

OUR VISION

*for Glasgow and the Clyde Valley*



ClimateReadyClyde



**Adaptation  
Scotland**  
supporting climate change resilience



The Climate Ready Clyde project and Adaptation Scotland Programme are managed by Sniffer.

Sniffer is a registered charity delivering knowledge based solutions to resilience and sustainability issues.

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# Introduction



Scotland's climate is changing. We have also seen this in Glasgow and the Clyde Valley. Over the last few decades it has become warmer and wetter. We have had an increase in rainfall, especially in winter, and more heavy downpours. This can be very challenging to deal with, especially when heavy rainfall causes flooding.

As a region we are already taking action to deal with changes in climate but we know that much more needs to be done. The climate change we expect in the future is far greater than anything we have experienced in the past. We must work together to meet this challenge.

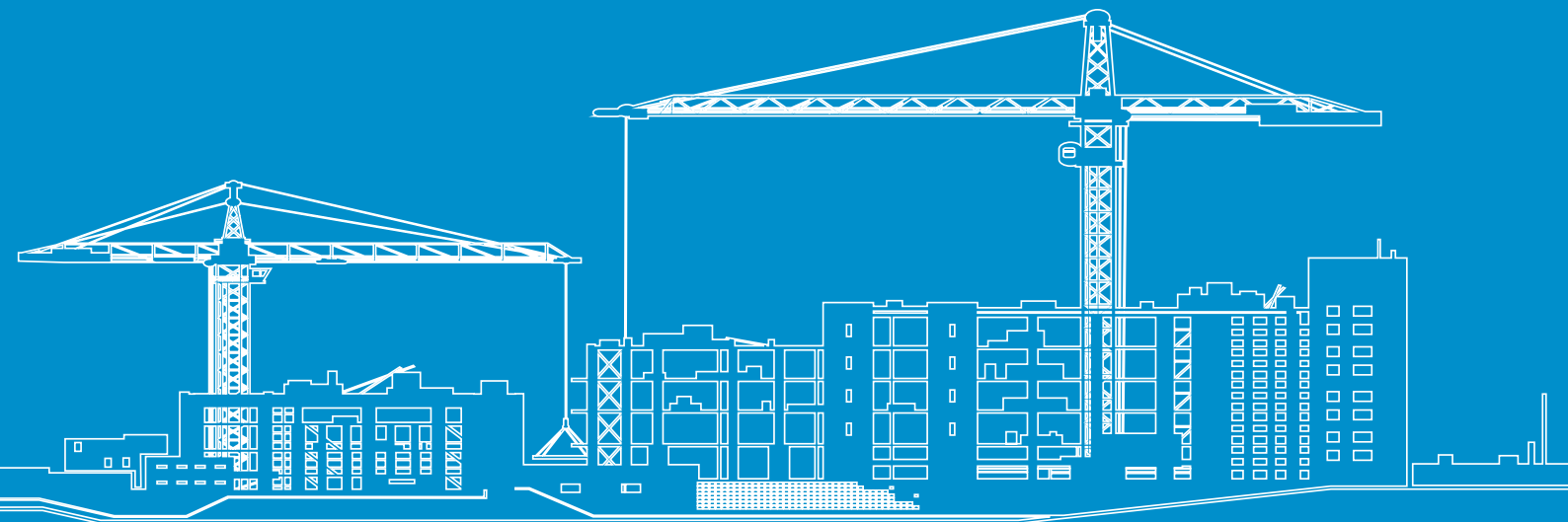
The measures that we take to build resilience to climate – both current and future – will reduce the direct impact from climate-related events (e.g. flooding or heat waves), and have benefits for our economy, environment and society. People are at the heart of a Climate Ready Clyde

as we set out a vision for our future with a changing climate.

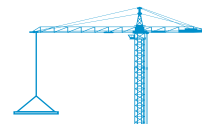
Making our vision of a Climate Ready Clyde a reality depends on a co-ordinated response from across the region, with leadership from the public sector, businesses and communities. Fortunately, Glasgow and the Clyde Valley has a long history of working together to address challenges. The Climate Ready Clyde project draws upon this spirit of partnership, bringing together a diverse range of organisations with this shared vision. It is a first step to a strategy and an action plan making us climate ready.

This document sets out the challenges that we face, our vision for a future under a changing climate, and our commitment to working together to develop a regional Climate Ready Strategy and Action Plan by 2015.





# The challenge



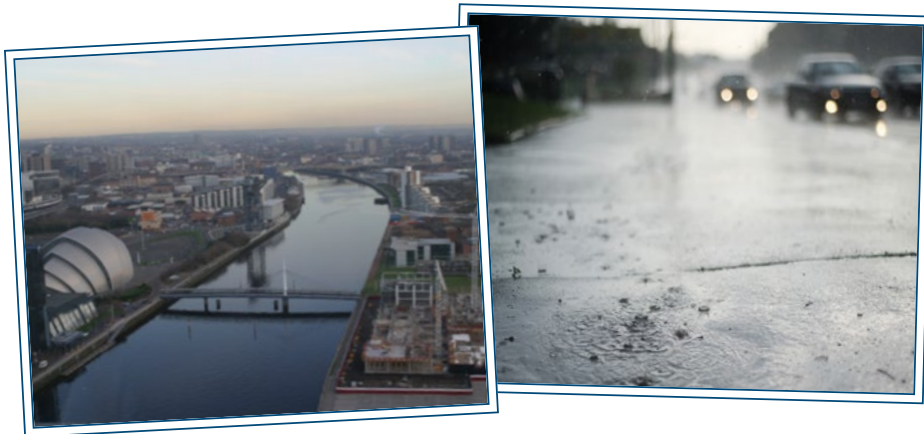
The emission of greenhouse gases is changing the global climate. We are already experiencing some of this change in Scotland but we can expect far more in the future. To meet the challenges posed by our changing climate, we need to understand how climate can and will impact on our lifestyles, our work and our services.

## RAINFALL

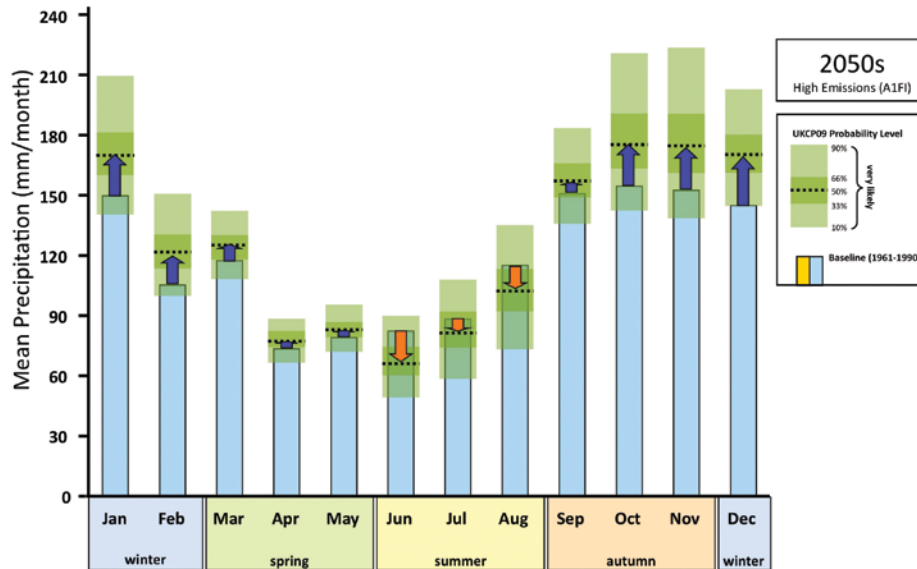
In Glasgow and the Clyde Valley we know about rain! You have probably noticed that it has been raining a lot lately, with some very heavy downpours causing flooding and widespread disruption. In fact, it is not just the last few years that have been wet. Over the last few decades we have seen a trend of increasing rainfall, especially in winter. This trend is expected to continue in the future, with autumn and winters likely to become wetter through the 21st century (Figure A overleaf).

As well as an increase in total rainfall, we are also likely to see more intense, heavy downpours which can make it difficult to predict surface water flooding, especially in urban areas.

Flooding has a devastating impact on people, homes and businesses. It causes damage and disrupts the infrastructure and day-to-day services that we rely on.



*"By the middle of this century an average summer is likely to be drier."*



**Figure A:** UKCP09 Climate Projections for the Clyde River Basin showing mean precipitation. The blue bars show baseline, the green bars show the range of the UKCP09 projections for 2050s, while the arrows indicate direction of change.

The projected changes in rainfall patterns are likely to pose an on-going challenge to the Glasgow and Clyde Valley region. It is more important than ever that we take action and build upon the good work already underway across the region to make us more resilient to flooding.

Although increased rainfall is likely to be our biggest challenge, the climate projections also indicate that by the middle of this century an average summer is likely to be drier as new weather patterns are established. If not carefully managed, this could have implications for our water supply and the needs of residents, key services and businesses.

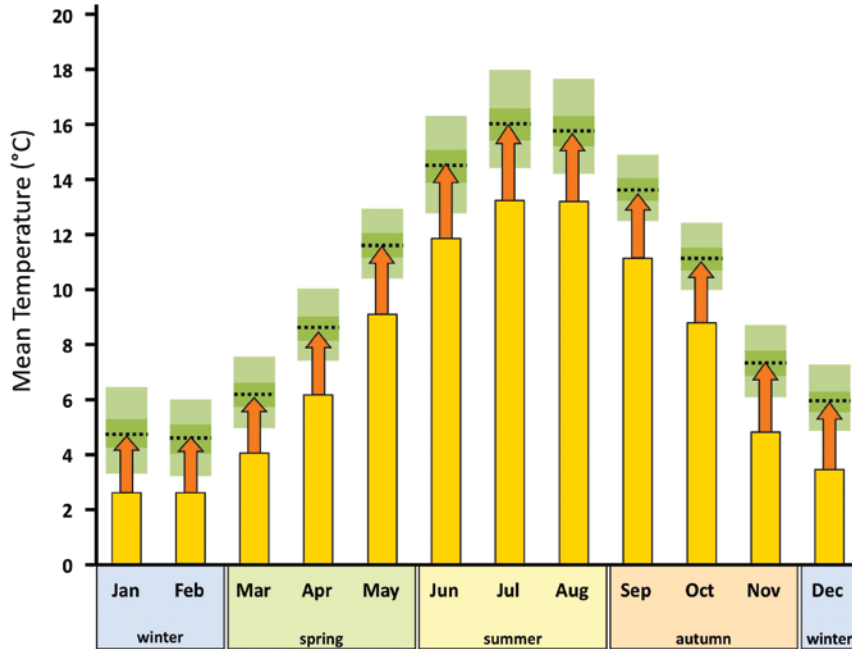


Figure B: UKCP09 Climate Projections for the Clyde River Basin showing mean temperature. The yellow bars show baseline, the green bars show the range of the UKCP09 projections for 2050s, while the arrows indicate direction of change.

*"The average temperature will rise by at least a couple of degrees by the 2050s."*

## TEMPERATURE

Most of us love those rare hot days! The prospect of temperature rise might seem like something to embrace. But it will pose a wide range of challenges to Glasgow and the Clyde Valley and we need to make adjustments to cope.

Over the last few decades temperatures in the west of Scotland have been on the rise, increasing by 1°C between 1961 and 2004. This trend will continue in the future. Climate projections show that it is very likely that average temperatures will rise by at least a couple of degrees by the 2050s (Figure B). This would mean that temperatures in Glasgow and the Clyde Valley are likely to become more similar to those currently experienced in the south of England – and it is possible they could even go beyond these temperatures.





We could benefit from a warming climate that encouraged greater use of the outdoors and a healthy and active lifestyle. Milder winter conditions could also reduce the need for heating and reduce the number of cold-related deaths. However, it will also pose significant challenges. For example, we will still need to use our existing buildings that have been constructed with past climate in mind. If they do not perform well in future climate conditions, they may need costly retrofitting or even have to be replaced.

Urban areas in the region may feel the heat most acutely in the future. This is due to the 'urban heat island' effect which leads to higher temperatures in densely populated urban areas where energy use is high, hard surfaces are prevalent, and vegetation is scarce. Glasgow city centre already has one of the most significant 'urban heat island' effects in the UK and this is something we must address to avoid problems as temperatures rise in the future.



## THE RISING SEA

*"Glasgow made the Clyde and the Clyde made Glasgow."*

The River Clyde is the heart of this region and it is Glasgow's connection to the sea which provides us with our rich and proud maritime and industrial heritage. However, it also poses a risk with potential to cause flooding and increase pressure on drainage systems across the region. These risks will be exacerbated by sea level rise which has been accelerating in recent decades. Relative sea level is projected to rise by up to 70 cm by the end of this century.

The public sector, businesses and communities across the region need to work together to effectively address the challenges from increasing rainfall, rising temperatures and sea level rise. Although the climate projections do not extend to changes in wind, high winds can cause a lot of disruption to buildings and transport infrastructure – as well as health and safety. This also needs to be factored into adaptation planning.

*"Relative sea level is projected to rise by up to 70 cm by the end of this century."*





# The vision



Although changes in our climate will result in new and difficult challenges, we can work together to create a future where Glasgow and the Clyde Valley is one of the most climate resilient regions in the world.

## PEOPLE AT THE CENTRE

*"People and communities will benefit from actions to adapt to climate change"*

### By 2020...

Work to include green networks and sustainable urban drainage at the heart of community regeneration and land use plans is having a transforming influence, most notably in communities that previously suffered decades of decline. In particular the 2014 Commonwealth Games athletes' village is an internationally recognised example of how the games legacy is also promoting climate resilience that will have benefits for generations to come.

Community-led projects to reintroduce permeable surfaces and create natural wetland areas are springing up across the region, making a valuable contribution towards reducing the risk of flooding. Communities that are most at risk of flooding are aware of the risks that they face and are involved in helping to make decisions about how these risks should be managed. Their proactive

engagement has, for example, made insurance more available in the most 'at risk' areas.

Communities are well aware of what to do and where to go for help when severe weather events happen. Extra help is available for vulnerable groups thanks to support networks developed by voluntary sector organisations, local authorities and the emergency services.



### By 2050...

Communities across the region are transformed as a result of investment in green networks incorporating sustainable urban drainage, as well as large-scale flood prevention schemes. This investment is paying dividends as people enjoy and use green networks and benefit from jobs created as business and investment is attracted to the region.

Temperatures have increased across all seasons and green networks are now playing an increasingly important role in helping people to keep cool during the summer

by providing natural shading and cooling. Green spaces make it easy for people to enjoy outdoor activities during warmer, sunnier days. Warmer winter temperatures and improved home insulation have also helped to reduce the number of cold-related deaths and illness among vulnerable groups.

Community enterprise companies and local food cultivation projects are part of day to day life across the region. This helps to build community resilience and create opportunities for local action to improve resilience to climate change.

*"This investment is paying dividends as people enjoy and use green networks and benefit from jobs created as business and investment is attracted to the region."*

## WE STRIVE FOR ECONOMIC RESILIENCE

### By 2020...

Glasgow and the Clyde Valley is benefiting from its growing reputation as a climate resilient region where climate risks are understood and acted upon. Businesses understand that climate change presents risks and opportunities, and take a robust but adaptive approach to these. Investments in climate resilient infrastructure and its maintenance, combined with business continuity planning, mean that disruption to business is minimised even when severe weather events occur.

Local businesses based in communities that are at particular risk of flooding are regularly consulted about local flood risk and have a say in how local risks are managed. Support is available to help

*"Adapting to climate change will help secure existing investment and generate new opportunities."*

small businesses develop continuity plans and recover quickly if they are affected by severe weather events.

Green networks incorporating sustainable urban drainage are at the heart of local communities. Road and infrastructure networks are now also much more resilient thanks to innovative drainage solutions and significant investment in upgrading sewerage networks. These measures have made the region a more resilient and attractive place to live and work, drawing increasing numbers of people to the region.

### By 2050...

Glasgow and the Clyde Valley is well established as a climate resilient region. It is now one of Europe's leading destinations of choice for visitors, investors and people. The region has developed extensive climate resilience knowledge and expertise providing employment opportunities to the local workforce. Business leaders across the region continue to play a leading role in identifying ways that new and emerging climate risks may impact on the sustainable economic development in the region. They are playing a crucial role in keeping the region climate ready.

Businesses are at the forefront of developing expertise and technologies in urban design and buildings, and water management. These skills are in demand internationally.

Business districts across the region are 'water sensitive' with excellent land drainage and innovative technology that allows reduced water use and reuse of storm and waste water. Temperatures have risen and investment in natural ventilation systems for buildings and green roofs and walls into our urban areas is paying off. This helps to keep offices and business premises cool and avoids the need for energy intensive air conditioning systems.

Remote access and home working are part of business as usual. Many companies have well established plans in place to cope with disruption to transport or infrastructure. This does still happen occasionally as a result of extreme weather events.

## WE WORK WITH NATURE, NOT AGAINST IT

### By 2020...

Changes in climate are beginning to have a marked impact on the types of plants and trees that are growing in the region's parks, woodlands and pathways. New species are appearing and some of the more familiar species are becoming less common. We have taken steps to help our natural environment adapt to changes in climate by carefully managing how it is used and developed.

The natural environment is playing a vital role in helping us cope with changes in climate. Natural wetlands and woodland expansion are helping absorb

increases in autumn and winter rain and in some places parks and playing fields have been designed to safely hold flood waters when water levels become dangerously high. We protect vulnerable coastal areas from development, and create natural wetland areas to protect areas further inland.

Pioneering work is underway to introduce trees, plants and green spaces into urban streets and town centres that are hundreds of years old. These new trees, plants and greenspaces will help absorb rainwater, reduce pollution and keep places cool as temperatures increase in the future.

*"We will protect our natural environment and use it to help us adapt to climate change."*

## By 2050...

Rainfall has increased markedly during autumn and winters and the street trees, plants, green roofs, walls and spaces introduced in the 2010's are playing a crucial role in helping to absorb water and manage flood risk. It's also warmer and these features are providing natural shading and cooling during the summer. Natural wetland areas are commonplace in urban areas. This helps to manage the risk of flooding by storing flood water and reducing the speed of surface water flowing into rivers and drains.

The cost of implementing and maintaining this 'urban nature' has been more than covered by savings made through avoiding flood damage and reducing the need for air conditioning in the summer. The greenest areas of our towns and cities are also attracting significant inward investment as businesses and residents are attracted to invest and live in these locations.

Our natural environment is changing as a result of warmer temperatures across all seasons and changes in rainfall that have occurred over the last few decades. Some species have become less common and others are emerging. Green spaces and networks that are in place across the region are helping our natural environment to adapt. Research is playing an important role in protecting habitats that are at risk. For example, increases in temperature and periods of dry summer weather are causing changes to wetland areas. New research is helping us to find solutions for these habitats to cope as temperatures continue to increase.

Periods of warmer, drier weather have also increased the risk of wildfires in the region's woods and forests. Emergency services, local authorities, woodland managers and volunteer organisations have established networks to raise awareness of the risk of wildfires and support rapid responses when fires happen.







# The journey



The journey has already begun. Over 40 different organisations, businesses and community groups are taking part in the Climate Ready Clyde project.

The project, initiated by Adaptation Scotland, has laid the foundation for strategic partnership working on the issue of climate change adaptation in the region. Participants have worked to develop a shared understanding of the challenges and opportunities the region faces as a result of climate change. They have been instrumental in driving forward action on a strategic approach. Project members have contributed to and supported developing this vision for a Climate Ready Clyde. They recognise the importance of working together to make the vision a reality. We hope that many others can now join these organisations to take important steps on the journey.

## CELEBRATING SUCCESS

We have good reason to be proud of our progress on making Glasgow and the Clyde Valley able to cope with current weather and future changes in climate. Here are just a few examples of work that is already underway:

### White Cart Water Flood prevention scheme

The White Cart Water is Scotland's largest flood prevention scheme and was completed in 2011 at a cost of £53million. The scheme combines world leading engineering solutions

and natural flood risk management techniques to protect over 1700 homes and businesses. The scheme has already saved flood damage estimated at £11million and will ensure that the area it protects remains a viable place to live and work for generations to come.

*The White Cart Water Flood prevention scheme is just one example of the pioneering approach to flood risk management that is being developed by Glasgow City Council in partnership with the Metropolitan Glasgow Strategic Drainage Partnership.*

## Seven Lochs Wetland Park

Destined to become Scotland's largest urban wildlife site, the Seven Lochs Wetland Park is an exemplar of green network planning. The Wetland Park area includes the upper catchments of four watercourses. Wetland creation and management within the park has the potential to help reduce flood risk in areas downstream of the park – including areas of historical flooding. The park also includes Community Growth Areas, which will see over 4300 new homes built by 2025.

The Wetland Park project will demonstrate how integrating new green infrastructure into developments, such as green street layouts, surface water floodplains and habitat links to surrounding wetlands can manage flood risk effectively while delivering better places to live, work and play.



## Climate ready development and regeneration

Glasgow City Council and partner organisations are working to place climate resilience at the heart of land use planning for the east end of the city. The award winning east end local development plan, now part of the Clyde Gateway regeneration region, and the 2014 Commonwealth Games village are two examples of sites where green networks and sustainable urban drainage are at

the heart of plans. Delivering these plans successfully will leave a legacy of climate resilience for generations to come and will be an example that others will follow.

These examples show what we are capable of achieving. However, this is just the start of what needs to be done if the region is to become more resilient to current weather and future climate. Our shared commitment to taking visionary action will ensure that this early work will be built upon.

*"The Seven Lochs Wetland Park is an exemplar of green network planning."*

*"We must build a shared understanding of the risks and opportunities we face, collaborate to implement actions, and share responsibility."*

### **Commitment to take action together**

We must work together to achieve our vision of a Climate Ready Clyde. We must build a shared understanding of the risks and opportunities we face, collaborate to implement actions that will benefit us all and share responsibility for adapting to climate change. No one organisation, business or community will be able to successfully adapt to climate change alone. We can become climate ready by working together.

In order to meet the challenges, we will develop a shared Climate Ready strategy and action plan by 2015. This important step will:

- Provide a focus for timely action. The decisions we are making now will influence how we cope with current weather and future changes in climate. The strategy and action plan will co-ordinate and drive forward new and existing actions to meet shared challenges and make sure that we benefit from any opportunities that emerge.
- Champion the excellent progress that we are already making towards becoming climate ready. We will use the strategy and action plan to develop our reputation as a world-leading climate ready region and we will seek to maximise potential economic benefits.
- Allow us to monitor and evaluate progress and track emerging risks and opportunities as our climate changes. We will develop meaningful indicators to help us tailor our strategy and action plan appropriately.

*We hope that you – the communities, businesses and organisations that are the very heart of the Glasgow and Clyde Valley Region – will join us on our journey to make this a thriving, vibrant climate ready region.*

# ClimateReadyClyde

The Climate Ready Clyde vision is endorsed by:



Climate Ready Clyde is being developed in partnership with a wide range of organisations, businesses and community stakeholders.

To find out more and get involved with the project:

Visit: [www.adaptationscotland.org.uk](http://www.adaptationscotland.org.uk)

Contact: [anna@sniffer.org.uk](mailto:anna@sniffer.org.uk)