

LOCALISATION OF GLOBAL SCENARIOS FOR CITY DEVELOPMENT

This paper will explore visions of sustainable urban development in the UK, specifically the Southwestern region of Bristol and Bath. We start with a description of the UK's current sustainable development policy and regulations, before turning to a discussion on alternative visions of city development. One of these different visions will be taken as example, that is the Regenerative City vision, taking inspiration from the ideas of Herbert Girardet. The aim is to try and understand whether this Regenerative City vision could be applied and attained in Bristol in the future. We try to understand this by looking at what a Regenerative Bristol would look like in the future, and by exploring the many different actions we can take in the present that could help us achieve that vision in the future.

1. CURRENT APPROACH

Why do we need sustainability?

We start this discussion with an overview of current sustainable urban development policies in the United Kingdom (UK). However, before looking at the particulars of UK policymaking in this area, it is worth exploring the reasons why there is now thought to be a need for more sustainable policies. Indeed, while nowadays the need to think about development in a sustainable way is generally understood and accepted, there is still some opposition to the notion of 'green' or environmentally friendly policymaking.

There are many different aspects to sustainability and thus, different definitions have been produced over the years. Perhaps the most famous of these comes from the World Commission on Environment and Development (also called the 'Brundtland Commission'). According to the Brundtland Commission, sustainability is about "not compromising the ability of future generations to meet their needs" (Grant Thornton, 2011: 8) while trying to meet our own, present needs. This would seem like a key point for policymaking all over the world. And yet, many years after the Commission's statement, sustainable development is still not at the heart of many national governments' work. Of course it is true that people, in general, struggle to think of future threats as being on the same level of importance as present-day ones. However, there is now a growing acknowledgement of the global trends that will be potentially devastating for the future of our planet. With this has come a recognition of the fact that these trends will "require prompt, large scale and profound decisions to be taken" (Sustainable Development Commission, 2011). The environmental issues affecting us are many and varied, and sometimes overlapping, and have been brought about by a series of factors, which include trends of ever-expanding growth and consumption. Examples of these problems are climate change, ecosystem destruction and contamination, genetic loss, overpopulation, deforestation, overfishing, air pollution, sea-level rise, acidic rain. All these phenomena can be so disruptive as to "break the linkages that permit the regenerative capabilities of the biosphere to function" (Caldwell, 1996: 7) correctly. The transition to a sustainable way of life has thus appeared to many to be the most obvious

choice for human development. Hence the importance of sustainable policies, aimed at preserving our environment, our biodiversity, and at helping to create a balanced, “sustainable relationship between humankind and the life supporting systems of the Earth” (Caldwell, 1996: 9). If we act now, we might be able to design our cities in a way that does not jeopardise the Earth’s ability to provide for future human and planetary needs, for the benefit of all.

When it comes to urban development in particular, some aspects can be identified as key features of sustainability. There is the economic aspect - the ability of a city to flourish in business and commercial terms and to have a strong and competitive economy; the environmental aspect, this relates to both the physical space that the city occupies as well as its natural and historic environment, and its wider ‘footprint’; the social dimension, mainly concerning factors such as quality of life, public health, poverty and community regeneration; and finally the institutional dimension, this plays a “supporting role” and creates appropriately sustainable governance mechanisms “which align with long term sustainability objectives” (Grant Thornton, 2011: 8). Government policy can help in all these areas by creating mechanisms which ensure innovation and promote healthy communities and a protected environment for our cities. An urban development policy is thus considered to be sustainable if it is environmentally, socially and economically viable in the long term period, in a long term institutional structure.

This idea that the cities of the future need to be sustainable has been adopted by many (though not all) policymakers, governments and organisations all over the world, with the private and public sectors now finally making strong links “between the sustainability of the environments in which they operate and their own long-term sustainability and viability” (Grant Thornton, 2011: 8). But why are cities so important to ensure a sustainable future? Quite simply, cities are important because that’s where the majority of people will live in the future, based on projections. It is believed that thanks to a steady growth in urbanisation which started to gain its momentum in the 19th century, the number of people living in cities by our mid-century will vastly outnumber those that don’t. According to some scholars, we had already reached this “tipping point in 2008” but by 2050 the world population is predicted to be around “80% urban” (Grant Thornton, 2011: 10) (other figures range from about 70% to over 80%). Of course, this would mean a continuation of cities’ enlargement in order to include the suburbs and surrounding countryside. Additionally, the scale of a city and the scope of city administrations make it particularly well suited to policy experiments and the implementation of SD policies. Given this vision of our “planet of cities”, it is clear that cities will play a crucial role in the future. Thus it is important to adapt our urban living and working environments to be resilient in the face of challenges to their economic growth, use of resources and local environment.

UK Sustainable Urban Development Policy

We now turn to look at the United Kingdom's specific policymaking regarding sustainable (urban) development.

As we have seen, thanks to the high rate of urbanisation we are experiencing in our times, the question of the future of cities is increasingly becoming a focus for national governments. These, along with local-level policymakers, have joined international organisations and institutions in thinking about what changes we can expect to see to cities in the long term period, and what we can do about it. Recent studies (including from the UN) show that an estimated majority of the world's population will be living in urban areas by mid-century, as opposed to about 50% now. Cities "are expected to continue to grow in number", with an estimated "40 mega-cities worldwide by 2030" (Moir, Moonen and Clark, 2014: 8) as opposed to 28 today. These will include cities like Delhi, Shanghai and Tokyo. Although this process of urbanisation is predicted to be geographically irregular and uneven, with nearly 90% of the "increase in urban population by 2050 expected to be concentrated in Asia and Africa" (Moir, Moonen and Clark, 2014: 8-9), UK urban centres will face a lot of challenges in the coming years too. Different British governments have started to consider taking action in this area since they want to ensure that despite these changes, UK cities will remain economically and environmentally resilient. Emphasis has been put on cities' ability to maintain a sound economy regardless of some specific UK challenges such as rising sea levels (Thames Estuary), rising temperatures and soil conditions, extreme weather events like flooding, and transformation of precipitation patterns (DEFRA, 2012: 5).

There are many principles guiding the UK's plan for a sustainable development of cities. They all reflect the UK's idea of sustainable development (SD). According to "Securing the Future", a 2005 government's paper, SD is intended as a long-term agenda that is not in conflict with growth and prosperity, but which instead promotes new "ways of living, working, producing and travelling" that also "stand to achieve wider benefits to human health and well-being" (HM Government, 2005: 3-4). The following set of UK SD principles are identified in the paper (HM Government, 2005: 16-17): 1. Living within Environmental Limits; 2. Ensuring a Strong, Healthy and Just Society; 3. Achieving a Sustainable Economy; 4. Promoting Good Governance; 5. Using Sound Science Responsibly. It could be argued that this is a very traditional way of thinking about SD policy, with the state's use of the economy and good governance to achieve a more green society. SD is important for the UK because it helps promote better environments, which in turn brings social and economic benefits. There seems to be a clear focus on the economy: SD is pursued through "a sustainable, innovative and productive economy that delivers high levels of employment" (HM Government, 2005: 16) along with a socially inclusive society. Importance is also placed on the efficient use of energy and other resources: inefficient use is seen as "a drag on the economy" (HM Government, 2005: 17).

The newer Coalition government that followed refreshed its SD vision but based it on the 2005 strategy. In its papers the government recognises the previous 5 pillars for SD policymaking and as part of these it highlights, among others, "the importance of stimulating economic growth and tackling the deficit" (National Assembly for Wales, 2015). The UK is committed to SD, with the Department for Environment, Food and Rural Affairs

(DEFRA) as a key player in this policy area. DEFRA helps develop SD tools and mechanisms for assessment and implementation, encourages sustainable procurement across the whole public sector, and has helped develop a “new set of sustainable development indicators” that measure progress on “key issues that are important economically, socially and environmentally in the long term” (Department for Environment, Food and Rural Affairs, 2015).

These important key issues are many and varied. The need for sustainable consumption and production is one of them; this involves reducing inefficiency at every stage of the production process. Then there’s climate change and the government’s commitment to tackling it. The UK seeks to reduce and optimise its energy use and carbon emissions and to adapt to the overall “future impacts of climate change on the environment, economy and society” (HM Government, 2005: 72-73). This is also to be achieved through supporting the development of “low-carbon technologies such as renewables and nuclear” (DECC, 2015) energy, believed to be essential for the UK to secure its own energy supply. The Government also claims it is taking steps towards a ‘green economy’ which will bring growth without underestimating the importance of natural capital. Environmental protection is indeed another policy principle, along with the need to protect natural resources essential “for our economy, our wellbeing and our long-term security” (DEFRA, 2011). Another aim is to create enabling and empowering communities that reflect SD principles and practices. This is all part of the ‘Big Society’ idea of communities of local people involved in local action, which is supposed to improve general well-being and environmental awareness (DEFRA, 2011: 5-6). Finally, the Government is firmly committed to greening itself as well, that is: to reduce its own environmental impact. This will be achieved by reducing its greenhouse gas emissions and waste production, reducing water consumption, and improving recycling processes (DEFRA 2014) in all Departments. All this is also accompanied by monitoring indicators to ensure transparency and to make sure the Government is seen as leading by example in this area “through the ambitious greener Government targets” (DEFRA, 2011).

These SD issues are reflected in the UK’s urban SD policy. Local government and city authorities are asked to adopt all these sustainable development practices, to make sure that those local areas are better prepared for the challenges of the future that we mentioned before. The Government believes that a good relationship between the built and the natural environment is essential. Policies such as urban planning, and especially the National Planning Policy Framework (NPPF), thus help put the focus on the Government’s vision for SD for cities. Here are some key features of this vision:

1. SD is fundamentally seen as being about ‘positive growth’ that helps improve our cities for our generation and future ones. Crucially, a presumption in favour of SD has been put at the centre of the NPPF. This is seen as a “basis for every plan, and every decision” (DCLG, 2012: i-ii): local authorities should therefore do their best to ensure their policies reflect this presumption and favour developments that are indeed sustainable.
2. Planning for cities should be less about simple scrutiny and more about actively and creatively trying to find ways to enhance our urban spaces. Specific focus is given to

economic outcomes of sustainability initiatives and Government support for growth through the planning system.

3. Decisions on urban and city planning should be “a collective enterprise” (DCLG, 2012: ii) and should aim to include all affected stakeholders such as local communities and neighbourhoods. Cities should encourage community-led initiatives that promote SD and a higher quality of life.
4. There needs to be a boost to the supply of housing. Cities are advised to use evidence to ensure they meet the needs for affordable housing in the markets, especially by appropriately identifying local sites and land. Planning for larger scale developments such as “new settlements or extensions to existing villages and towns that follow the principles of Garden Cities” (DCLG, 2012: 13-14) should also be encouraged if appropriate to the area. Precedence should also be given to developments that aim to retain cities’ cultural and historical heritage while at the same time complying with environmental regulations and SD legislation.
5. Spaces and habitats that have been depleted or degraded can be “refilled by nature” (DCLG, 2012: i) and restored. This includes land such as from Green Belts, which help prevent urban sprawl. The Government is committed to preserving them, as they are essential for urban regeneration and for “safeguarding the countryside from encroachment” (DCLG, 2012: 19). Cities should therefore take action to preserve and enhance this land.
6. More collaboration between cities is to be encouraged. This can be especially important when planning for the protection of regional wildlife and enhancement of the natural local environment. Measures should be taken to reflect “the Government’s commitment to halt the overall decline in biodiversity” (DCLG, 2012: 25), for example by minimising pollution and by “mitigating despoiled, degraded, derelict, contaminated and unstable land” (DCLG, 2012: 25-26).
7. Local authorities need to be prepared to meet challenges such as climate change, coastal change and flooding and implement appropriate strategies. Urban development planning will be a major instrument for cities to improve their own resilience, reduce greenhouse gas emissions, and move towards a low carbon energy system.
8. Cities should assist with the creation of a sustainable transport system, although this is only expected to happen according to different communities’ requirements and needs. Reducing congestion should be high on local authorities’ priority list.
9. An advanced communications infrastructure is to be encouraged, as it will facilitate cities’ provision of services and improve their “sustainable economic growth” (DCLG, 2012: 11).
10. Support needs to be given to rural areas or deprived areas as well, by improving their growth, competitiveness and prosperity through SD principles. The Government is in fact “committed to supporting rural communities by protecting our environment, growing the rural economy and creating more jobs” (Natural England, 2015).

These, in summary, are the key points of the Government’s vision for SD as related to urban planning. The need for cities to be resilient in the face of changes such as rising urbanisation,

climate change and pollution is acknowledged. But instead of massive changes to our way of life, in general, the idea is that with short-term action and innovation, solutions for our cities that are sustainable and economically viable will be found and “delivered with precision...on an industrial scale” (Innovate UK, 2015). These policy solutions, adopted in the short to medium term period, should ideally help our cities to adapt for the longer term one. This ‘top-down’ policy framework, from the national to the local, seems to be more about ‘tweaking’ policies here and there to help promote a uniform idea of sustainability at the different local levels, and less about a radical change to how we generate energy and growth, or how we manage the economy and resources. Although a national government-led policy might not take into account all the specific local factors, it does have the advantage of being able to organise concerted action that looks to the long-term, at different local levels in the short and medium terms.

However, this is arguably just one of the many approaches available to us. In the next part of this paper, I introduce and describe one of these alternative visions of Urban Sustainable Development (USD), the Regenerative City vision.

2. ALTERNATIVE VISIONS

Alternative Visions for City Development

Before outlining the characteristics of the Regenerative City, which has been chosen as case study, we will briefly analyse some other visions of future city development. These are many and varied, and they present future city ideas that are somewhat different from the UK Government’s ‘business as usual’ foresight; here are just some examples.

1. The first vision here presented does not seem to diverge too much from the one described in Part 2, since it includes SD policy solutions, but also retains, in small part, the idea of dependence on traditional mechanisms like fossil fuels. It comes from professional services firm **Grant Thornton**. In their “Sustainable Cities” report, they talk about the city of the future as being “an eclectic mix of sustainability solutions and shorter supply chains” (Grant Thornton, 2011: 7). It is a city that does not rely on grid supply as much as it used to (although it is not independent from it), and is very much technology driven, although it does not distance itself from its past and heritage. Technology is now a key and vital part of every urban space, in the form of smart meters and mechanisms that enable citizens to interact with their environment in a way that was not possible before. This has led to an increase in efficiency, functionality and interactivity (Grant Thornton, 2011: 50). According to this paper, if we were to wander around this future city, we would see a “colourful and diverse bloom of vegetation” (Grant Thornton, 2011: 51) everywhere, eco-power stations, a “fleet of small, waste methane-powered and electric collection vehicles” (Grant Thornton, 2011: 51), a lot less private petrol and diesel powered cars, and a lot more bikes and green public transport. There is also a flourishing of solar panels, a network of small area heating and energy solution, and lots of

community- and corporations-owned urban orchards. All this paints a (very optimistic) picture of a city that is now thriving, resilient and steadily transitioning to a low-carbon economy thanks to its past SD strategy focusing on resource and waste management.

2. The second vision comes from **Salter Baxter**, an international communications and strategy advice company. It is explained in its “Cities in Focus” section of their annual report. According to this company, given growing populations, outdated infrastructure, pollution and poor housing, what we really need to make our metropolises cleaner is careful planning. This, along with “innovation, investment and cooperation” (Salter Baxter 2010: 17) could help us create low-carbon and green urban spaces. What are the main features of these future ‘green’ conurbations? Firstly, they will have taken the time to measure and reduce their greenhouse gas emissions, for example by retrofitting existing buildings before 2050. Smart meters will have been deployed everywhere, helping consumers understand and manage their usage and demand. Decentralized energy networks with smart grids will be common, with a significant reduction in energy waste and costs. Waste and solar energy and heat production programmes will be well underway. Sustainable transport and electric or hybrid vehicles will be a reality, with more people using bikes than ever before: all this will lead to “cleaner, quieter cities” (Salter Baxter 2010: 19). Other features include: solar charging bays for cars, high-speed rail, waste-converting power plants, zero-carbon housing with “onsite renewables” (Salter Baxter 2010: 21) and microgeneration (local generation of heat and electricity), and biofuel planes. Moreover, this vision is based on the gradual but steady shift away from oil towards a biofuel society: in this future city, biorefineries convert various waste and products into fuel, animal feed and oils. To achieve this very techno-centric city vision, a significant shift in mass behaviour is required, especially if we are to understand the need to make radical changes to the way we live, and think about our energy system and economy. Moreover, according to this vision, a ‘holistic’ SD policy framework such as this will have come from complex interactions and cooperation between cities, and between city departments. The key message of the Salter Baxter city vision is that it is achievable, “if we can marry science, political will and technological innovation” (Salter Baxter 2010: 18).

3. The third idea is that of the Compact City as described (but not created) by multinational **SHELL**. This can be found in a recent Shell Scenario study on future economic, social and political developments. This research too acknowledges the need to make cities efficient in the face of a growing urban population and “pressure on vital resources of energy, water and food” (SHELL, 2015). According to them, the solution lies in “compact, densely- populated, well-planned cities with effective integrated infrastructure and services” (SHELL, 2014: 5). These Compact Cities will be resource-efficient and attractive: they will be places where urbanisation has been properly managed, so that it has not led to “declining quality of life, greater environmental degradation, accelerating greenhouse gas emissions, social stresses and political turbulence” (SHELL, 2014: 4). Instead, people in well-organised compact cities will be able to enjoy the good things that come with growing urbanisation: a wide and diverse

economy, innovation, and prosperity. Although the research itself states that residents actually consider relatively spacious cities attractive, it argues that “from a resource perspective, the ideal evolution for any city is to become increasingly compact with more efficient, integrated infrastructure and effective public transport” (SHELL, 2014: 46). A denser city will positively address issues such as energy waste, long transport journeys and petroleum dependency. This is because in a compact city energy can be reused more efficiently, citizens only need to travel shorter distances, and they can do so by using clean fuel powered cars. Moreover, freight transport efficiency will be improved by “managing a clear boundary around a city” where warehouses will “become the gateway to the city” (SHELL, 2014: 47). The energy generation sector would also be improved by the combination of heat and power generation and carbon capture technologies. Shell thus envisions the Compact City as the ideal city of the future, a city that is resilient, low-carbon, and most importantly, highly densely populated.

4. The last city vision comes from John D. Kasarda and Greg Lindsay. Their peculiar view of an “**Aerotropolis**” has been hailed by Time Magazine as one of the ten ideas that will change the world. According to this vision, the rapid growth and expansion of airports and airport-linked facilities is making these areas “anchors of 21st century metropolitan development” where anyone can “conduct business, exchange knowledge, shop, eat, sleep, and be entertained without going more than 15 minutes from the airport” (Kasarda, 2011). City airports, “key nodes in global production and enterprise systems” (Kasarda, 2011) will slowly become airport cities. This new form of urban space includes a central airport city, transportation corridors, related businesses and commuter clusters, and dedicated airport links lanes and networks. The authors claim that the new Aerotropolis will not be a static, historic airport model, but instead a more dynamic and environmentally and socially conscious development, thanks to strategic planning. It will also be an economically efficient and attractive place to live. This will be achieved, for example by leaving “sufficient green space” (Kasarda, 2011) between the various clusters, which should also be “designed to human scale providing local services and sense of neighbourhood” (Kasarda, 2011). For this vision to materialise, an approach that combines airport, urban, regional and business planning is needed.

The Regenerative City

The city vision that has been chosen as a case study in this research is that of the Regenerative City, as proposed by the World Future Council and especially Herbert Girardet. It has been chosen as a contrast with the usual national, top-down government approach to urban development that has been described in Chapter 1. The Government generally looks to the long-term global situation and, based on what is forecasted to happen, tries to adapt its medium-term, national-level policies to attain SD. Instead, what we aim to do here is to take

a completely different idea of what the city will be like (in this case, the Regenerative City vision) and see how it could manifest itself in the long term both at the global level and at the local one (for the Bristol, Bath area). Only then, once we have understood how this idea can be translated to the future of the Bristol/Bath region, can we think about specific short-term, local actions to achieve that vision.

The concept of a Regenerative City (RC) is inherently different from other visions because it doesn't only focus on human health and general environmental protection, but actively seeks to "create a restorative relationship between cities, their local hinterland and beyond" (World Future Council, 2012). It is a concept that goes beyond sustainability, towards actual regeneration: most cities nowadays "function in a linear manner" since resources and energy flow "through the urban system without concern about their origin or the destination of their waste" (World Future Council, 2012). Proponents of the RC argue that it is possible to create cities that actually mimic nature's "zero-waste" cycle, becoming regenerative as a result.

A growth in global urbanisation will mean the need to fundamentally rethink the way humans relate to nature. Since urban areas are now almost defined by their ability to attract economic activity, competition between cities has had significant impacts on nature and its resources, which are increasingly being depleted thanks to this urbanisation process. Our continuing dependency on fossil fuels has also had bad consequences for all planetary life. A RC, given enough political will and long-term planning, could help us restore damaged ecosystems and decrease the size of cities' 'ecological footprints', which now "stretch across much of the Earth" because of the city's tendency to "draw on nature's bounty from across the world rather than its own local hinterland" (WFC, 2010).

The authors seem to have taken inspiration for the RC from early human settlements as described by Johann H von Thünen, here named 'Agropolis'. These were "systematically tied into the landscape surrounding them" (WFC, 2010) thanks to an elaborate system of cultivation and maintained a continuing fertility thanks to a regular return of organic waste from the city to the field. This elaborate system consists of concentric rings of land (each with a different allocated use) that surround the main urban community. Production of resources that need to be used or sent to markets fairly quickly is located nearer the centre. Wood and timber production would be located in the next ring, with grain fields and animal farms located further out still, all to reflect needs and transportation costs. The Agropolis is thus a balanced, restorative urban system. Of course, this system of re-integration would be hard to implement for the larger cities of today. But can we learn from this idea, and alter it to suit our future, modern cities? This is where the RC vision comes in. Although we should aspire to this vision, the authors acknowledge that we might be a long way away from an 'upgraded' Agropolis: a better name for the cities in which we live now would be 'Petropolis' instead. This comes from the fact that nowadays, all the key functions of a city are "powered by massive injections of petroleum and other fossil fuels" (WFC, 2010), and urban areas are now seen as global resources hubs rather than local centres of civilisation. However, there might be hope for change, especially since more and more people are starting to realise the unsustainability of fossil fuel dependency and its ecological and economic impacts.

The RC is thus based on the need for a balanced relationship between cities, hinterland, and also all the areas that sustain the city with vital supplies. The RC is about creating comprehensive strategies to enrich the surrounding environment and sustenance areas, and embracing new financial, technological, commercial and political opportunities while backing away from fossil fuels.

In this next section, we explore some main features of this city idea: what will a future Regenerative City look like in a general, global, long-term scenario?

1. **CIRCULAR METABOLISM.** One of the main changes will be to the city's actual 'metabolism'. As mentioned before, most cities now are organisms with a linear metabolism: resources go from production to consumption to waste. There is not much public concern about their origin or final destination. Examples of this are when materials are extracted, processed into goods and finally discarded as "rubbish which cannot be beneficially reabsorbed into living nature" (WFC, 2010). This linear approach is clearly unsustainable in the long term, hence why it is important to start thinking about a circular approach that mirrors nature's own cycle, in which every output will become an input injected back into the production process. Although recycling is now widely accepted, it is not enough to ensure our cities will be regenerative and resilient. This new, circular system is thus more environmentally and economically viable than the one we have today.
2. **ECOSYSTEMS.** The city's relationship with its ecosystem will need to be addressed. The problem with today's resource production is that we do not return key nutrients and useful waste to the fields and lands we farm (where they come from): instead, "agricultural land is kept productive by applications of artificial fertilisers" which have a negative impact on the soil. In a RC, this would change, thanks to technological advancements that will enable us to create urban systems that replenish and sustain the ecosystems on which they depend. This includes farmlands, seas, rivers, and forests. Moreover, thanks to carbon and bio sequestration, it will be possible to achieve a carbon-neutral city.
3. **ENERGY.** The Regenerative City will be able to ensure high energy efficiency thanks to the use of Renewable Energy (RE) technologies to generate power, and thanks to the retrofitting of existing buildings. Decentralised RE production will be a reality, especially when it comes to wind, solar and biomass energies. Community-led RE schemes will benefit the local economy, environment, and people's wallets: all this will lead to a smarter use of energy, also resulting in a reduced carbon footprint for the city (WFC, 2013: 10). When the city is too large to fully benefit from local RE generation, a network of connected RE systems will help them with their additional energy requirements. RE innovations will also change the urban transport system, with both public and personal vehicles being powered by various new green methods.
4. **WATER.** Water consumption will be reduced, and optimised, especially when it comes to non-essential usage such as watering gardens and flushing toilets. Grey water will

be treated for reuse and minerals previously discarded in urban sewage will be recovered, reducing ecological and marine damage.

5. OTHER FEATURES. More efficient ways to produce, supply and store food will be found, with a special emphasis on local, community-based food production and peri-urban agriculture. This will help keep resource costs and demand down, by making the most of the local natural capital, allowing “value to remain in the area” (WFC, 2014: 4). Community activities and general social life will take place in shared, often public, spaces; helping to “create social bonds and enhance cultural value” (WFC, 2014a: 19). Further technological advances and innovations will make possible a synergy “amongst local economic players” (WFC, 2014: 4) which benefits all urban citizens. Moreover, businesses will think RC more attractive than others since they have a longer-term viability and a higher resilience capacity.

Therefore, as we have seen, despite the challenges, the RC vision can help us ensure that future generations “inherit a robust and intact world” where “cities continue to provide opportunities” (WFC, 2014a: 16) for a better quality of life for all. It can also help democratise the planning process, thanks to localised decision-making structures. The RC reconnects citizens with their rural systems and local assets, creating a symbiotic, mutually beneficial relationship.

3. REDUCE, REUSE, RESTORE

Regenerative City Vision: Future Bristol/Bath Area.

In this next part we try and apply this RC perspective to the local level, more specifically in this case, to the Bristol/Bath area. Although more emphasis is given to the bigger metropolitan area of Bristol, it is possible that in the future the suburbs of both cities could expand so much that they’ll form one single big conurbation.

The more common way of looking at policy change is to take a vision of how the future could be based on projections of events, and bring that vision down to a national level of government, situated in the medium term. This process, based on the idea that government is the key agent of change, is an almost ‘direct’ route from long-term vision to national, medium- and short- term policy change. What we want to try to do in this essay is to see if there is an alternative way of thinking about policy change when relating to long-term plans. Thus, what we want to do now is to take the global, longer-term perspective of the RC vision (in itself an alternate vision of future developments) and bring it down to the local, long-term level. The ‘local’ in this case, as we have said, means the Bristol area. Once we have explored what a ‘regenerative’ Bristol area will look like in the future, we move on to a discussion of what we can do now, in the short term period, in the same local area, to achieve that future vision (in Part 4).

Thanks to its bottom-up nature, this method – from future global idea, to idea applied to the future local setting, to present local change – might be a good fit for those who wish to bring about the real-life adoption of the RC vision. It might also be better than the traditional top-down government-led approach, since a vision especially designed for cities might not translate too well into a national-level policy framework. Moreover, as cities (and citizens) increasingly become true agents of local change, they might be more suited to understanding how to implement the specific policies needed to achieve that Regenerative vision.

What will happen to this area in the future based on the RC vision? What will a Regenerative Bristol/Bath region look like? Below is a description of some of these main features. If there was a slogan for the future Regenerative Bristol/Bath urban area, it would be “reduce, reuse, restore”. We will now see why.

The city of Bristol (and its surrounding areas) has greatly increased its population size since the 1980s. This has led to higher urban density, which has in turn led to urban sprawl and a growing reliance on resources from distant locations. The RC vision could enable the city-region to become a regenerative, sustainable system. One of the key characteristics of the RC is its innovative idea of a **circular metabolism**. This concept can be applied to the Bristol/Bath region: this area’s economic, industrial and social processes will no longer follow a linear metabolism, but will instead become part of a continuous cycle that will result in reduced outputs and more recycled inputs. Resources will be mainly taken from the local surrounding environment, or from the nearby English and Welsh regions. The resources will begin the process as inputs into the Bristol urban area, and the resulting city outputs, if possible, will be injected back into the city production process or into the surrounding local area (Bristol, Bath, and wider South West England). The thing to bear in mind is that in the future “circular” Bristol, inputs – for the most part – will be, or will be coming from, renewable resources. Other outputs such as pollution and unrecyclable waste will probably still exist, but they will be reduced in size and impact. Throughputs such as recycling will become extensive practice, for both organic and inorganic waste materials. Many inputs (like timber, renewable energy, water) will thus become recyclable outputs, which will help with the urban environment’s renewal process. Waste would be largely converted back into nutrients and reusable energy and will not contribute to the damage to the regional ecosystem.

The Bristol area could thrive without the routine use of fossil fuel-based technologies, by “drawing on RE (renewable energy) supplies from within their boundaries, as well as from further away” (WFC, 2010a: 3); this would reduce energy demand, stimulate the creation of green jobs and ensure **energy** security for the local region. “Building the capacity of smaller, rural communities to supply excess renewable energy” (WFC, 2010a: 5) to Bristol and Bath will be essential, and will make those communities more prosperous and self-sufficient. The Bristol area is well suited to the development of most RE types: it will be quite common to see solar panels, wind turbines, thermal and biomass systems everywhere in the future city and region. The area, with its frequent windy and sunshine-full days, is a particularly good

place for solar arrays and wind farms. The latter will be largely on the coast and in the countryside, with smaller wind turbines mounted on roofs in the cities. Bristol would therefore be aiming to become a fully RE powered city: coupled with efficient local management, this could also lead to solutions for poverty and health issues (e.g. unemployment and pollution). We can expect a future Regenerative Bristol to have resource efficient buildings, heated and cooled by RE, with normal and micro-CHP (combined heat and power) facilities now commonplace. What we would also find in the future is local energy production systems and mechanisms that will allow producers to distribute this energy via regional, national and even international grids and networks. The decentralisation of energy production, as already mentioned, will make Bristol greener and more resilient.

The region, and especially the cities of Bristol and Bath, will aim to adopt a **zero-waste policy**, in order to adhere to the principles of a regenerative city. Investments in innovation and future technological advancements will help local authorities to create a balanced, sustainable city-waste cycle relationship. Bristol could become one of the first cities with a system that creates new inputs from traditional outputs. Waste materials and resources will be completely reused and recycled, and the volume itself of waste will be reduced. We can also expect a booming of companies and organisations specialising in treatment and transformation of waste into energy, and promotion of recycled products (such as fertiliser). Energy will also be generated by Bristol's and Bath's sewage and liquid wastes; grey water will be treated and reused (e.g in toilets, gardening).

Another important feature of the forthcoming, regenerative Bristol would be its **transportation** system: in the future, completely powered by Renewable Energy adapted to both private, commercial and public vehicles. Apart from obvious reductions in pollution, RE transportation (hybrid, electric, fuel cell) would bring benefits to both the main cities and the rural South West: Bristol and Bath will become more accessible and liveable; the rest of the region will benefit from improved connectivity and lower agricultural production costs.

Speaking of agriculture, in the future, greater emphasis will be placed on **local food** production and consumption: 'urban agriculture' will be the norm in Bristol and Bath. This will not only provide cities with a steady supply of local food with virtually 'zero food miles' attached to it, but it will also help reduce rural emissions and energy demand coming from large, intensive farming zones. This urban farming phenomenon will manifest itself in personal, public, community- or business- supported orchards and farms.

Finally, Bristol and its surrounding region will attract businesses and organisations, thanks to its increased resilience and long-term sustainable life-span and viability. Technological advancements, Renewable Energy production and distribution, a greener 'Capital of the South West': all this will lead to a new, **green economic sector** with more local jobs and initiatives, which will be redistributed throughout the regional hinterland as well. The local

public sector will benefit too, with the creation of new positions needed to adapt to the necessities of forthcoming times. Another consequence of a future Regenerative Bristol area will be greater **citizens' participation**. This will grow as more and more people increase their interest and stakes in their own communities' resources production and local decision-making process.

In this section, we have thus seen what a Regenerative Bristol and Bath region will look like in the future, around the end of the century. It will be a sustainable city-region, which will aim to adapt to inevitable world changes by adopting important principles such as reduction of emissions and waste, recycling of most resources, and green energy production and consumption. All these elements of a Regenerative city, such as Renewable Energy, green transportation methods, zero-waste, local agriculture, energy and water efficiency, greener economy, social inclusion and more democratic governance; all these features come together in this chapter, to form a practical basis for the Regenerative City vision in Bristol, Bath and local countryside. In the next section, we will explore practical measures, schemes and initiatives that we, as citizens of the South West, can develop and implement to prepare our city-region for the transition to Regenerative City.

4. LOCAL ACTIONS FOR REGENERATIVE BRISTOL/BATH

Here we are at the last section: what are the local policies, actions, schemes, activities that we, as citizens, organisations, businesses and communities, can implement to achieve a Regenerative Bristol? Here are some examples (some of which are already taking place all over the region) of what we can all do to act here, now.

RENEWABLE ENERGY

- The South West in general, and Bristol & Bath in particular, need comprehensive schemes to ensure our future spaces will be largely if not completely powered by renewable energy by the end of the century. At the national as well as local policy-making level, with possible input from the private sector, there needs to be a substantial effort to create programmes and schemes now that will make a RE infrastructure a reality later. Some research has shown that if Bristol were to exploit "all its local potential sustainable energy resources to the full" (CSE, 2009) the city would see a substantial reduction of CO2 emissions (around 22%): this is something the city needs to act on now. Councils, local government officers, private organisations and pressure groups should all unite and focus on the need to make the most of the South West's abundance of RE resources, and make a case for a 100% renewable city vision: and the first priority of this should be to invest and create a local Smart Grid energy system. This is because we need structures able to support "high levels of

variable renewable energy” (The World Bank, 2015) that need to be integrated into our power grids now.

- **Solar:** the concept of the solar city should be promoted at the national and international level by local policymakers. Feed-in programmes should be implemented to allow small-scale but widespread distribution of solar energy structures. Targets should be set by councils on how many solar energy systems installations they plan to complete by a certain timeframe, in concerted action with other UK councils. The Bristol area is an almost perfect place for photovoltaic panels, we should strive to make the most of this favourable condition: council offices, schools, libraries and other public buildings should continue to be fitted with solar panels when appropriate, or support photovoltaic farms next to their own buildings. These will enable local offices to be self-sufficient when it comes to energy, save money, and actually create income.
- **Other:** The docks area (Avonmouth) of Bristol and the wider Channel coast area of the South West could be developed to host more **wind and biomass farms**. Existing plans for wind turbines should not be scrapped but should be supported instead. It is also essential that a true informed debate take place, regarding the pros and cons of wind farms, and general renewable energy infrastructures. We should foster the creation of a better-equipped marine, wave or **tidal energy** industry; various sites all over the region could benefit from such developments (e.g. Hotwells and the coast). Moreover, tidal power might also be attractive since it does not need plans and facilities for back-up power. Biomass boilers and normal and micro- combined heat and power (CHP), which reduce energy costs for buildings and lower carbon emissions, should also be installed as trials first, all over the main cities and towns.
- City officials should not be afraid to set an example and “move boldly to issue appropriate building regulations, efficiency standards and mandatory renewable energy (RE) provisions for new buildings” (WFC, 2010a: 12) but they should actually go further and embrace RE and regenerative ideas in all standards and regulations. Incentives such as appropriate taxation measures or new pricing strategies might be useful tools available to local authorities. Targets should be set, with important milestone years such as 2025, 2050 and even 2090; councils should devote specific departments and jobs to the important issues of resilience, sustainability, regenerative planning. Independent organisations and groups should be formed, to share expertise and knowledge in the sustainable energy and green economy sectors, in order to “revolutionise the way we generate, supply and use energy” (Regen SW, 2015).

WASTE

- Bristol and Bath should also aspire to become **zero-waste cities**; this could be enabled by setting practicable targets and by placing this concept at the heart of their urban design, construction and waste management policies. The recycling of as much material as possible should continue to be supported, but this would not be enough to make Bristol or Bath a truly regenerative city. Local authorities should act now to

make sure the recycling potential of any discarded material is maximised, for example by supporting “waste-to-energy” initiatives and businesses. These would help ensure that, in the long run, zero waste is sent to the region’s landfills. These companies could generate energy from liquid or solid wastes coming from all sorts of buildings (commercial, schools, supermarkets), while at the same time recycling nutrient-rich resources to be re-used as fertilisers by the region’s farmers.

- **Rainwater harvesting** systems could be installed in all gardens, public or private, to improve water recycling rates and water security. **Wastewater** and sewage water recycling and grey-water re-use should also be a central part of waste and water management practices and policies at local government offices. Grey-water reuse could bring up to “a two-thirds reduction in the volume, cost and energy required for sewerage treatment and up to 90 per cent reduction in fresh water demand” (WFC, 2013: 12). With better wastewater processing we will be able to re-capture all the nutrients and minerals that would otherwise be wasted, and we can put them to good use in Bristol’s and Bath’s farmlands.
- Therefore, the creation of private businesses, organisations and charities that focus on better waste management practices should also be encouraged. An example of this, already in existence, is GENeco, an “award winning recycling and renewable energy company” (GenEco, 2015) with a very good history of innovative and environmentally friendly waste solutions. They produce RE and fertilisers from waste: hazardous waste is no longer in circulation, organic fertiliser is available to local farmers, and cheap and sustainable energy is created, all from the same resources we would so carelessly waste or send to a landfill to rot.

COMMUNITY, LOCAL SOLUTIONS

- Local communities could hugely benefit from schemes such as decentralised and **community-owned energy** and heating systems. These would enable entire villages to live off the main grid, and be powered, cooled and heated entirely by cheap, green RE. Programmes and incentives should be set up to bring about these systems, as decentralised energy is proving to be a popular and efficient way to meet the demands of rural communities, or even, in the future, entire city quarters and neighbourhoods. Entire villages could pool their resources and invest in a local energy production facility (for example, community solar panels), perhaps with the help of community projects organisations or energy businesses. These schemes, such as district-wide heating facilities (similar plans for district heating systems near Temple Meads are currently being looked at) could be virtually replicated in any part of our region, and would not only provide much-needed environmental benefits, but also local funding and employment opportunities.

- The region's **farms** and other agricultural spaces can also play their part in greening the Bristol region, by investing in RE. Small- and medium- scale RE infrastructure can easily be placed on farms, to harvest resources such as wind and sun. This would also add to farmers' own income generation opportunities, as they could use or sell any extra energy which they have produced off the national grid. Moreover, this could also attract investors to the farms, and new local jobs (construction, security, engineering, even hospitality).
- Another great initiative that has been gaining momentum and popularity in the past few years, and which could greatly contribute to Bristol/Bath's sustainability (and regenerative city) targets, is local food production. This could be anything, from **city farms, community orchards**, or local fisheries and markets. The development of such activities, and similar ones like networks for local farmers and city growers and consumers, should be encouraged and supported. Anyone could now set up a community-level and community-owned farm, a green space in the heart of a village or city, connecting people to the environment, and to each other. Examples of these organisations can be found all over the world, and they could employ very innovative methods (such as in the case of Boston's 'aeroponic' CityFarm) or very traditional ones. Some examples can be found in our region as well: "Grow Bristol" develops sustainable ways to grow food in the city, "The Severn Project" produces high quality vegetables and helps disadvantages people, and social enterprise "The Community Farm" operates a local, organic food delivery service from Somerset. Other initiatives include local community orchards such as the one in Horfield and Redland, and even community seed banks.

TRANSPORT

- We should act now to ensure we achieve a better and more **sustainable transport** system in our urban spaces, especially Bristol. We need to both promote the use of renewable energy in transportation and reduce the use of private vehicles so as to avoid congestion problems (which already exist). We need more innovation and investments in RE in the fields of transportation, more research on how to make vehicles energy efficient with more alternative fuel technologies. Local officials can also help with this by reviewing spatial planning policies taking into account sustainability needs.
- Walking, cycling, car sharing, bike sharing, pedestrian zones: all these projects are steadily being implemented all over the region, and need continued support and financing as they would help the Bristol region to work towards a transportation solution. Communities should work with each other and with "other stakeholders to implement innovative transport projects" (WFC, 2009: 5) such as rapid transit systems and high speed railways (Savage, 2011: 104).

- Some other examples of good innovative ideas: Bristol's new Biobus, a bus that converts waste into alternative fuel; hydrogen powered ferries and boats to be used in canals and rivers both in Bristol, Bath and the countryside; and roads covered in photovoltaic cells that take and collect energy from the sun, store it, and even use it to charge solar-powered vehicles.

OTHER ACTIONS

- How else can we bring about a regenerative Bristol city-region? There are a few other things we could focus on in the short term. One of these is to provide better, greener **housing** for our region. Public and private housing agencies and construction companies should continue to abide by environmental regulations for construction, but they should also make a case and strive for eco-houses and zero-carbon buildings. Regenerative principles should be integrated with urban policy principles at all levels. Thus, energy and waste efficiency can be achieved by retrofitting existing buildings now, helping homeowners with insulation and CHP installation schemes, but also by converting derelict and abandoned buildings into useful assets for the community, and by supporting and lobbying for new large scale zero-carbon housing developments.
- Our regional **natural environment** should also be protected and safeguarded: educational and useful nature-based programmes such as tree planting activities in schools, organisations or businesses are welcome and should be encouraged. There should be clear directions from local government regarding the preservation of wildlife, forests and blue areas in the Bristol sub-region. Local organisations do a lot, but could do a lot more to engage citizens and improve their understanding of nature, biodiversity and science in general. This could be achieved with more topical workshops, exhibitions, festivals, events and educational seminars: all this is to ensure citizens understand the importance of our natural surroundings and of restorative urban development.
- If we want the Bristol city-region to truly thrive as a regenerative city in the future, there needs to be a process of knowledge-sharing and networking between different cities with similar goals. **Networks**, partnerships, twinning of cities can bring stakeholders (leaders and professionals and citizens) together, and provide the perfect opportunity to create and develop the essential projects and activities we need today to achieve that regenerative vision. Apart from support and cooperation, networks can also become important monitoring and reporting tools for those cities looking to go down the regenerative path.
- Finally, some change could come from innovations in the technology field. 3D printing and other similar new methods can contribute to the city's zero waste policy, can improve resilience by utilising sensors in the right way, can improve productivity and also revolutionise local community manufacturing and retailing.

Conclusions

We've seen what the current UK government approach to sustainable urban development is, and we've tried to give a different approach with the use of the Regenerative City as long-term aim. We now live, and indeed will increasingly live, in the age of the city, since globally more people will live in cities than in other areas by mid-century. This means cities and citizens are increasingly important actors, and agents of change; we can expect them to lead the way when it comes to the application of technological innovations, urban sustainability frameworks, and resilience measures.

But can Bristol achieve this vision with the tools we have today? It will be possible, if we are able to pool resources, cooperate and put a lot of effort into transforming our current city-region into the regenerative city it should be. A lot of the effort would also probably be spent on education and disseminating of knowledge regarding the benefits of such a change. There are currently some important barriers to the development of a Regenerative city, such as a tendency of local governments to deal with related matters (energy, waste, food) independently and without cooperation; lack of proper funding; and perhaps most importantly, the lack of political willingness and inability to "imagine a future different from the present" (WFC, 2014a: 20-21). Sometimes it can be hard for policymakers, officials, or indeed the population, to think about and plan for the longer-term (more than 40-50 years).

We can only hope that once more and more of the actions, programmes and activities illustrated in part 4 are implemented, people will truly understand what is at stake for cities and the whole country. The need for these changes would also be highlighted by a credible long-term plan endorsed by both local authorities and central government. Bristol can become a Regenerative City if there is a collective behavioural change that will enable the city to positively influence its environment and future, for example by investing into RE, zero-carbon and zero-waste projects.

If we do not start acting now, we might not have much time later in the century to adapt to inevitable changes and make our cities, and lives, resilient. This can only be achieved with full cooperation of all stakeholders and parties involved. Isolated actions can help set things in motion at first, hence why it is important for the Bristol city-region, currently European Green Capital, to start acting now. However, since the entire world (of cities) will face big changes in the future, it is essential for us to have a concerted, international, cooperative action to change our cities for the better.

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