**Sustaining Stirling**

A Document Detailing Recommendations for Policymakers and Politicians  
Addressing the Climate Crisis

Submitted by Transition Stirling for consideration to Stirling Council and the Environment & Housing Committee

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**Foreword**

On October 3rd 2019, Stirling Council passed a motion declaring a climate emergency, articulating and underscoring the potentially catastrophic nature of climate change to the citizens of Stirlingshire. At the macro level, this declaration came at a time of profound importance for the human species. It is now widely accepted that the escalating effects of climate change in fact represents the single greatest challenge ever faced by humanity, greater even than the Second World War or the specter of nuclear conflict. The following, therefore, is an attempt to bring greater citizen engagement to the table at a crucial juncture of the Stirling region’s future.

This document may be seen as simply a series of observations. Its methodology is purely qualitative: this document contains no groundbreaking findings. It relies on primary and secondary source material as well as anecdotal evidence collected ad hoc from the public. The nuances of climate science and its projections, at this point well established, are not discussed. The recommendations within may read more as reflections; most are intuitive and based on remarkable work and leadership already conducted by the Council, academics, policymakers, NGOs, and others.

This in mind, this document has four main objectives:

1. **To consolidate the work of others concisely for the use of Stirling Council as it addresses the climate emergency.**
2. **To serve as a reminder of proposals, recommendations, and commitments made by various public bodies, including, but not limited to, the Council.**
3. **To highlight the indispensability of citizen engagement in addressing the processes and implications of climate change.**
4. **To stress the urgency of the climate emergency and the necessity of aggressive and immediate preventive, mitigative, and adaptive measures through broad system change.**

In addition, this document aims to avoid bias. It is a nonpartisan document and aims for objectivity, drawing on the best available evidence, much of which comes from Stirling Council itself. To the extent that bias may exist, however, this writer will be upfront: all who have contributed to this document are, by their own admission, environmentalists, and firmly believe that a climate emergency is an issue that transcends the realm of politics– it is an existential issue.

As such, this document speaks to our collective inertia that has led us to this climate emergency, symptomatic of our universal, innate tendency to ‘kick the can down the road’. To the extent that we can, we must be conscious about this fundamental aspect of human nature. In the context of climate change, this pervasive pathos occurs for a variety of reasons. For legislators, the scope and intensity of actions required to address it may present intractable challenges to issues of electability and legacy, not to mention political values. For citizens, it may relate to individual worldviews and socioeconomic circumstance. These are not criticisms. In fact, in contrast to past crises, the scale and intangibility of climate change means the urgency to act eludes true comprehension by any person, no matter how well versed in the issue he or she may consider themselves.

The issues herein, along with the recommendations provided, may seem insurmountable. Indeed, this is to some extent the point: they may prove just that. It is arguable, however, that it is better to stop halfway up the mountain of aspiration than it is to rest on the plateau of intransigence, though the latter may seem more appealing in the moment. The actions taken today will have resonance far beyond tomorrow, judged by the indelible mark that we leave on the historical record. And if we are indeed to reach the summit that provides us and our descendants with a prosperous and equitable future, it will require a unified front from all. For what it is worth, we hope that this document provides some focal points around which to further this effort.

**Executive Summary for Policymakers**

Note to Members of the Housing and Environment Committee

The recommendations and observations of each section of this document are summarised below for ease of use. Policymakers who wish to use this document should consult this Executive Summary for brevity when discussing the climate emergency on November 14th, 2019. These salient points are also highlighted throughout the main body of text. Those wishing to consult this document at the Housing and Environment Committee should first see pages 4 to 6 of this document.If desired, the rest of the document may also be consulted for in-depth analysis and detail on these summarisations.

1. Section 1: Introduction

* Immediate action addressing climate change is the least expensive and damaging route in the medium to long-term.
* Delaying the implementation of systematic measures will impede progress already made towards addressing climate change.
* The Council must use system thinking to view all activities and decisions through a holistic lens of climate change.

1. Section 2: Issues of Citizen Engagement

* The urgency, challenges, and opportunities of climate change must be clearly conveyed to the public through a large-scale public information and community engagement drive.
* A unified political front must be presented to the public.
* The Council must transform into an exemplar institution of sustainability to lead the public, providing it with an enabling environment in which to change.
* A Citizens Assembly on climate change should be established to oversee progress.

1. Section 3: Issues of Transport

* Public transport must be promoted as a cost effective, convenient travel means.
* Public transit should be electrified, expanded, and integrated into one system. Vancouver, Canada may be used as an example to follow.
* Road infrastructure needs to be made electric vehicle-friendly; proposed road infrastructure should be reconsidered as they perpetuate path dependency on private vehicles. New infrastructure should strive towards carbon neutrality.
* Stirling City should be pedestrianized and vehicular use in the City center must be reduced to a minimum.

1. Section 4: Issues of Building and Energy

* Building codes should be strengthened to increase resilience against adverse weather events and make them carbon neutral.
* Initiatives to retrofit buildings should be scaled up for the above reasons, including the propagation of solar PV, A-rated boilers, and insultation.
* Procurement of renewable energy must be prioritised and a Renewable Portfolios Standard as in California should be considered.

1. Issues of the Circular Economy

* A refundable deposit system for glass and plastic bottles should be introduced. Public recycling and compost street bins in urban area should be considered. Water fountains should be ubiquitous to reduce plastic water bottle use, especially amongst tourists.
* Easy public access to specialised recycling centers should be facilitated.
* The discrepancy between what grocery supermarkets and the council deem recyclable must be resolved, perhaps with a “Stirling recyclable” sticker for products the council recycles to reduce consumer confusion.
* The single-use plastic dependency of grocery stores must be disincentivised and penalised through mandatory compliance agreements.
* Zero waste should be promoted, with concrete aims to eliminate single-use plastics. The hospitality and food industries, for example, should be beholden to composting schemes, refuse plastic straws and cutlery, and purchase recyclable napkins.
* Schools should be considered a focal point of zero-waste with curricula reflecting an emphasis on the circular economy and climate change education.
* The Council must lead by example by being the first institution to set zero-waste targets and eliminate single-use plastics in day-to-day activities.

1. Issues of Ecosystems and Tourism

* A large-scale program of ecosystem restoration must be undertaken. A Council-led tree planting scheme could create jobs, mitigate climate change, and provide a local source of fuel and construction material.
* Existing programs and initiatives of ecosystem restoration, such as the Council partnership with On the Verge, should be expanded. Preventive river management and restoration should be prioritised.
* The Stirling City Park and River Project should move beyond the proposal phase, as they promise high rate of return on investment (£4.71 million in social benefits per annum). Doing so would create opportunities for increased tourism, high social returns on capital, City prestige, and mitigation against climate change effects.

1. Issues of Food Security and Agriculture

* Consumers must be made aware of the environmental impact of certain foods; legislation to provide ‘carbon impact labeling’ on products should be considered.
* A VAT/local tax increase on products – especially non-local, imported ones – with high carbon footprints should be enacted.
* Public information initiatives such as ‘meat-free’ days, and vegetarian and vegan alternatives should be promoted by health and environmental authorities.
* The local farming community must not be alienated by diet and produce transitions. It will need to be supported by promotion of local produce as the norm at the household table, advertisement, and expansion of local points of sale.
* Farmers should be given access to, and training in, alternative methods of production that utilizes low-carbon practices, local and weather-resistant crops, and organic agriculture. They should be considered environmental stewards with the ability to positively impact local ecosystems, with access to financial incentives for providing services such as carbon storage and soil/wildlife protection.
* Community members should be empowered so as to have access to space and technical skills to grow produce at home and in community gardens. This will allow an early pioneering of locally sourced food supply.

1. **Introduction**
   1. **Accomplishments by Stirling Council**

Recognising that addressing climate crisis requires a collaborative approach, it is worth acknowledging the significant steps that Stirling Council (henceforth “the Council”) to address climate change. The most relevant and recent, perhaps, being the declaration of a climate emergency. The Council also established a cross-party Strategic Forum to consider Sustainability, Economy & Environment issues in 2010[[1]](#footnote-1); joined the East Central Scotland Vehicle Emissions Partnership with the view of highlighting the implications of idling engines[[2]](#footnote-2); and was the first council in Scotland to sign a Sustainable Development Agreement with the Scottish Environment Protection Agency[[3]](#footnote-3). The Stirling area is also projected to comfortably meet targets of reducing emissions by 40% by 2021 (off a baseline level from 2006/07)[[4]](#footnote-4). With a track record of environmental action, the Council has built a robust foundation from which to launch exemplary environmental action.

* 1. **The Urgency of Change**

This citizen’s document, having recognised the groundwork completed by the Council, stresses the urgency of immediate action that surpasses anything proposed or undertaken thus far; carbon neutrality by 2045, for example, is an insufficient timeframe, with most environmental groups and climate scientists calling for this to be achieved far earlier than this date.[[5]](#footnote-5) This sentiment is not reflective of any political ideology or desired socioeconomic outcomes by any group; it is rooted in objective fact. According to a new report to be submitted to the UK government by the Committee on Climate Change, current policy at all levels of government is “not nearly at the level of ambition required”, necessitating a near-total reevaluation of existing policy.[[6]](#footnote-6) Recommended actions in this document are systemically disruptive and potentially politically divisive, including implementing carbon taxes, ending subsidisation of the fossil fuel industry, and providing economic incentives for low-carbon activities. Others, such as mass education for consumers to inform them of the environmental implications of their lifestyles, will be capital-intensive endeavors. **It is, therefore, critical that all members of society fully understand that acting now is the least expensive and damaging course to take in the medium to long term.**

As a result, councils across the UK face a fine balancing act between managing public willingness and implementing necessary change. It is perhaps unsurprising that research has indicated that decisionmakers, from household heads to policymakers, often fail to prioritise climate change despite professions that it is important[[7]](#footnote-7). This is because adaptation of climate-resilient pathways, in presenting challenges to conventional development models[[8]](#footnote-8), may obfuscate the returns of sustainable ones. However, the Intergovernmental Protocol on Climate Change has asserted that a limited timeframe currently exists in which action taken towards climate-resilient pathways will “improve human livelihoods and social and economic well-being” while also promoting sound environmental management[[9]](#footnote-9).

**Delaying the implementation of these widespread measures will likely ultimately impede, if not derail, progress already made towards sustainable development, significantly reducing future options** for climate-resilient pathways[[10]](#footnote-10). Moreover, lack of assertive action will have direct implications for Stirling’s citizens; already, local data suggests that severe weather events are occurring almost a third more often than they did at the turn of the century. Such events threaten the health of citizens (especially the elderly, young and economically disenfranchised), and also strain public resources by necessitating increased healthcare and year-round disaster response plans that were previously seasonal[[11]](#footnote-11).

1. **Issues of Citizen Engagement**

**2.1. Communicating with the Public**

It has so far been established that immediate measures should be taken if the Stirling region is to weather, and thrive in, a changing climate. In the case of Stirling Council, **this document recommends a large-scale, unprecedented public information drive that:**

a) **conveys the urgency of climate change and its direct implications** for inhabitants of the region as an issue of imminent consequence**;**

b) **highlights the opportunities and benefits** of structural changes that must occur;

c) **articulates the importance of individual action** to mitigate said implications and;

d) **stresses that system changes are cross-party sanctioned** and outside the remit of electoral politics.

In the case of points a), conveying urgency, and b), highlighting opportunities and benefits, the Council has recognised the issue of public engagement in the past, aiming to “communicate and raise awareness of climate change challenges, issues, threats and any opportunities”[[12]](#footnote-12). However, although this may have been communicated to certain elements of society, it would seem normatively observable that this has not been the case for the average citizen. In an era of sensationalism, **deployment of words such as ‘emergency’ without a corresponding urgency to act dilutes their meaning** and risks eliciting a ‘boy who cried wolf’ scenario in the eyes of the public. To fully emphasise what a climate emergency entails, options to be considered could include use of public advertising space, introduction of extra-curricular sustainable living modules into the schools, and American-style town halls on the issue in line with the Council’s stated goal of a “wider communication consultation process”[[13]](#footnote-13). It is recommended also that the Council acts on its suggestion to publish a ‘climate change guide’ for public distribution[[14]](#footnote-14).

In regard to point c), individual action, several councillors have recently observed that corporate responsibility must be accompanied by responsibility at the individual level[[15]](#footnote-15). Indeed, the per capita emissions of citizens of Stirling is roughly 1.3 times the national average[[16]](#footnote-16). In order to encourage the required level of individual engagement in sustainable living, community members should be empowered to lead by example. One avenue to consider would be to apply an initiative undertaken by Historic Environment Scotland at a community-wide level, which grants the accolade of ‘Green Champion’ to those who commit two hours per month to undertaking activities such as composting and promoting reduction in waste. Community engagement is further encouraged by events such as conferences and seminars that reinforce positive behavioural change[[17]](#footnote-17).

Concurrently, engagement can be boosted by focal point ‘community hubs’ – centers, perhaps not unlike that of Transition Stirling – that promote local crafts, culture, and skills; serve as liaisons to the Council to articulate matters of local concern; and educate on sustainable living[[18]](#footnote-18). Given that the Council has already established Community Planning Partnership (CPP) Leadership Groups and Area Partnerships to lead, “develop, and implement local communication and participation strategies”[[19]](#footnote-19), these could serve as a vehicle of coordination for such ‘bottom-up’ initiatives that further integrate communities.

**2.2. Participatory Democracy as a Means of Meaningfully Engaging the Public**

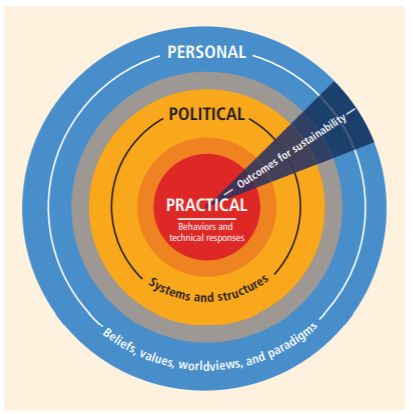
As per point d), the apolitical nature of climate change, of Section 2.1., the Council faces the unenviable task of rallying the public around the issue of the climate emergency while also framing it as a matter of apolitical concern. The Council’s Single Outcome Agreement recognises that business-as-usual approaches to addressing a climate emergency will be insufficient and advocates for “step-change”[[20]](#footnote-20) through comprehensive monitoring of and engagement with communities operating under ambitious timescales. On paper, this is a desirable approach; however, actual implementation will be a challenge both in the Chamber and in the public sphere, requiring a level of political capital that may not exist as party politics inevitably comes to define the rhetoric of a climate emergency.

The **establishment of a local Citizen’s Assembly** would facilitate the proposals outlined in the Single Outcome Agreement whilst shielding it from the mechanisms of partisan politics. By subjecting it to independent oversight and employing a quasi-random selection process of citizens and civilian experts, a Citizen’s Assembly could provide equitable demographic representation, widespread consideration of stakeholders, transparency to the process of deliberative democracy, and aggregate the best ideas deriving from civil society through continuous consultation with experts. From there, it could work in tandem with the Council, and other initiatives such as the CPP, to implement citizens’ ideas as well as expedite the democratic process when the legislature is unable to reach consensus.

Moreover, Citizen’s Assemblies are not new or untrialed endeavors; in fact, they have been deployed with notable success in a number of countries to provide effective public consultation and break polarised political deadlock. For example, a Citizen’s Assembly was successfully employed to reach consensus on the divisive issues of abortion and same-sex marriage in the Republic of Ireland; they have also been successful in countries such as Canada, Poland, and Australia – and, indeed, Scotland. Moreover, the UK itself recently established a citizen’s assembly on climate change at the national level[[21]](#footnote-21). By adapting this tried and tested method of deliberative democracy, the Council could better determine and implement necessary policies, gain public goodwill through increased participation, and, if successful, generate significant media attention as an example of sound local governance and responsiveness to a polarising issue.

**2.3 The Council as Leaders of the Citizenry**

Although there exists ample scope for increased citizen participation in confronting climate change, the role of the Council as an institution of leadership cannot be understated, for as important as civilians are as agents of change, so too are the elected leaders of the people. This is largely because institutions and their norms play a critical role in shaping definitions and manifestations of sustainability, while also influencing the ability of local communities to adopt and put these into practice[[22]](#footnote-22). In particular, vital contributors to the economy, such as farmers, cannot be expected to make standalone alterations and adaptations to practices and livelihoods; **citizens and businesses** **require an “enabling environment” facilitated by institutions of governance**[[23]](#footnote-23). Such an environment can be broken down into three spheres[[24]](#footnote-24). The first is the practical sphere, consisting of economic and technological initiatives and innovations propagated by the Council. The second is the political sphere, which relates to social and political norms espoused by institutions of leadership. The third is the personal sphere, i.e. the views and practices of the public, both shape and are shaped by political values. Understanding that all three spheres are codependent, and that all three are directly dependent on the leadership provided by local government and its values/practices, then, is essential.



*Fig. 1.: The interrelatedness of different spheres of transformation towards sustainability means one cannot act without the others.*

With this established, the Council cannot be viewed as an independent institution of change; it must be a diffuser of change that permeates all aspects of society from the top-down. Initiatives such as designating senior ‘Carbon Champions’ in departments, as seen in Angus Council, and electing champions of climate change to the council, as at Inverclyde Council[[25]](#footnote-25), provide strong examples of leadership to the public and should be adopted or otherwise integrated with existing policies. Other substantive examples should also be provided: publicly divesting from and repudiating all fossil fuels in favor of green investments, working with the national government to implement carbon taxes on industry involved in polluting activities that fail to make mandatory improvements, and banning all Council-related domestic air travel should be considered. A community-wide cap-and-trade system championed by the Council, as seen in British Columbia and California, also warrants exploration. Measures and others like these will reflect the Council’s willingness to make difficult changes and provide exemplary institutional leadership to citizens who are expected to make alterations to their own lifestyles.

At the same time, climate change awareness training, collaborative focus groups, and “toolbox talks on energy efficiency” for public servants will also imbue a culture of sustainability by which to provide example[[26]](#footnote-26). Structural upgrades to council buildings and infrastructure, such as further fleet electrification that phases out vehicles that run on fossil fuels, rollout of LED lighting, and adoption of best insulation and glazing practices[[27]](#footnote-27), will provide positive reinforcement to public servants.

1. **Issues of Transport Infrastructure**

**3.1. Encouraging Sustainable Road Transport**

In order to effectively deal with climate change, changes to institutions and individual behaviors will have to be matched with corresponding alterations to public services and infrastructure through decarbonisation of transportation. Doing so is a particularly pressing issue, as transport contributes to 27% of national emissions, 27% of which comes from road transport[[28]](#footnote-28). At the individual level, transport currently accounts for 34% of a household's carbon footprint[[29]](#footnote-29). In line with the public information drive that addressing climate change necessitates, large-scale awareness campaigns in conjunction with bodies such as Transport Scotland and Tactran will **promote sustainable travel choices** that are cost effective to the public.

The Stirling area sits between the major trade centers of Edinburgh and Glasgow and is heavily dependent on its road infrastructure – as demonstrated by the contentious Viewforth Link Road proposals[[30]](#footnote-30). Obviously, Stirling and its surrounding areas cannot and should not simply abandon this infrastructure – some 50% of journeys are made by car within Stirling[[31]](#footnote-31) – but aggressive initiatives must be undertaken to increase efficiency surrounding its usage. **Proposed roads**, such as the Viewforth Link Road and the Kings Park Braehead Ring Road, **should be holistically reconsidered** to determine if they are actually in keeping with emissions reduction targets and future trends of decreased private vehicle ownership, or simply satisfy short-term economic and political goals with capital that could be better invested in public transit or improving existing roads. Where it is insisted that new road infrastructure be built, as in the case of the Viewforth Link Road, mechanisms such as Clean Development Management (CDM) or Joint Implementation (JI) should also be employed to offset all emissions from construction and subsequent use so as to make them carbon neutral developments. This could be attained in part by making roads (especially new ones, but also including existing ones, such as the A84 at Raploch and the A9 motorway) into ‘green corridors’ by hemming them with trees that reduce air pollution and even mitigate flooding[[32]](#footnote-32).

For private vehicles, **road infrastructure needs to be made electric vehicle-friendly**, taking example from Historic Environment Scotland’s goal to eventually phase out all fossil fuel vehicles by 2032[[33]](#footnote-33). To facilitate this, latest research indicates that “there needs to be a massive rollout of charging infrastructure along motorways, in towns and in cities”[[34]](#footnote-34). Indeed, the Council has done some work to facilitate this transition; electric vehicle use in the Stirling area is on an upwards trend, with the amount of charging sessions conducted up 310% on 2015/16 and 79% on 2017/18[[35]](#footnote-35). This will mean significantly increasing the 19 council-owned units with charging points. Accompanying this should be a push for generous national subsidies for those purchasing electric cars, along with the establishment of local Car Clubs, lift-share schemes, and promotion eco-driving education programs, such as those championed by Central Scotland Regional Equality Council, for public and private sector organisations.

**3.2. Public Transit: Simplified and Sustainable**

**All public transit should be electrified** by 2025, achievable in urban centers by overhead electrical lines which provide a trolley-system. For rural routes, alternative fuel or electric motors should be considered for buses. Failing this, the Council should commit to mechanisms such as CDM or JI that effectively offset all carbon emissions generated.[[36]](#footnote-36) Bus services, which are decreasing[[37]](#footnote-37) in rural areas, should be expanded. Overall, accessibility to bus and rail should be increased, especially in regards to the Council’s intent to improve “key commercial and park and ride (P&R) routes, including: – City Centre to University/Alloa; City Centre to Bannockburn/Plean; Castleview P&R to City Centre; Springkerse P&R to City Centre; [and] emerging P&R sites to City Centre (including southern P&R along Glasgow Rd)”[[38]](#footnote-38). Park and ride facilities will require investment for construction, expansion and the establishment of travel hubs to facilitate low carbon travel around and beyond the region[[39]](#footnote-39).

Public transit as a whole should be incentivised for the entire population, as the reality is that using the transit system in Stirling can be a confusing and costly experience. To do this, the Council could employ **a model used in Vancouver, Canada, although** **the cooperation and incentivisation of the various privately-owned bus companies will be required** for it to be successfully employed in Stirling. In Vancouver, a ubiquitous travel card can be used across transit options. Credit or monthly travel passes can be loaded on to these cards, with lesser prices for young people and seniors. In the case of students, the cost of travel is taken on by universities by factoring it into fees. For passes with credit, money is deducted based on distance travelled with a ‘tap-in/tap-out’ system on trains, while a single flat rate is applied for buses. Monthly passes allow unlimited travel to all areas. For those without a travel card, tickets that are purchased on buses and trains are transferable to other services for up to an hour after purchase, while single day passes for the entire transit system can also be purchased. Fares are determined on a yearly basis, rising if infrastructure is being upgraded, and they are kept competitively low so as to disincentivise private vehicle use.

Buses accept coins only via ticket machines onboard, eliminating time wasted by drivers individually selling tickets to long queues of customers. Alternatively, contactless credit and debit cards can be ‘tapped’ on the travel card reader that deducts a flat rate. Finally, at individually numbered bus stops, a freephone number can be texted or called to provide a location-specific, automated timetable reading; the singular city-wide transit app can be used to access more detailed information, including real-time alterations and disruptions to services. Such simplification of the transit experience does not only encourage uptake and increase the efficiency of the system; from a tourism perspective, it makes public transit a far more attractive and less convoluted option for visitors, reducing the primacy of the car as the transport of choice for the tourist.[[40]](#footnote-40) It has been observed that rising tourism in the Stirling area is increasingly putting pressure on road networks[[41]](#footnote-41).

**3.3. Pedestrianising the Future**

As the Council has noted, **a modal shift to cycling and walking should be facilitated**. In order to achieve this, **vehicular use in Stirling City Centre must be reduced to an absolute minimum**, pedestrianising as much as possible so that only essential access is maintained – namely council services/emergency vehicles, vehicles for citizens with mobility restrictions, delivery vehicles, lift-share/Car Club vehicles, and public transit options. These vehicles would enjoy special status so as to access limited on-street parking. The main areas this would affect are the City South Public Realm (Albert Place, Dumbarton Road, Port Street, Upper Craigs, Wellgreen, and Newhouse), Stirling Station Gateway, and Cowane Street[[42]](#footnote-42). Smaller settlements within the Stirling area should also consider this model, or at the very least incorporate it into town-center development plans as they grow. Preceding implementation of the pedestrian model in urban centers could include low-speed zones, anti-engine idling enforcement, and car free areas during off-peak traffic hours.

These measures would revitalise local businesses and high street shopping through increased footfall, improve air quality/public health, reduce traffic accidents, and, of course, contribute to overall targets of emissions reduction. They would also increase the City’s aesthetic appeal and accessibility from a tourism standpoint. Irrespective of the type of vehicles Stirling’s citizens use in the future, parking facilities for those coming into the city would be required before they proceeded into the center via public transport or on foot. In this case, park and ride facilities could be used for long-term parking, while closer facilities adjacent to the City center would be limited to short-term stays, generally for locals undertaking day-to-day tasks such as shopping.[[43]](#footnote-43) While parking fares and availability should not be draconian, they remain “one of the most effective measures available to the Council to manage traffic”[[44]](#footnote-44) and as such should be structured so as to make it more cost-effective and convenient to access urban centers via transit from park and ride centers and transit hubs.

As private vehicular travel becomes increasingly disincentivised, the benefits of cycling and walking will have to be clearly conveyed for residents and tourists alike, from both a practical and a health standpoint. The Council’s own target to maximise the uptake of these options by 2022[[45]](#footnote-45). To do so, further initiatives such as the successful Braehead and Broomridge cycling and walking project and the Cowie streetscape project will require replication. Public bike-share schemes should be universally introduced, perhaps by looking to a pilot project carried out by Historic Environment Scotland, which partnered with a charity to introduce refurbished Royal Mail bikes for public use; for every bike purchased, one is sent to Malawi to aid communities there.[[46]](#footnote-46) NextBike Stirling/Pedal Forth are already existing programs that could also be supported through continuation and expansion. Stirling is thus primed to become a cycling hub, having numbers of people using bikes to get to work exceeding the national average.[[47]](#footnote-47) To encourage further uptake of this transport type, plans for a ‘Green Network’ should be pursued, as proposed by the Transition Stirling plan, that connects the community with active travel routes by 2025[[48]](#footnote-48).

1. **Issues of Building and Energy**

**4.1. Building Stirling’s Future**

For reasons of both efficiency and mitigation, the impacts of climate change will eventually force momentous changes to how buildings are constructed and operated. In terms of mitigation, Stirling is increasingly threatened by water: flooding in the winter and water shortages during the summer[[49]](#footnote-49). These conditions are likely to worsen over time, demanding **stringent building codes** that allow buildings **to weather the forces of nature** that will increase in magnitude over the years as their structural integrity concurrently depreciates. These codes will also have to be adopted for the more imminently pressing factors of **meeting required emissions targets and financial cost**. As with most methods of mitigating the effects of climate change, the urgency of accepting that, in the words of Chris Stark, Chief Executive of the Committee on Climate Change for the U.K. government, “We need a real plan, and the sooner we do, the cheaper it will be overall” should not be understated[[50]](#footnote-50). The Council has not set emissions targets for, among several others, the construction and land use sectors[[51]](#footnote-51); doing so would provide the necessary stringency to start making these investments today.

Stirling Council currently allocates significant budgetary resources to investing in the energy efficiency of buildings. Techniques such as **installing A-rated gas boilers, external and internal insulation, and solar photovoltaics (PV)** in Council Housing has, between 2018-2019, cost over £4.6 million – £4 million of which was commanded by PV[[52]](#footnote-52). A further £938,638 was designated for insulation of private properties. It is beyond the expertise of this writer to give figures, but it would seem intuitively apparent that significant further capital will need to be allocated in this vital area in order to rapidly bring all buildings up to speed with best practice at a rate of thousands, rather than hundreds, per annum.

As an organisation with properties that are inherently acutely exposed to climate change, Historic Environment Scotland is ahead of the curve in terms of adopting efficiency measures to alleviate climate change and represent a potential partner with which to collaborate. In one example, the organisation invested just over £480,000 in climate change upgrades in one property, resulting in a 30% reduction in energy usage, a 40% fall in associated emissions, and “a cumulative financial saving of £782,357 giving a payback time of approximately 5 years and an overall saving of £300,450 since payback”[[53]](#footnote-53). Impressive figures like these were in part achieved through involvement of contractors utilising best practice and materials. The knowledge gained was then shared with communities seeking to make similar savings to promote upskilling and use of local materials[[54]](#footnote-54) – a socioeconomic win-win that could be transferred to Stirling.

* 1. **Energising Energy Procurement**

Stirling Council and many property owners in the region have partially recognised that **returns come from investment in building efficiency**: at least 742 properties in the area have PV installations, which generate over 1.7 million kilo watts of electricity per year, saving an overall estimated 1,038 TCO2 per year at a financial saving of £263 per tenant[[55]](#footnote-55). New battery technology is also being pioneered in select homes to store excess electricity generated during the day for use during the night. They can also hold less expensive off-peak electricity procured from the grid during the winter. Overall, this has resulted in financial reductions to household electricity bills while making the homes “over 90 per cent self-sufficient in free electricity generated from the solar panels” that supply the batteries[[56]](#footnote-56).

**Initiatives like these should be scaled up as much as practically possible – as should other means of energy procurement which Stirling is utilising**. Among the most promising of these is the recent £6 million partnership with Scottish Water Horizons to build a network of low carbon, cost efficient heating through upcycling of wastewater. The opportunity to expand this initiative beyond select public buildings exists and should be seized upon immediately, promising local job creation and upskilling, reductions in fuel poverty, baseline emissions savings of 381 TOC2 per annum, and financial dividends for the Council[[57]](#footnote-57). In the same vein, as an area with potential for wind farm development, so-called ‘Group 3’ areas – those “likely to be acceptable”[[58]](#footnote-58) for strategic turbine placement – should be developed to their fullest extent; suggestions that the minimum height of turbines be raised to 51 meters should also be given credence, as substantial wind farm investment represents an opportunity to create technical jobs in an economy that will demand retraining for workers and to meet renewable energy procurement targets.

To accelerate and cement the move to 100% renewable energy procurement, **Stirling can look to other successful regions, such as California.[[59]](#footnote-59) This state enacted a Renewable Portfolio Standard** that legally obliges all retail to pursue renewable energy procurement according to a Least-Cost Best-Fit (LCBF) methodology that takes into account economic/quantitative considerations, and social/qualitative considerations[[60]](#footnote-60). Further research could be conducted into the viability of scaling this initiative down in order to make Stirling a U.K. exemplar of renewable energy efficiency and procurement.

**5. Issues of the Circular Economy**

**5.1. The Economy of Recycling**

According to Zero Waste Scotland (ZWS), a circular economy that prevents new waste generation is one of the most effective ways to reduce carbon output – by 2050, a well-established circular economy could prevent 11 million TCO2 from entering the atmosphere every year[[61]](#footnote-61). Stirling is one of the most advanced recycling communities in the U.K., being on track to meet ZWS targets of 70% recycling of household waste with no more than 5% of that going to landfill by 2025[[62]](#footnote-62). The continued reduction of nonrecyclable waste will likely be aided by the recent standardisation of waste collection across the region – all areas should be beholden to the exact same recycling and waste disposal standards. However, as articulated in the foreword, this document argues that it is better to set ambitious targets that may not be met than to comfortably attain those that are easy.

A feasibility study could be conducted on how to exceed these targets. For example, the soon to be national **refundable deposit system for plastic and glass bottles** should be put into practice as soon as possible. The introduction of water fountains across urban centers, especially Stirling, would likely drive down single use water bottles, especially among tourists during the summer season. In the same vein, public street bins (the numbers of which could be increased in all areas) need not be refuse bins; many countries supply them in pairs or even threes, the other two being a recycling bin and another for compostable food. Specialized recycling centers could be better served by public transit for those who wish to recycle plastics not collected by the council but are in fact recyclable at these locations.

In addition, **recycling efforts are hamstrung by a discrepancy between what grocery supermarkets and the council deem recyclable**. Most products contained in plastic, especially the ‘house’ ranges of supermarket chains, are simply labelled ‘not yet recyclable’. Fresh produce, in particular, is almost always packaged in nonrecyclable plastics. It would be beyond the authority of Stirling Council to force changes to the national supply chain standards of these corporations. However, at the local level, this could be ameliorated somewhat by **mandatory compliance agreements that levies taxes on certain nonrecyclable packaged goods that must be borne by the supplier**, the revenue of which goes into Council recycling services.

The primary reason for the proliferation of nonrecyclable packaging is cost efficiency for supermarkets, which are neither incentivised nor legally compelled to a) use recyclable packaging, b) use no packaging for select produce (such as fruit and vegetables, as is the case in Canada), or c) provide recyclable/biodegradable newspaper wrap or paper bags to consumers. Furthermore, a multitude of products on shelves, such as crisp packets, are routinely labelled as recyclable but are not accepted by Council recycling services, contributing to the twofold effect of confusing consumers who want to commit to zero-waste lifestyles and allowing suppliers to ‘greenwash’ their hands of any societal obligations or environmental liability. It would **take a simple sticker labelled “recyclable for Stirling” on products to definitively ascertain what products are and are not recyclable in actuality**. Given that public pressure campaigns have forced changes to the supply practices of supermarket chains such as Aldi[[63]](#footnote-63) in the past, those backed up by the Council would likely have even greater success as corporations try to protect their brand image in the eyes of increasingly environmentally conscious consumers.

**5.2. Changes for the Future**

Another bulwark to the attainment of the circular economy is single use plastics. For example, the **hospitality industry (namely restaurants, cafes, and hotels) should be mandated to compost all food waste, remove plastic straws from service, purchase recyclable and reusable serviettes, and subject coffee cup lids to a council levy**. The drive against single use plastics should not be merely confined to this sector, however; all businesses should be subject to waste audits that streamline consumption, update waste contracts and even designate a special Project Officer to oversee the transition to a circular economy[[64]](#footnote-64).

As discussed earlier in this document, as perhaps the greatest institution of leadership in the area, **the Council must embody good practice – and so should go beyond commitments to review single plastics use with the view of phasing them out entirely**. However, as of 2018, the Council as an organisation uses over 600,000 single use plastic cups, containers, and cutlery every year[[65]](#footnote-65). Other plastic-intensive institutions, such as schools (some of which, anecdotally, use approximately 55,000 single use water bottles per annum) can then follow suit. Schools in particular should be considered a focal point of the circular economy, as graduates from these will enter a future in which this economic paradigm is the norm. It seems somewhat incongruous, then, that the number of schools with Green Flag awards is declining[[66]](#footnote-66). Moreover, most are not obliged but rather volunteer to sign up with the Keep Scotland Beautiful Eco-Schools program – less than half of which attained Green Flags[[67]](#footnote-67). It is important that there is emphasis on inculcating a sense of environmental stewardship in the next generation through robust education programs dealing with present and future ‘real world’ issues such as transport, ecosystems, waste, and food security.

**6. Issues of Ecosystems and Ecotourism**

**6.1. Restoring Stirling’s Ecosystems**

Science has definitively established that the climate is changing. For Stirling, it has meant winters that are 17% wetter than in the past[[68]](#footnote-68). By 2050, the increase could be as high as 60%; at the same time, summer temperatures may rise 4-5 degrees Celsius[[69]](#footnote-69). Ecosystems will be humanity’s greatest allies in mitigating these effects – but they will require help if they are to help us. A massive program of ecosystem restoration, the likes of which have never been seen before, will have to be undertaken. If successful, the protection and prosperity they bring to the people of Stirling will be written in to our past – and future.

**A massive tree planting scheme will, sooner or later, be a national undertaking** – if the U.K. is to meet its current carbon neutrality targets of 2050, some 1.5 billion new trees will be needed[[70]](#footnote-70). Stirling can both lead the way and reap the benefits of this sea change: trees not only sequester carbon; they provide a host of other immediate benefits, such as lowering temperatures and minimizing flooding. In Stirling, they represent **an** **opportunity to create forestry jobs and a local source of fuel and construction material**. Tree planting is not an activity to be undertaken in insolation, however. It will require concurrent investments in wildflower meadows, hedgerows, rivers, and more[[71]](#footnote-71).

For example, the Stirling area is intrinsically tied to its expansive river system. The catchments of this in large part find their confluence at the River Forth near the City. As indispensable as these waterways are in sustaining Stirling, they are equally capable of wreaking severe disruption, as evidenced by the City’s historic vulnerability to flooding. By 2100, according to the Scottish Environmental Protection Agency, the Forth region will experience a peak river flow of up to 40% total rainfall in the region[[72]](#footnote-72). As local weather becomes wetter in winter seasons, preventive management of rivers will become all the more pressing. This reality presents an opportunity to promote a wide study into how to **return Stirling’s rivers to their natural state and to implement Natural Flood Management (NFM) strategies** that will aid in mitigating some of the impacts of climate change, including flash flooding[[73]](#footnote-73). In particular, effective management the upper catchment will provide benefit to urban areas downstream, slowing the river flows and making landscapes and habitats more resilient to the impacts of climate change.

What is required, then, is not piecemeal restoration of aspects of ecosystems, but **the total restoration of a wide variety of habitats in available urban and peri-urban spaces in Stirling**. It will require expansion on existing plans and initiatives, including, for example, the Council partnership with On the Verge, which has transformed 32,000 m2 of grass into meadows[[74]](#footnote-74). For the greatest positive impact on biodiversity, funding should be directed toward improving existing habitats and creating habitats that contribute connectivity to other habitats within Stirling – the importance of integrated habitat networks for the persistence of flora and fauna is well-established[[75]](#footnote-75). To achieve this, the Stirling area could look to biodiversity initiatives championed in neighboring Falkirk for inspiration[[76]](#footnote-76).

Relevant targets the Council has signed up to, such as the 2020 Challenge for Scotland’s Biodiversity, should be adopted and updated[[77]](#footnote-77) to reflect this change. The 2018 Stirling Plan, the master plan for the region’s development, calls for, “appropriate measures for the safeguarding, conservation and enhancement of the historic and natural environment”[[78]](#footnote-78). It will likely have to be revised to account for the true scope of environmental restoration that scientists deem sufficient to address climate change.

**6.2. The Green Tourist**

The financial cost of tree planting, habitat restoration, and orientating society around nature is implicit. The good news, however, is that wise investments yield dividends. Perhaps the best example of this is the **proposed Stirling City Park and River Projects**, part of the Stirling City Region Deal, a plan representing an opportunity for both environmental stewardship and socioeconomic benefit. If successfully undertaken, Stirling could become known as an international leader in these areas.

Stirling is an internationally known outdoor tourism destination, with over 3 million outdoor visits every year. If the Deal is brought to fruition, the redevelopment could bring an extra 580,000 visits to Stirling City, along with an estimated £20 million in disposable income[[79]](#footnote-79). For the inhabitants within the two projects, **this would mean an estimated £4.71 million in welfare benefits every year**.[[80]](#footnote-80) In all, the projects could bring an economic Internal Rate of Return on investment equivalent to annual yields of 12.5% and 13.7% respectively over 50 years[[81]](#footnote-81). Perhaps more importantly, though, the projects would bring features, such as a city farm, a community orchard, and arboretum zones that would **“increase the biodiversity of the site and also assist in alleviating flooding”[[82]](#footnote-82), bring greenspace to the citizenry, and reduce the output of carbon**.

**7. Issues of Food Security and Agriculture**

**7.1. Food Supply and Sustainability**

With food accounting for 30% of a household’s carbon footprint[[83]](#footnote-83), the way in which Stirling’s citizens both consume and procure their food will necessarily change, especially because climate change will cause disruptions to the prices and supply of global food chains. Again, community engagement will be needed to catalyze adaptation measures; **citizens need to understand the impact of food they consume on the environment, with legislation introduced to provide ‘carbon impact labelling’ on products**, till receipts, and shopping websites. At a minimum, there will need to be a 20% decrease in red meat and dairy consumption[[84]](#footnote-84) that is portrayed as both healthy and environmentally responsible. **Public information initiatives, such as ‘meat-free days’ and promotion of vegetarian and vegan alternatives**[[85]](#footnote-85), should be encouraged by local health and environmental authorities. These established, **the Council should encourage the national government to begin cutting and redirecting subsidies for livestock and start introducing incremental VAT increases on these products** – using the imminent end of EU CAP funding as a window of opportunity to reevaluate national agricultural policy. In particular, **those with the highest carbon footprints, such as air freighted produce, should be first and foremost subjected to higher taxation rates**. This will help encourage a consumer shift to foodstuffs deriving from the local economy.

**7.2. Supporting Local Self-Sufficiency**

At the same time, **the farming community in Stirling cannot be alienated**, especially meat and dairy producers. **Many will have to be given confidence in retraining programs, as well as access to financial incentives for providing services such as carbon storage and soil/wildlife protection** – in line with national government plans to pay landowners for providing public services[[86]](#footnote-86). A normatively appealing **redirection for dairy and cattle subsidies would be into organic agriculture** which would dramatically reduce agricultural runoff and ecosystem decline as well as raise standards of produce for consumers. Such initiatives will help reverse the blanket narrative that agriculture is part of ‘the problem’; in fact, farmers acting as community stewards have the potential to be an integral part of ‘the solution’ that no other sector of society can provide. For instance, by growing novel water-borne crops, farmers could be on the frontline of preserving Scotland’s biodiverse peatlands that are subject to soil erosion from conventional agriculture – thereby preventing up to seven million tons of sequestered carbon entering the atmosphere[[87]](#footnote-87). In providing essential local ecosystem services, farmers may also have the opportunity to benefit from Stirling’s status of a tourist destination by becoming hubs of agritourism through cooperation with tourism bodies.

To support local farmers, targets of self-sufficiency, and the environment, **local produce should become the norm at the household table**, instead of far more environmentally damaging imports. Farm-to-table produce will lower emissions from transport, reduce packaging, reinforce positive behaviors of sustainability within the community and, of course, provide net social and economic benefit for the population by supporting local jobs and trades[[88]](#footnote-88). As an example, the Stirling Food Assembly, which sells produce from local producers and incentivizes consumers to buy local, has had demonstrable economic benefit – even in its limited scope[[89]](#footnote-89). Advertisement and expansion of this and other local points of sale, such as the Stirling Farmers Market, represent an opportunity to engage the community with sustainable, local food of unparalleled quality. Moreover, as the largest suppliers of produce to the population**, supermarkets and other grocers should be encouraged by the Council to make local produce the focal point of their sales**, replacing international supply deals with goods directly from the community[[90]](#footnote-90).

Finally, **new techniques of food supply should be pioneered** at an early stage to insure against the impacts of a changing climate on the food supply chain. At the individual level, **community members will need to have access to the space and technical skills required to grow vegetables at home**, in community gardens, street gardens, and so on[[91]](#footnote-91). Council programs such as The Edible Borders project, under which Council Land Services planted vegetables across Stirling city for residents and charities, should be made ubiquitous across communities in the region. Furthermore, unused land could return to ‘the Commons’ for productive use by amateur fruit and vegetable growers. **For farmers, new crops that are adaptable to a changing climate should be promoted**, such as *Glyceria fluitans*, as a cereal staple crop, bulrush for fodder and building material, and sphagnum moss to replace chemical fertilisers[[92]](#footnote-92).

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