental Finance, Greater Manchester Combined Authority, The Wildlife Trusts (September 2020). Greater Manchester Environment Fund Overview – presentation slides.

# Discussion of financing options

A summary of the high-level evaluation for potential financing options in Glasgow City Region is provided below in Table 5. The table highlights that a Glasgow City Region Climate Adaptation Fund, the crowdfunded green bond, Green Infrastructure Blended Finance Lending Facility and Nature Based (sustainable urban drainage systems) Funding Models offer the largest opportunities for Clyde Rebuilt to complement wider plans for an Innovation Portfolio and the Adaptation Strategy.

Financing option	Evaluation Criteria					
	Revenue stream potential	Portfolio opportunity	Existing examples	Scope for innovation	Blended finance	SCORE
Placemaking Crowdfunded Climate Bond	High	High	High	High	High	High
Glasgow City Region Climate Adaptation Innovation Fund	High	Medium	High	High	High	High
Green Infrastructure Blended Finance Lending Facility	High	High	Medium	Medium	High	High
Adaptation infrastructure including green and sustainable urban drainage systems solutions	Medium	Medium	High	High	High	High
Clyde Climate Forest Fund	Medium	Medium	Medium	High	High	Medium
Climate Risk Reduction Partnership	Medium	High	High	High	Medium	Medium
Revolving fund to transfer climate benefits to adaptation	Medium	Low	Low	Medium	Medium	Medium

Table 5. Summary of the financing options evaluation.

Some broad estimations on the potential investment size for each finance option is provided below in Figure 22. A Glasgow City Region Climate Adaptation Innovation Fund would have the largest potential to mobilise private sector investment, with the Green Infrastructure Blended Finance Lending Facility next. Other financing options have lesser and varying levels of leverage potential, however key to note is that all will mobilise private sector investments and can be more easily replicated than funds and facilities, which can take time to design and operationalise. Thus, speed of deployment of the financing options is also important to consider, enabling short-, medium- and long-term solutions to be put in place.

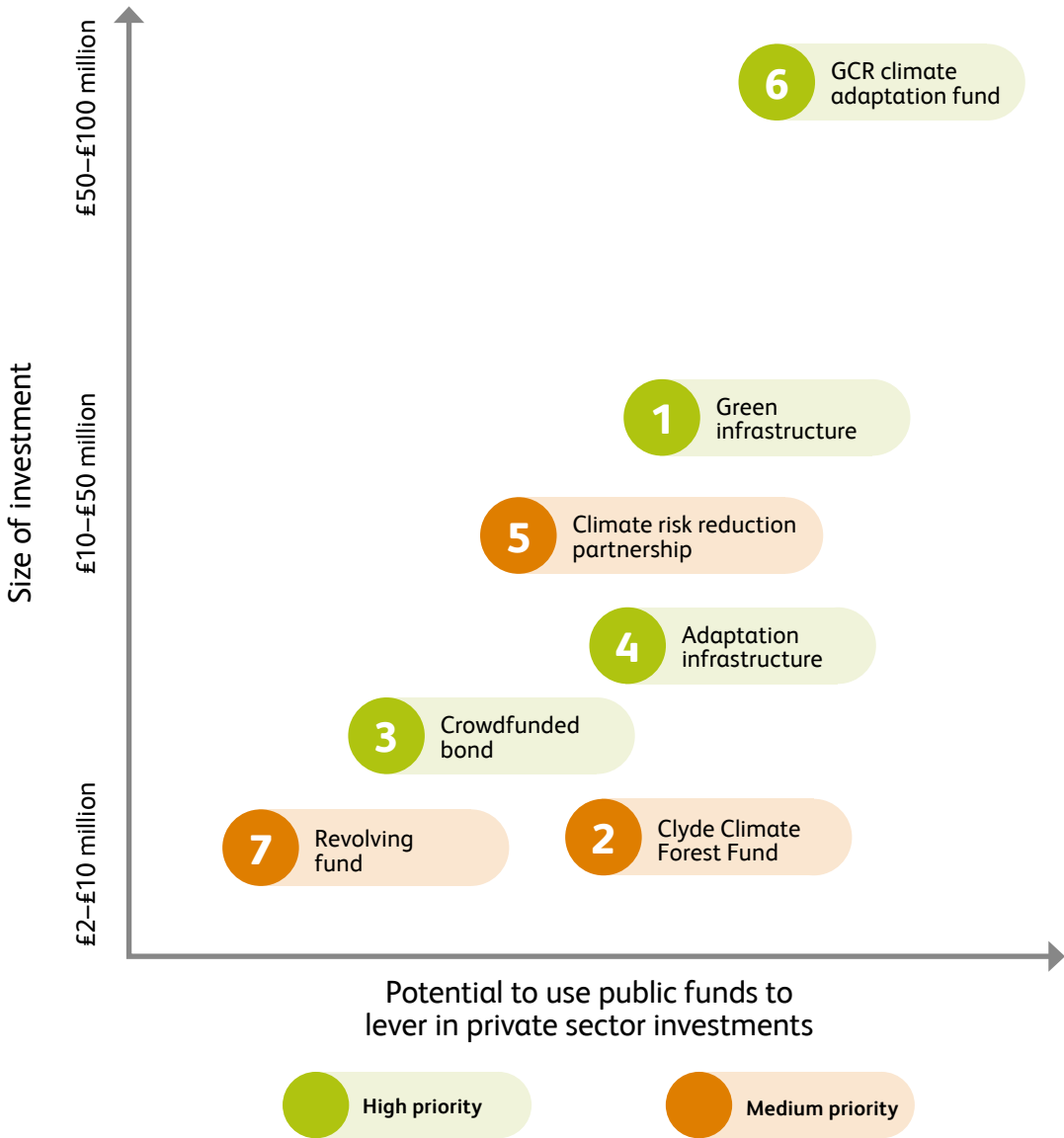


Figure 22: Approximate investment sizes and leverage potential for the financing options

# Recommendations and Next Steps

To conclude, successfully unlocking the finance for Glasgow City Region's Adaptation Strategy and Innovation Portfolio, and more broadly, bridging the finance gap is likely to require three strategies, in partnership with local, national and UK actors:

- *Increasing the proportion of direct grants and creating the conditions for adaptation.* There are some adaptation activities and investments that require (and justify) public intervention, notably because of market failures, or because they involve investments or changes where there is limited private sector interest. In these cases, public investment can support core adaptation, but there are opportunities to also use public funds to create the enabling environment for actions by the private sector and others.
- *Encouraging public organisations operating in Glasgow City Region to move a more commercial mindset.* There are opportunities to use public funds or assets to support public-private sector partnerships or unlock investment from the private sector for adaptation. These opportunities could be very significant and can help to address the adaptation finance gap.
- *Developing innovation for adaptation.* There are many emerging opportunities for adaptation and these can be developed through a cycle of innovation. This pilot and demonstrate new approaches with new actors. This can be developed through partnerships including local research institutions and national and European research funders, local, Scottish and UK Government, and the private sector. This would also position Glasgow City Region as an innovation hub for the emerging adaptation economy, i.e. for new adaptation goods services.

The next stage will be for Clyde Rebuilt to develop a bespoke proposal for capitalising its own portfolio approach. In all cases, there remains an early-stage gap for projects which will likely need to be bridged by technical assistance from the public sector. It will also be important to consider the right vehicle for delivering such investments and approaches, e.g. through existing Glasgow City Region governance, or through separate legal entities such as special purpose vehicles. It may also be possible to expand or evolve existing national frameworks such as the Green Investment Portfolio used by Scottish Government.

Stemming from the information presented in this paper, the following sets out a series of recommendations for resource mobilisation to support the Adaptation Strategy and the Portfolio Blueprint. The focus is on actions that will deliver climate finance for adaptation, but also have the potential to generate wider benefits for Scottish Government and Glasgow City Region, related to green job creation, unlocking private investment and finance, and a just transition to a low carbon resilient pathway.

Finally, to enable Glasgow City Region to realise these opportunities, we recommend it should put in a place an integrated financing structure which brings together the Adaptation Strategy Interventions, the Innovation Portfolio and a dedicated set of innovative financing models, to realise synergies and cross subsidise the range of activities.



Recommendation	Who
1. Explore with Government how to create an enabling environment for adaptation. This could be through the creation of a seed fund for piloting some of the financing options.	Scottish Government, Local Authorities
2. Target existing innovation funds towards adaptation to help bridge the early stage innovation gaps.	Innovate UK, Scottish Funding Council
3. Explore the potential to work with accounting rules to classify technical assistance as capital spend if it leads to the ownership of an asset.	Local Authorities, Glasgow City Region
4. Map the companies covered by TCFD to understand the extent of physical risk and use the information to formulate a financing solution.	Clyde Rebuilt
5. Explore the potential to create a revolving fund, with benefits from future climate change used to address costs.	Clyde Rebuilt, Scottish Government, Local Authorities, corporates involved with urban infrastructure
6. Explore how to take forward other financing options with appropriate sets of stakeholders, including interest financial institutions.	Clyde Rebuilt, public and private sector stakeholders
7. Investigate with government how to work alongside existing and committed programmes.	Scottish Government, Local Authorities
8. Develop a bespoke proposal for capitalising the Innovation Portfolio approach, including the right vehicles for delivering such investments and approaches.	Clyde Rebuilt, Climate Ready Clyde, Glasgow City Region, Scottish Government
9. Design and implement an Adaptation Finance Lab	Clyde Rebuilt, Scottish Government

Table 6. Recommendations

# Annex A: Public Funding Sources for Adaptation in Glasgow City Region

Type of instrument	Description	Uses	Spent by	Amount available
Capital Grants	Received from the UK Government, distributed by the Scottish Government to local authorities.	Usually spent on non-current assets which are typically long-term assets such as land, property and equipment. Some of the ring-fenced grants are for resilience interventions, such as for flood alleviation.	Local Authorities	£11.56 billion for 2020–21.
		Maintenance of infrastructure networks. These can include activities that increase the resilience of infrastructure and the built environment.	Generally channelled to agencies or utilities that are highly regulated by economic regulators which include a mix of public and private sector organisations such as Scottish Water, the Scottish Environmental Protection Agency, NatureScot, Scottish Forestry, energy companies, Transport Scotland and Strategic Transport Partnerships.	Based on Scottish Government planning discretion.
Clyde Mission	The Clyde Mission Fund aims to make the Clyde an engine of sustainable and inclusive growth for the city, the Region and Scotland.	The Clyde Mission Fund will be used to support capital projects that deliver economic stimulus and jobs and contribute to one or more of the five National Outcomes that underpin the Clyde Mission.	Open to public sector, private sector and third sector or community organisations.	A total £10 million for 2020–21.
The Public Works Loan Board (PWLB) – concessionary debt loans	Funds are from the National Loans Fund earmarked for project capital expenditure.	Housing, infrastructure and front-line services.	Local Authorities can apply for loans.	Maximum net amount of PWLB loans that can be outstanding is subject to a statutory amount of £85 billion to £95 billion in a single financial year.

Type of instrument	Description	Uses	Spent by	Amount available
User charges for water and other maintenance	Scottish Water’s investment programme (other utilities such as for electricity and gas could consider similar investment programmes).	Improvements to Scotland’s water and waste-water infrastructure. For e.g. portfolio includes a £120 million resilience programme connecting Ayrshire and Glasgow water supply systems through a new 30-mile pipeline. Planning for the 2021–27 investment programme is ongoing.	Scottish Water	£3.9 billion (includes a £120 million resilience programme connecting Ayrshire and Glasgow water supply systems through a new 30-mile pipeline).
Non-Profit Distributing (NPD) Model	Alternative funding structure for public private partnerships developed for Scotland in 2008–9.	Large public infrastructure projects or services (e.g. roads, schools and hospitals).	Public private partnership	Based on proposed project.
Taxes	Local taxes that can be charges through ‘Tax Incremental Financing’ (TIF) which was enabled in Scotland by Scottish Statutory Instrument No. 391.	Public infrastructure	Local Authorities	Based on local authorities planning discretion.
The Climate Challenge Fund (CCF) – grants and loans	Business assistance in Scotland, which can be a combination of grants and loans.	Mitigation and adaptation – most have been awarded to mitigation.	Organisations that are community run are eligible to apply.	Just over £111 million total capitalisation. Grants are available for up to £100, 000.

Type of instrument	Description	Uses	Spent by	Amount available
Scottish Enterprise – grants	Research and development	Initiatives that will bring about social and economic benefits focusing on innovation. Cross-sector. Involve some kind of capital investment and should service markets wider than Scotland only or compete with companies outside Scotland.	Small and medium sized enterprises and larger companies can apply for the grants.	-SMEs working independently on innovative projects may be awarded between 35%–50% of eligible projects costs. -Large companies working independently on innovative projects may be awarded between 25%–40% of eligible projects costs. -SME carrying out R&D which will result in a product for a commercial partner(s), your commercial partner(s) must contribute a minimum 20% to the project costs, up to 45% of the remaining eligible project costs will be supported.
	SMART: SCOTLAND	Support high risk, highly ambitious projects. It covers two key areas of R&D: conducting feasibility tests and developing prototypes. Cross-sector.	Small and medium enterprises (SMEs).	Support up to 70% of the eligible costs for a small enterprise and up to 60% of the eligible costs for a medium enterprise, maximum grant is £100,000.
	Regional Selective Assistance (RSA)	Supports projects that will create or protect jobs in Scotland. Cross-Sector.		The level of grant is based on the size of the business and the location in Scotland.
Scottish Investment Bank – debt and equity	The Scottish Investment Bank is Scottish Enterprise's investment arm and provides investment advisory services for private sector business, in addition to debt and equity.	Cross-sector to support economic growth in Scotland.	Small and medium sized enterprises can apply for funding.	Varies based on the application.

Type of instrument	Description	Uses	Spent by	Amount available
Early-stage Growth Challenge Fund managed by Scottish Investment Bank – grants, debt and equity	New fund as part of a £38 million package aiming to support high growth companies who have been demonstrably affected by COVID-19.	Cross-sector	Private sector companies can apply for funding.	Maximum of £300,000 per company.
Scottish National Investment Bank (SNIB) – debt and equity	SNIB was a result of the Scottish Government's 2017–18 Programme for Government <sup>59</sup> to support economic growth in Scotland.	Provides finance and act to catalyse private investment to achieve a step change in growth for the Scottish economy by powering innovation and accelerating the move to a low carbon, high-tech, connected, globally competitive and inclusive economy.	Small and medium sized enterprises can apply for funding.	Total initial capitalisation of £2 billion over ten years. Specific investments based on the application.
Glasgow City Region City Deal – grants	An agreement between the UK and/or Scottish Government and a city, which gives the city and its surrounding area the autonomy to decide how to support economic growth, create jobs or invest in local projects. Glasgow City Region has the largest City Deal in the UK.	The initiative currently supports twenty-one improved infrastructure projects including roads and bridges. Cross-sector.	(1) improve infrastructure with a £1.13 billion fund, (2) support growth in life sciences, (3) enable innovation in businesses and (4) reduce unemployment. Funds are provided by the UK and Scottish Governments (each provides £500 million in grant funding to the city region). Local authorities will borrow a further £130 million.	
Scottish Futures Trust (SFT) – grants	An infrastructure centre of expertise owned by the Scottish Government.	Public infrastructure.	Public sector organisations, to support them plan, fund, deliver and manage their construction projects and buildings better.	2020–22 is £10.1 million, of which £8.7 million comes from the Scottish Government Core and Programme Grants.

59 Scottish Government (2017), "A Nation with Ambition: The Government's Programme for Scotland 2017-18 (<http://www.gov.scot/programme2017>)

## Resilient Regions: Clyde Rebuilt

The Resilient Regions: Clyde Rebuilt project is delivered by a consortium including Sniffer, Paul Watkiss Associates and Creative Carbon Scotland, and EIT Climate-KIC, and is funded by EIT Climate-KIC and fifteen local partners. The project has received funding from Climate KIC, supported by EIT, a body of the European Union.

The views expressed in this publication are the sole responsibility of the author(s) and do not necessarily reflect the views of Climate-KIC or the European Union. The European Community is not liable for any use made of this information.

### Lead Authors

Paul Watkiss Associates: Sumalee Khosla and Paul Watkiss

### Contributing Author

Sniffer: Kit England

Khosla, S. and Watkiss, P. (2020). Financing Clyde Rebuilt: Resource Mobilisation for the Glasgow City Region Climate Adaptation Strategy and Innovation Portfolio. Deliverable 06 of the Resilient Regions: Clyde Rebuilt project.

Published by Clyde Rebuilt, Glasgow, Scotland

Copyright: Resilient Regions: Clyde Rebuilt, 2020

Climate Ready Clyde, c/o City Chambers East,

Floor 2, Room 29, Glasgow, G1 1JL

T: 0141 229 7738

E: [climatereadyclyde@sniffer.org.uk](mailto:climatereadyclyde@sniffer.org.uk)

W: [www.sniffer.org.uk/climatereadyclyde](http://www.sniffer.org.uk/climatereadyclyde)

Sniffer is a registered Scottish charity number: SC022375, company number: SC149513. Registered office: Caledonian Exchange, 19a Canning Street, Edinburgh, EH3 8HE

Creative Carbon Scotland is a Scottish Charitable Incorporated Organisation. Registered Scottish charity number: SC042687. Registered office: City Chambers, Room 9/50, High Street, Edinburgh, EH1 1YJ



## The Adaptation Strategy and Action Plan has been funded in part by the **Resilient Regions: Clyde Rebuilt** project

The Resilient Regions: Clyde Rebuilt project was delivered by a consortium including Sniffer, Paul Watkiss Associates and Creative Carbon Scotland, and EIT Climate-KIC, and is funded by EIT Climate-KIC and the fifteen local Climate Ready Clyde partners. The project has received funding from Climate-KIC, supported by EIT, a body of the European Union.

The views expressed in this publication are the sole responsibility of the author(s) and do not necessarily reflect the views of Climate-KIC or the European Union. The European Community is not liable for any use made of this information.

Climate**Ready**Clyde

Paul Watkiss Associates



Deep Demonstration  
Resilient Regions  
GLASGOW CITY REGION  
Clyde Rebuilt



SGN



Inverclyde  
council



# Climate**Ready**Clyde

Climate Ready Clyde, c/o City Chambers East,  
Floor 2, Room 29, Glasgow, G1 1JL

**T:** 0141 229 7738

**E:** [climatereadyclyde@sniffer.org.uk](mailto:climatereadyclyde@sniffer.org.uk)

**W:** [www.climatereadyclyde.org.uk](http://www.climatereadyclyde.org.uk)

Sniffer is a registered Scottish charity number: SC022375, company number: SC149513.  
Registered office: Caledonian Exchange, 19a Canning Street, Edinburgh, EH3 8HE

Creative Carbon Scotland is a Scottish Charitable Incorporated Organisation.  
Registered Scottish charity number: SC042687.  
Registered office: City Chambers, Room 9/50, High Street, Edinburgh, EH1 1YJ