Energy Descent Action Plan

Making Renfrewshire Sustainable

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Summary

Climate change is happening and poses a serious and urgent threat to our civilisation. If we take sufficient action now we can still avoid the worst impacts of climate change, but this will require radical change in how we live and work in the near future. Less well known are the threats from increasing scarcity of crude oil. As oil becomes more expensive and less available, the costs and availability of transport, food, chemicals and fertilisers will all decline.

This Energy Descent Action Plan (EDAP) is an attempt to consider what actions are necessary in our local area to reduce our greenhouse gas emissions and reduce our vulnerability to oil scarcity (peak oil). We believe that radical action is required now, but that this will have a variety of positive health and social benefits if undertaken pro-actively.

Although much of the action and change required has to occur at a policy and government level, there is much that can be done by local people working together to bring about change. This EDAP identifies the lessons that can be learnt from more sustainable times in Renfrewshire's history, the current greenhouse gas emissions locally and the actions that should be considered.

Large changes can occur from seemingly small actions taken by small groups of people, particularly where they are able to link up with other like-minded groups in other areas. In Paisley, this could involve: an audit of the need for housing insulation combined with a small project to install and evaluate it; launching a campaign for changes to policy (e.g. carbon rationing); taking direct action to redistribute road space towards cycling; inviting students at Reid Kerr college and the University of the West of Scotland to help us design and evaluate transition projects; establish a food co-op; or running courses on permaculture.

Currently, we are a small organisation with limited capacity to create this degree of change. We hope that after you read this EDAP, you will join us as part of the Paisley Transition Town group, or contribute to this effort in your own unique way.

Introduction

Welcome to Paisley Transition Town's initial look at preparing Renfrewshire for a future with much less energy than we have today. This is the first part of a plan to reduce energy use in Renfrewshire. In the near future we will have to use a lot less energy than we do today because firstly oil is going to become far too expensive for most of us and secondly we need to produce much less CO_2 to slow climate change.

The Transition Town movement is a loose international network of communities (over 300 in the UK alone) seeking local solutions to these huge global challenges. Although we are not yet recognised officially as a Transition Town, our group is closely guided by the principles and methods of the movement.

Paisley Transition Town was set up in 2008 to face the dual challenges of climate change and of dependency on ever more scarce and expensive oil. We are acting to increase and promote locally grown food, and we campaign for town-centre renewal and for infra-structure changes in transport and power generation to reduce climate impact and oil dependency. We aim to inform and consult widely with local people to produce realistic targets, appropriate for Renfrewshire, with broad support. We are preparing for the transition from an oil rich society to an oil poor one.

This Energy Descent Action Plan is the second edition. The first six chapters describe the challenges ahead and put them in a local perspective. The final two chapters were deliberately left unwritten in the first edition and were intended to reflect the consensus of a series of meetings of the Renfrewshire public. We ran four meetings across the county and although they were not well attended we were able to produce the important chapters. This EDAP reflects the views of the Paisley Transition Town group and all the people we have met during the meetings and over the last twelve months. We are still very much open to further suggestions from interested and concerned individuals and groups and hope, in future editions, to revise and expand these chapters in the light of such contributions.

This Plan can then be used by everyone from politicians and planners to businesses and individuals, to shape a better future for this generation and for those to come.

Chapter 1

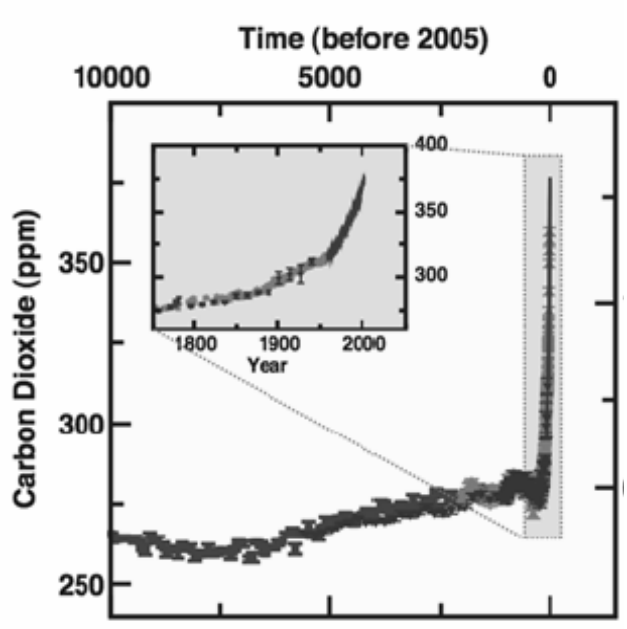
Energy descent: what is it and why are we planning for it?

'Energy descent' is the term for a planned strategy to confront the inevitable decline in the availability of energy (such as oil, gas and fossil-fuel generated electricity) that will accelerate in the coming decades. It is inevitable because some of the main sources of energy that we currently use, such as oil and gas, are becoming increasingly scarce, expensive, and environmentally damaging to extract. We also need to pro-actively decrease our energy use in order to reduce greenhouse gas emissions and consequent climate change. This chapter discusses the twin drivers of energy descent (climate change and peak oil) before making the case for creating an 'Energy Descent Action Plan' (EDAP).

Climate change

There is now scientific consensus that climate change is happening and that human activity is the major contributory factor. The release of greenhouse gases such as methane from livestock and carbon dioxide (CO_2) from burning fossil fuels, combined with continued destruction of forests (which absorb CO_2), has led to an exponential rise in atmospheric CO_2 concentration since the beginning of the industrial revolution (Figure 1).

Figure 1 – The rise in CO2 levels since the industrial revolution [1]



Carbon dioxide and the other greenhouse gases gather in the atmosphere, obstructing the radiation of heat from the Earth's surface. This is what generates a rise in average global temperature. This change in temperature interferes with the interconnected climatic systems across the world which will result in warming and droughts in some areas and flooding in others – so called 'climate chaos'.

Climate change poses an urgent and potentially devastating threat to humankind. If current trends in the release of greenhouse gases continue it is predicted that the world will soon reach a 'tipping point' where very rapid changes in the global climate will occur. At this tipping point (estimated at around 450-550ppm equivalent of CO_2), action to reduce greenhouse gas emissions may be too late because the warmed atmosphere and oceans will create their own momentum towards further warming and climate change. This is because, for example, CO_2 trapped beneath the Siberian permafrost will be released into the atmosphere and because there will be increased decomposition of organic materials into CO_2 in rainforest areas. Action to prevent catastrophic climate change (i.e. a rise of greater than 2^oC which approximates to this tipping point) therefore has to occur before the worst problems are revealed.[2]

If the average global temperature rises by more than 2^oC the effects on humankind will be largely mediated through economic and social disaster rather than direct threats to health (such as increased malaria transmission in the UK). It is the flooding of places like Bangladesh, the Maldives, the Thames estuary and Grangemouth that will have the greatest effect, by disrupting the economic and social systems we have come to rely upon. There is the potential for millions of people around the globe to be evicted from their homes by rising sea levels. The flooding would destroy their source of income and their social networks. There would be literally tens or hundreds of millions of people homeless, without land, housing or jobs. Furthermore, the agricultural basis for the food supply of the globe would be under threat – not only because of flooded land, but because of increasing drought, pestilence and severe weather.

The globalised nature of the world economy leaves few safe from the turmoil of climate change. A failure of the rice crop in South East Asia could cause the 21st century equivalent of the Irish potato famine, but affecting two billion people.

Sustainability

The fundamental truth about unsustainable systems is that they are, by definition, unsustainable and liable to collapse.[3] Therefore the questions that should be posed about all unsustainable systems are: "How quickly, and by what means, can the system be returned to an environmentally stable state whilst preserving as far as possible the dignity and well-being of its population?" The ecological footprint is a measure of the land area used to sustain a defined population's life and is a good measure of how environmentally

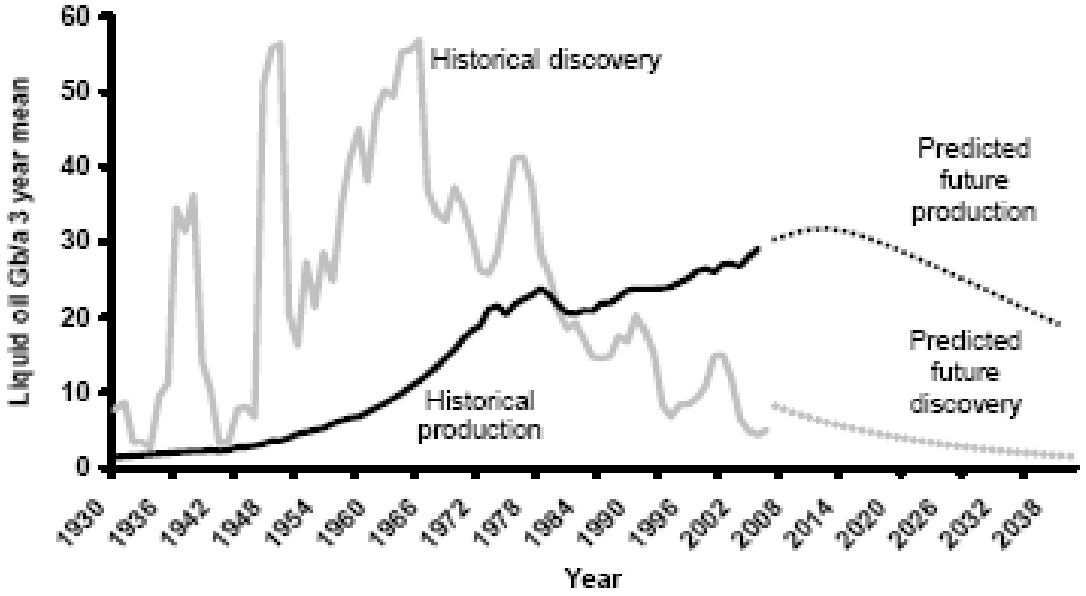
sustainable a system is. It measures the area of land needed to produce all the goods and services for a population (e.g. food, energy and metals). The footprint therefore indicates both how the earth's limited natural resources are distributed amongst groups and whether or not the total (or aggregate) consumption of the world is sustainable.

The ecological footprint of the UK is approximately three times the area of the country. This means that if everyone currently alive in the world consumed as much as we do, we would need three planets to sustain us. The population of the earth as a whole is heading towards two planet living. This is setting the planet up for an environmental collapse not dissimilar to Easter Island or Rwanda where the combination of environmental damage with population growth, competition, conflict, and climatic change led to disaster.[3]

Peak oil

Oil (petroleum) is a critically important component of our present economy, and its continued use, at anything like the present rate, is totally unsustainable. 'Peak oil' is the term used to presage the inevitable fall in the rate of production of oil. It is said that we will only know in retrospect when it has occurred (since we cannot know whether the rate of oil supply will increase or decrease in the future), but it is likely to be accompanied by rapid rises in oil prices and consequent economic recession. It is likely to occur soon because the rate of discovery of 'new' oil has been falling rapidly since 1970. There is therefore a growing gap between the amount of oil being produced every year and the decreasing discovery of any new resource (Figure 2).

Figure 2 – "Peak Oil" and the future decline in oil supplies [4,5]



Compounding the problems associated with the decline in oil discovery is the problem of declining accessibility and quality of oil. The oil nearest the surface and of the highest quality was discovered and extracted first, with the oil that was slightly deeper and of less good quality extracted next. This is why in 2007 there are companies struggling to extract useful oil from the tar sands of Canada and companies drilling in the deep water West of Shetland in an attempt to find and utilise the dregs at the bottom of the notional global oil barrel.

Demand for oil continues to grow with the ongoing development of India and China. The globalised economy has also become increasingly dependent on oil (mostly as a transport fuel for cars, road freight, shipping and air travel, but also as a chemical feeder for plastics and fertiliser), as each country becomes more specialised in its economic output and increasingly reliant on international trade for goods and services. It would be very difficult for Scotland to become rapidly self-sufficient for food in the future without adverse consequences for food prices and availability, yet increasing oil scarcity makes the need for self-sufficiency greater.

There is no alternative energy source that is as concentrated and portable as oil. It is possible to envisage renewable energy resources providing electricity and heat in the future, but it is not realistic to expect that air travel, car travel and the globalised economy will be able to carry on as before after the peak. For example, fossil fuels represent the stored solar energy that fell on the earth's surface over millions of years. The energy was captured by plankton and vegetation and then compacted by burial under the earth's moving tectonic plates, creating coal, natural gas and oil. It would be folly to suggest that any sources of solar energy could reproduce such a large repository (millions of years of stored solar energy) in equivalent terms. Although there are large unexploited coal deposits, their use would simply contribute to the problems of climate change discussed above. There is therefore a need to reduce our reliance on fossil fuels if the economic and social problems of peak oil (and peak gas) are to be avoided.

Summary of the environmental challenge society faces

Even if the world does not act to prevent catastrophic climate change, the unsustainability of the globalised economic system, in terms of its use of oil and gas use, will generate change. The real danger is that the global population suffers a 'double whammy' of climate change and rapidly rising energy prices if the necessary actions are not taken.

This means that every aspect of our lives will need to be redesigned for sustainability: how we get around, what our houses are like and even what we do for a living.

The current global economic system incentivises increased production and consumption (economic growth), and the externalisation of social and environmental costs (so they do not feature as negative considerations in the reporting or planning of economic activities). Without continued economic

growth there is no means for individuals and firms to repay debts previously incurred and the system becomes unstable.

A different form of economic growth, based on knowledge and social relations is possible, but it is difficult to see how this could happen unless a different economic system entirely is created. This would be planned not to generate material growth but instead to live sustainably within our means and to maximise equity, democracy, well-being, social interaction, health and education.

Chapter 2

A History of Paisley and Renfrewshire

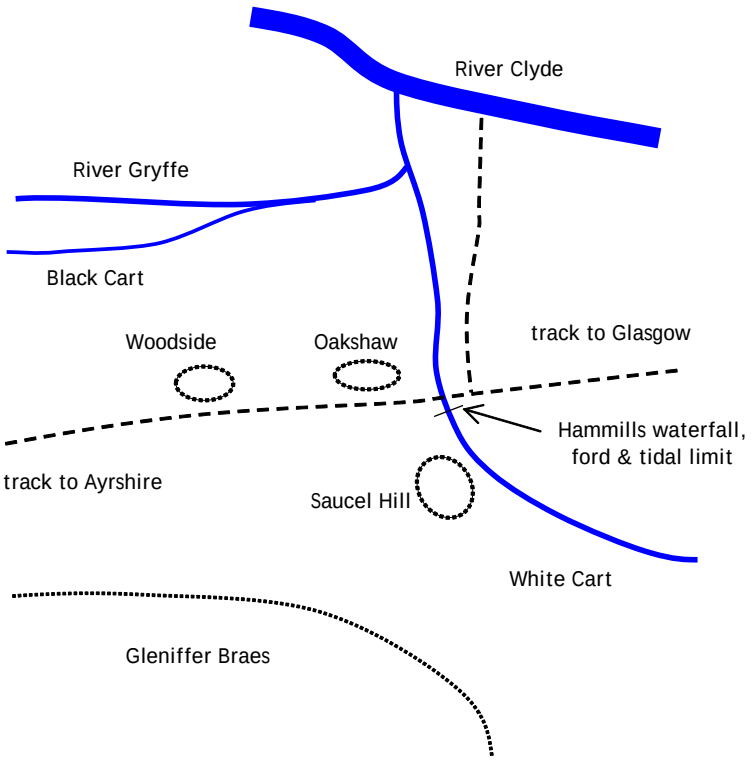
Learning from the past

Many civilisations have declined and even disappeared due to living unsustainably and failing to adapt to changes in the resources available to them. The modern industrialised world has been built on fossil fuels. Now the increase in demand and depletion of resources has reached a point where their cost will rise inexorably, and continuing emission of greenhouse gases threatens the world with catastrophic climate change. This chapter outlines some of the revolutionary changes our area has already undergone, and focuses on aspects which may help us envisage a more sustainable future, through a reduction in carbon emissions and improved food security. It outlines how in the 18th century Renfrewshire grew to be Scotland's pre-eminent textile manufacturing area and Paisley its third largest town, with minimal use of fossil fuel, harnessing human, animal and water power. Coal fuelled further expansion of manufacturing in the 19th century and continued as the main electricity generator until the 1980s. Oil was the chief engine of growth of the 20th century, used in transport, agriculture, and manufactured goods of all kinds.

Origins and early settlement[6]

There has been a settlement at Paisley since at least the 5th century on the right bank of the White Cart River by the Hammills waterfall (Figure 3).

Figure 3 - Physical position of Paisley and the Renfrewshire (circa 500 AD)



The location offered water power, a ford across the river on a main route between the central belt and the south west of Scotland, a navigable link to the Clyde, and defensible hills of Oakshaw and Saucel. The abbey was founded in 1163 on the right bank of the river and its supporting village grew up on the left bank along the routes west (the High Street) and south (Causeyside Street). The wealth of the abbey was drawn from its large land holdings scattered over Scotland, and from being one of the four main pilgrimage destinations in Scotland.

Renfrew, the only other settlement of note in Renfrewshire from Norman times, grew up near the confluence of the White and Black Cart and the Clyde with ferries across the rivers, boat building and fishing. It had some strategic importance in defence against the Vikings until they were defeated at the Battle of Largs in 1263. Otherwise the county was rural with a scattered agricultural settlement (fermtouns) and churches in small villages (kirktons) at the centre of the several parishes.

Paisley and Renfrewshire before the industrial revolution

In 1489 the grant of burgh status allowed Paisley to take advantage of its central location in a fairly good agricultural area to become the main market place for Renfrewshire. The first bridge over the river (St James') built the following year, helped it continue to develop after the dissolution in 1560 of the abbey which had been the *raison d'etre* of the town for four centuries.

Early industrial revolution[7, 8]

For Scotland the Union of the Crowns in 1603 opened up commerce with England, and the Union of the Scottish and English parliaments in 1707 allowed trade with the growing British Empire. From the humble beginnings of coarse linen production for local markets, Paisley developed into a major quality textile manufacturing centre selling to the top end of the English market. Quality linen production was overtaken by silk in the 1770s, and the 1780s saw the start of the domination of cotton, which continued to grow right through the following century.

Using credit raised in London, and introducing and developing technical improvements, a growing number of entrepreneurs made Paisley the commercial centre for an integrated textile region, in which the whole process from raw material to finished goods was carried out. Progressively the various stages of textile manufacturing were centralised from dispersed rural cottages to urban workshops and then large mills, which were initially built wherever water power could be harnessed. These new mills were the basis of the founding of Johnstone new town in 1782, Linwood and Bridge of Weir in 1792, and for the rapid expansion of the existing parish centres of Kilbarchan, Houston (from 1781), and Lochwinnoch (from 1788). By the mid 1790s Renfrewshire had more than 40 large cotton mills.

Paisley was the geographical and commercial hub of the Cart 'Basin' or river system, where water power was harnessed extensively, often by innovative means, from the early eighteenth century. This was used initially to exploit mineral resources (lime and coal), and from the 1770s to drive large textile mills. Although the topography around Paisley itself was relatively flat, the social and commercial development of the town depended on an integrated water-based and water-powered textile industry in a 20 mile radius of Paisley. Most of the leading entrepreneurs and textile merchants were Paisley-based. In the town itself, the first big spinning mill was powered from 1791 by water raised up to a reservoir by a coal-fired steam pump. From 1798 the introduction of coal-powered steam rotary engines allowed Paisley to overcome the constraint of poor water power sources, and more large mills were built there. Renfrewshire had become the pre-eminent textile region of Scotland, rivalling south Lancashire in England. Paisley attracted migrants from near and far in the most rapid urbanisation anywhere to that date, making it the largest urban settlement in Scotland after Glasgow and Edinburgh (about 4,000 in 1738, 6,800 in 1755, 24,000 in 1788, and 38,000 by 1821).

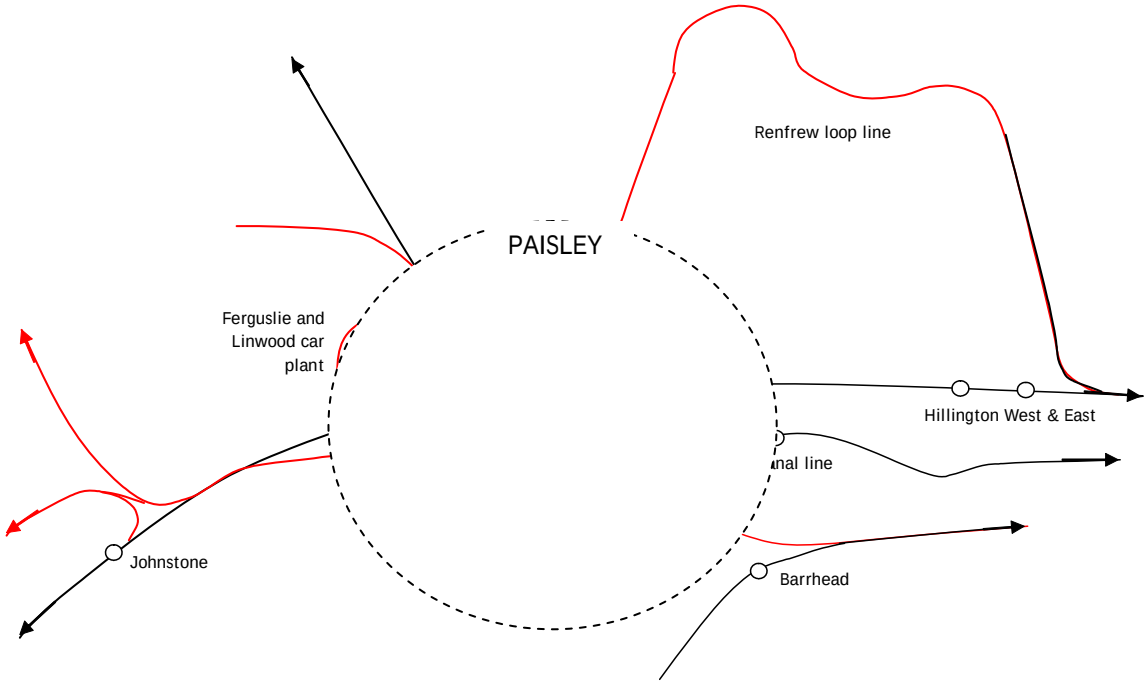
It is notable that this growth involved little use of fossil fuels, beyond domestic cooking, heating and industrial boiling processes. Raw materials were imported, and manufactures reached their markets by horse drawn vehicles and sailing vessels. It should be noted, however, that human labour was extremely cheap, with Scots paid a bare minimum for long hours of work, and slaves growing the raw cotton in the American colonies, generating huge profits, much of which went into industrial investment. But investment in urban infrastructure was lacking, leading in due course to epidemics.

19th Century fossil fuelled industrialization[9]

Coal was exploited in and around Paisley from the medieval period and by the mid 18th century larger pits were exploited within a three mile radius at Quarrelton and Newton. James Watt planned a waggon way from Hurlet in 1773, which was completed later as a link to the Paisley canal. Paisley had sufficient coal resources up to World War 1. After the economic depressions in the 1830s through to the 1850s, and cholera epidemics in 1832, 1833 and 1848, coal consumption rose rapidly for manufacturing, domestic use and transport.[3] Two views of the town from Saucel Hill show how the town changed: Clark's 1825 panoramic view shows seven high chimney stacks, while in a comparable view photographed about 1890 over 36 can be made out through the grimy atmosphere, together with several magnificent public buildings, erected as monuments to the several families which had made huge fortunes in the town. Paisley was described in the 1890s as one of the smokiest towns in Scotland.

The Glasgow to Johnstone canal, opened in 1810, eased coal transport from the Quarrelton, Elderslie and Hurlet mines, and provided a 45 minute passenger service to Glasgow. Railway lines opened from 1840 allowed coal to be brought in from further afield (see Figure 4).

Figure 4 – The height of the railway network in Renfrewshire (black lines indicate the railway lines currently in use; red lines indicate the disused lines)



From 1827 some coal was used to make gas. The new transport links accelerated a growing integration of Paisley, Johnstone and Renfrew into the greater Glasgow conurbation. Besides textiles, heavy engineering, foodstuffs and other manufacturing developed. Some heavy industry grew up along the White Cart River in Paisley and Renfrew, and in Johnstone.

Luxury textiles met sudden reverses with changes of fashion, notably when in 1870 the bustle ended demand for Paisley shawls, but the steadier world market for quality sewing threads grew. It came to be dominated by the two great Paisley based cotton thread empires of the Coats and Clarks. [4] All the stages of production were brought together in their huge mill complexes in the west and east ends of the town respectively. The two companies amalgamated in 1896. By the eve of World War 1, 10,000 people were employed in Paisley, producing about half of the world's sewing thread. Raw materials flowed in from around the world and finished goods exported back. Subsidiaries abroad were developed to avoid tariff barriers. With further amalgamations, the headquarters eventually left Paisley and production was also progressively moved away to achieve even greater economies of scale and to benefit from cheaper labour abroad. This has been the pattern for many of Renfrewshire's more successful industries, with few left today, while many others failed to compete and closed down. The high stacks and polluted atmosphere have gone. Of more enduring benefit have been the public buildings and parks the Paisley magnates bestowed on the town.

The remaining industry and services (education, health, administration, shopping) which expanded largely after World War 2 depended especially on electricity, but this was generated mainly by coal fired power stations until

the 1980s. Then natural gas and nuclear power took over as the main energy sources. Natural gas has likewise largely taken the place of coal for heating of buildings. Transport by road and air is dependent on oil.

Today the manufactured goods and food consumed in Renfrewshire are mostly produced elsewhere, and still using fossil fuels. Some is produced on the other side of the world and transported over great distances. The process of globalisation has depended on cheap fossil fuel, and in the last hundred years especially on oil. Rising oil prices are now raising the cost of almost all goods consumed and transport, and hold the prospect of changing the balance of advantage to those which use less carbon fuels in their production and transport.

Personal transport

Until World War 1 the growing population of Paisley was accommodated by redevelopment at greater and greater densities, i.e. by overcrowding. Even in the 1920s most people still lived in tenements. The town was still compact enough to traverse by foot and to reach public transport for journeys out of the town (by canal from 1810, by train from 1840 and tram from 1885). Physically the settlement began to extend significantly only after World War 1, first with the building of council housing schemes, and later with the development of private housing estates. While improving housing conditions, at the same time it made many people dependent on buses to reach the town centre, the hospitals and factories built in the outskirts of the town and in other settlements. Rising private car use reduced the viability of bus services and so their provision, leaving those without cars in the suburbs isolated. With the development of suburban supermarkets, of central Glasgow into the second largest retail centre in the UK, and more recently of new shopping centres at Braehead and Silverburn, car owners shop less in the old town centres, leading to their decline.

Air travel

Glasgow airport was built on the northern edge of Paisley in 1966 and was expanded in 1976, 1994 and 2008. With package holidays begun in the 1970s and shuttle services to London in 1975, passenger numbers grew to 8.8m in 2006. Since then they have declined to 1998 levels, falling to 6.5m in 2010, partly due to rising oil prices increasing fares. Air cargo has plummeted since 2005. Around 70% of passengers come from within the Glasgow city region's population of 1.75m. Under 7% of all the airport's passengers are from Renfrewshire. Over half of all passengers take domestic flights (53% in 2009), and these are mainly to and from London. About 4,500 people are employed at the airport, around half of them living in Renfrewshire. Taking Scotland as a whole, foreign tourists flying in are outnumbered several times by Scottish tourists flying abroad.

Agriculture[10]

A revolution in Scotland's agriculture began during the 18th century, taking off from around 1780. Although the soils and climate of Renfrewshire are middling by Scottish standards, the big land owners as elsewhere in the country invested in agriculture, amalgamating their tenants' smallholdings to create larger, more productive farms, with crop rotation and livestock in newly enclosed and drained fields. Much former marginal rough grazing was transformed into arable fields. The range of crops grown was increased. The displaced crofters and their sub-tenants (cottars) moved to towns and villages providing labour for expanding manufacture. The growing urban markets and the Napoleonic wars restricted food imports, ensuring good prices for food and for flax for the linen industry. Lime, produced using coal, aided land productivity. Improved roads allowed food to reach their urban markets irrespective of the weather. However, dependency on largely locally produced food left the urban population vulnerable to poor harvests, as happened in 1799 and 1800. Other than in the manufacture of lime for fertiliser, agriculture developed through the 19th century and the first few decades of the 20th with little use of fossil fuels.

The introduction of steam ships and refrigerated transport signalled the beginning of the globalisation of food distribution from the 1880s. UK agriculture went into depression and the diversity of the crops and livestock shrank. Cheap imports in the 1920s caused much marginal land to be abandoned and a shift from arable towards livestock production. The World War 2 'Dig for Victory' campaign saw a temporary re-ploughing of grassland. It was only with the shortage of manpower due to both world wars that farming came into the age of petroleum, with increased productivity dependent on diesel fuel for farm vehicles and machinery, and for the production of fertilisers, herbicides and pesticides. The rising price of oil has now begun to raise agricultural costs, and those of the processing, packaging and distribution of food.

Some government fiscal policies have had a distorting effect of increasing land value independent of its productivity. In 1922, agricultural land was exempted from local property taxes (rates). The abolition of death duties on agricultural land has made it attractive as an investment.[6] Tenants' rights to buy have led some big land owners to assign no new leases when old tenants retire. The old steadings are sold off for housing development. Farm contractors, having no long-term interest in maintaining the land's productivity, leave field drains to become blocked just as global warming is increasing rainfall. Former good land is being invaded by reeds. There is little diversity of production left, with most of the farmed land now used for beef cattle.

Horticulture[11, 12]

The growth of the urban population of Renfrewshire was mainly due to migration of people from the countryside of the county and beyond. They left the agricultural land they had worked and the plots (kale yards) they had depended on for most of their food. In most towns and villages they lodged in

tenements without private gardens, working long hours, and becoming dependent for all their food on what they could buy. Only the new town of Johnstone, and the planned villages of Eaglesham, Lochwinnoch, Houston and Linwood, were laid out with generous gardens. Most of the population increase was accommodated by redevelopment of cottages and two storey tenements with three and four storey ones. In Paisley there was some development of new land, starting with New Street in the 1730s, and continuing with the 'new town' on former abbey grounds from the 1780s.

Most of the towns' food initially came from the surrounding farms and market gardens. The 1858 Ordnance Survey map shows several market gardens and orchards around Paisley, and a few houses of wealthy citizens with substantial gardens. The big estates of the landed gentry all had large walled kitchen gardens tended by professional gardeners. A few richer Paisley tenement dwellers rented one of the 45 gardens in a large area to the east of Mill Street, called United States Gardens. Starting with the development of Castlehead in the 1870s, suburbs of villas with large gardens were added around the town. These were cultivated by employed gardeners, a class of servant which rapidly disappeared after World War 1. The last market gardens in Renfrewshire, east of Houston, did not cease production until the 1990s.

After private rented housing became unprofitable before World War 1, local councils became the main providers of new housing for ordinary people. In Scotland they continued the tenement building tradition as this form of development is cheaper than the English garden suburb approach favoured by the Scottish Office. During World War 2 the number of allotments in the UK was doubled in the 'Dig for Victory' campaign, helping to a halve UK food imports. Horticulture proved to be seven times more productive than agriculture per acre cultivated. But Renfrewshire's local authorities made available only a small number of allotments. So very few people, the descendants of many generations who had had no opportunities to garden, took part in or benefitted from this movement.

By the time the new council housing estates were being occupied in the 1950s, food rationing was ending, so those tenants with private gardens had little incentive to start growing some of their own food. Nine of the 12 allotment areas in Renfrewshire were developed with housing in the decades after the war, and two of those remaining have been reduced in size. Many of the new council dwellings were still being provided in tenement blocks with only common drying greens behind and small gardens to the front, or in tower blocks. The private housing estates built in more recent years have, in response to high land prices and a lack of demand for large gardens, provided minimal ones. So today few have any experience, knowledge, or opportunity to grow some of their own food.

Chapter 3

A picture of the area and its people today

Introduction

The introductory chapter of this report illustrates why we need to plan an energy descent for our community. The first step in creating such a plan is to describe the current situation: how society works in Paisley and its surrounding area. Without some knowledge of where we are now it is impossible to plan for where we want to be.

Fortunately, there is a wealth of information now available in easily accessible and summarised forms to allow an overview to be quickly generated. There are however important gaps in the information available, and these will be described so that further work can be done to address these gaps in the future.

People and demography

Approximately 170,000 people live in Renfrewshire (of which 18% are aged 15 years or less, 66% are aged 16-65 years and 16% are aged over 65 years). The number of people living in Renfrewshire has been falling over the last decade.[13] In common with the rest of Scotland, the population is ageing. This is largely because of a decline in the birth rate but also because of an outward migration of young adults.[13]

Employment and the economy

The area's biggest employers are in the public sector: local government and their associated non-governmental organisations (such as housing associations and leisure trusts) and the NHS (especially the Royal Alexandra Hospital which serves a very large population including some of the Argyll islands and Loch Lomondside). Industrial and manufacturing employment has declined radically over the last 50 years with only a small number of employers left (e.g. BASF who manufacture pigments and Hewlett Packard who produce electrical equipment in Erskine). A much larger proportion of the population is now employed in service industries such as retail, banking, insurance and, peculiar to the Paisley area, the service industries based in and around Glasgow airport.

Society and culture

Paisley has an extensive, if not always vibrant, cultural and civic core. This consists of retail, leisure, cultural, civic, religious and educational organisations and facilities.

Retail

Paisley town centre has a number of core streets with shopping facilities (including the High Street, Moss Street, Gauze Street and Causeyside Street) as well as two indoor shopping malls (the Piazza and the Paisley Centre). All of these are currently struggling to maintain occupancy, and a series of unoccupied retail premises have appeared in recent years (most particularly in the Paisley Centre and along the core streets) (Figure 5). Paisley has however retained a number of unique shops which meet the needs of niche markets. Examples include: James Harvie's (a specialist tobacconist on Moss Street); a Milliner's (on Silk Street); Abbey books (Well street); Dooley's cycles (Moss Street); Rainbow Turtle (a fair-trade shop on Gauze Street); Neon Gecko (specialist reptile pet shop on Glasgow road); as well as numerous independent butchers, fishmongers, greengrocers and cafes. In recent years large supermarkets have become much more dominant; stores have opened adjacent to the main arterial routes at Lonend (Morrison's), Neilston Road (Morrison's), the Phoenix (ASDA), and Glasgow Road (Tesco).

Figure 5 – Paisley's empty high street has been colonised by 'ghost' shops

Renfrewshire council have recently approved plans to build a very large Tesco supermarket (to include food and non-food items) on Renfrew Road. This is expected to draw trade from other supermarkets in the town as well as from the town centre area. Land that was formerly given over to retail on Gauze Street (the former Arnott's site) is to be given over for housing.

Many residents of Renfrewshire and Paisley access shopping facilities outwith the town centre. Braehead shopping centre lies to the North-East along the M8 motorway and provides a large indoor shopping facility out of town. More recently, a similar large shopping mall has been constructed at Silverburn near Pollok. Glasgow City Centre has been marketed as the UK's second best retail destination using the tagline: 'Scotland with Style'. It also draws large numbers of shoppers from Paisley and Renfrewshire.

Leisure
Paisley is the home of St. Mirren Football Club and it has its stadium in Ferguslie Park. Numerous council-run facilities exist, including the swimming pool and sports centre at the Lagoon in Paisley town centre and several public parks (such as Barshaw, Brodie park and Ferguslie Gardens). Paisley has several well-used allotments and one underused plot (at Well Street).

Cultural
Paisley Central Library and Museum lie at the West end of Paisley High Street, just down the hill from the Observatory. Paisley Arts Centre is a converted church on New Street. Cultural assets are also evident in the community libraries which exist in Paisley's peripheral housing estates, the numerous architectural landmarks and monuments, and in the regular community events (such as Sma' Shot Day).

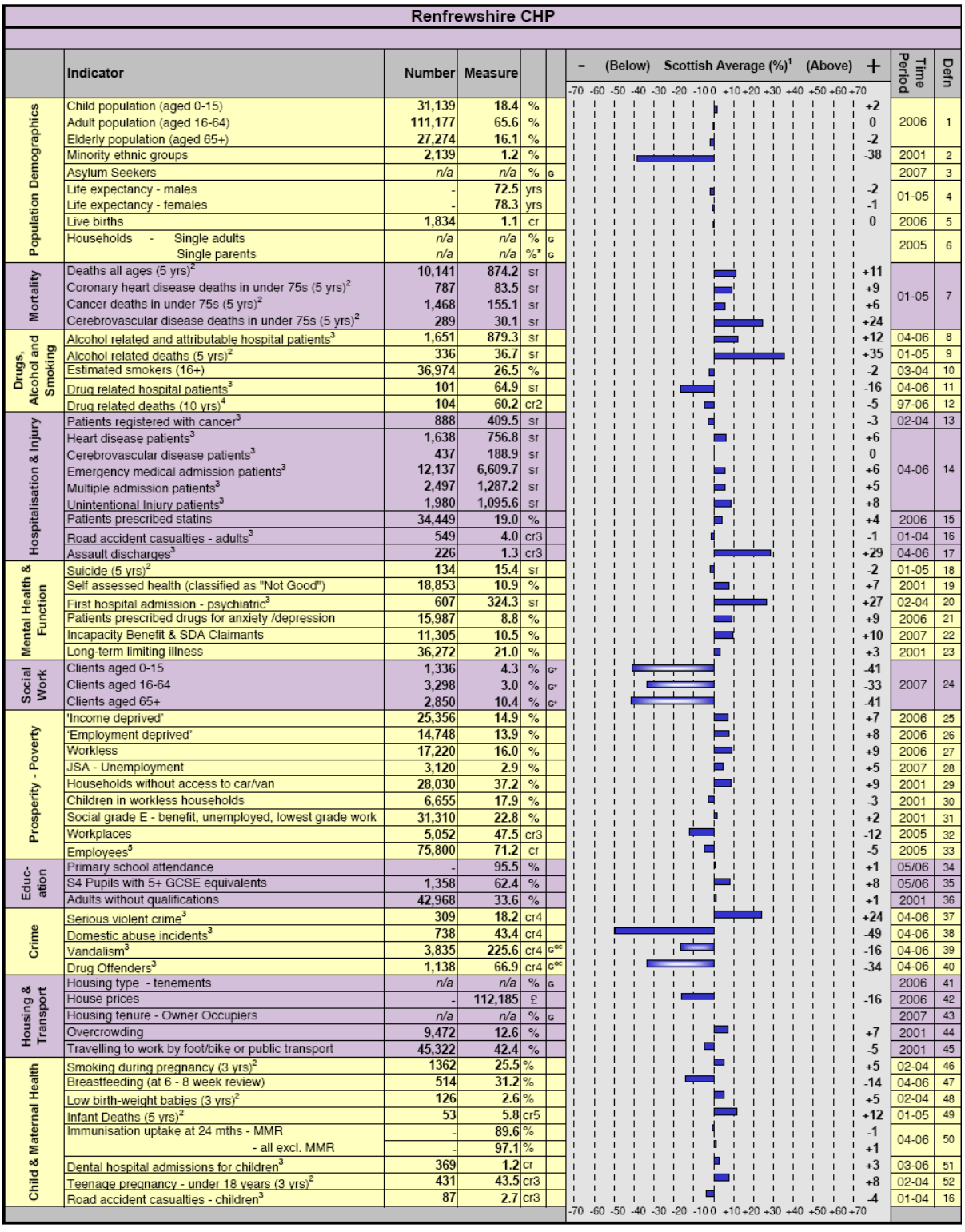
Civic life
Civic life in Paisley is visible in its active trades unions, political and campaigning groups (including active political parties, single issue campaign groups, community councils etc.), the wealth of clubs and societies in the town (including everything from Paisley Philosophical society to the amateur radio clubs) and sports clubs (such as Ferguslie Cricket Club, Kelburn Hockey Club, the Johnstone Wheelers cycling club and Jogging Buddies).

Religious
Like other towns and cities in Scotland, Paisley has retained a large number of religious congregations with their own churches and recent years have also seen a growth in a number of new evangelical religious groups settling in the town.

Education
The University of the West of Scotland has its largest campus in Paisley. Although the majority of its students are from Scotland, it attracts substantial populations of students from Europe, Ireland and the Far East, bringing diversity and vibrancy to the town. Reid Kerr Further Education College lies on Renfrew Road. There has been a reduction in the number of schools in Renfrewshire in line with the fall in school rolls in the last two decades. This has reduced the links between local communities and schools, but there are still close links in many parts of Paisley between the two.

Paisley has assets and strengths to draw upon as it faces the transition. The biggest asset it has is its people and the institutions, networks, skills, ideas and knowledge they possess. A comparison of the socio-economic characteristics of the town with the Scottish average is shown in Figure 6.

Figure 6 – A profile of Renfrewshire council [13]



Renfrewshire CHP

	Indicator	Number	Measure			Time Period	Defn
Population Demographics	Child population (aged 0-15)	31,139	18.4	%		2006	1
	Adult population (aged 16-64)	111,177	65.6	%			
	Elderly population (aged 65+)	27,274	16.1	%			
	Minority ethnic groups	2,139	1.2	%		2001	2
	Asylum Seekers	*n/a*	*n/a*	%	G	2007	3
	Life expectancy - males	-	72.5	yrs		01-05	4
	Life expectancy - females	-	78.3	yrs			
	Live births	1,834	1.1	cr		2006	5
	Households - Single adults	*n/a*	*n/a*	%	G	2005	6
	Single parents	*n/a*	*n/a*	%*	G		
Mortality	Deaths all ages (5 yrs)[2]	10,141	874.2	sr		01-05	7
	Coronary heart disease deaths in under 75s (5 yrs)[2]	787	83.5	sr			
	Cancer deaths in under 75s (5 yrs)[2]	1,468	155.1	sr			
	Cerebrovascular disease deaths in under 75s (5 yrs)[2]	289	30.1	sr			
Drugs, Alcohol and Smoking	Alcohol related and attributable hospital patients[3]	1,651	879.3	sr		04-06	8
	Alcohol related deaths (5 yrs)[2]	336	36.7	sr		01-05	9
	Estimated smokers (16+)	36,974	26.5	%		03-04	10
	Drug related hospital patients[3]	101	64.9	sr		04-06	11
	Drug related deaths (10 yrs)[4]	104	60.2	cr2		97-06	12
Hospitalisation & Injury	Patients registered with cancer[3]	888	409.5	sr		02-04	13
	Heart disease patients[3]	1,638	756.8	sr		04-06	14
	Cerebrovascular disease patients[3]	437	188.9	sr			
	Emergency medical admission patients[3]	12,137	6,609.7	sr			
	Multiple admission patients[3]	2,497	1,287.2	sr			
	Unintentional Injury patients[3]	1,980	1,095.6	sr			
	Patients prescribed statins	34,449	19.0	%		2006	15
	Road accident casualties - adults[3]	549	4.0	cr3		01-04	16
	Assault discharges[3]	226	1.3	cr3		04-06	17
Mental Health & Function	Suicide (5 yrs)[2]	134	15.4	sr		01-05	18
	Self assessed health (classified as "Not Good")	18,853	10.9	%		2001	19
	First hospital admission - psychiatric[3]	607	324.3	sr		02-04	20
	Patients prescribed drugs for anxiety /depression	15,987	8.8	%		2006	21
	Incapacity Benefit & SDA Claimants	11,305	10.5	%		2007	22
	Long-term limiting illness	36,272	21.0	%		2001	23
Social Work	Clients aged 0-15	1,336	4.3	%	G*	2007	24
	Clients aged 16-64	3,298	3.0	%	G*		
	Clients aged 65+	2,850	10.4	%	G*		
Prosperity - Poverty	'Income deprived'	25,356	14.9	%		2006	25
	'Employment deprived'	14,748	13.9	%		2006	26
	Workless	17,220	16.0	%		2006	27
	JSA - Unemployment	3,120	2.9	%		2007	28
	Households without access to car/van	28,030	37.2	%		2001	29
	Children in workless households	6,655	17.9	%		2001	30
	Social grade E - benefit, unemployed, lowest grade work	31,310	22.8	%		2001	31
	Workplaces	5,052	47.5	cr3		2005	32
	Employees[5]	75,800	71.2	cr		2005	33
Educ-ation	Primary school attendance	-	95.5	%		05/06	34
	S4 Pupils with 5+ GCSE equivalents	1,358	62.4	%		05/06	35
	Adults without qualifications	42,968	33.6	%		2001	36
Crime	Serious violent crime[3]	309	18.2	cr4		04-06	37
	Domestic abuse incidents[3]	738	43.4	cr4		04-06	38
	Vandalism[3]	3,835	225.6	cr4	G**	04-06	39
	Drug Offenders[3]	1,138	66.9	cr4	G**	04-06	40
Housing & Transport	Housing type - tenements	*n/a*	*n/a*	%	G	2006	41
	House prices	-	112,185	£		2006	42
	Housing tenure - Owner Occupiers	*n/a*	*n/a*	%	G	2007	43
	Overcrowding	9,472	12.6	%		2001	44
	Travelling to work by foot/bike or public transport	45,322	42.4	%		2001	45
Child & Maternal Health	Smoking during pregnancy (3 yrs)[2]	1362	25.5	%		02-04	46
	Breastfeeding (at 6 - 8 week review)	514	31.2	%		04-06	47
	Low birth-weight babies (3 yrs)[2]	126	2.6	%		02-04	48
	Infant Deaths (5 yrs)[2]	53	5.8	cr5		01-05	49
	Immunisation uptake at 24 mths - MMR	-	89.6	%		04-06	50
	- all excl. MMR	-	97.1	%			
	Dental hospital admissions for children[3]	369	1.2	cr		03-06	51
	Teenage pregnancy - under 18 years (3 yrs)[2]	431	43.5	cr3		02-04	52
	Road accident casualties - children[3]	87	2.7	cr3		01-04	16

Notes

1. The graph shows the "measure" (e.g. crude rate, percentage, years of life) expressed as a percentage below or above the Scottish measure, but using a range from a minimum of -70% to a maximum of +70% only. The actual plus/minus percentage value is shown in bold to the right of the graph. This is calculated as the area 'measure' minus the Scottish measure, divided by Scottish measure and multiplied by 100.
2. Numbers presented over a period of years (e.g. 5 years for mortality) but rates are annual average rates.
3. Average annual numbers and rates. 4. Numbers and rates presented over a period of years (e.g. 10 years for drug deaths).
5. Employee numbers based on location of business, not residence area of employees.

Key

cr - crude rate per 100 population; cr2 - crude rate per 100,000 population; cr3 - crude rate per 1,000 resident population; cr4 - crude rate per 10,000 resident population; cr5 - crude rate per 1,000 live births; sr - age-sex standardised rate per 100,000 population; yrs - years; %* - single parent households as % of households with children. Defn - see table of definitions & sources

The 6th column of the spine chart indicates where an indicator is not compared to the Scottish average but with a local alternative: G - Glasgow City average; G* - average of Glasgow, E & W Dunbartonshire, Renfrewshire & East Renfrewshire; GGC - Greater Glasgow and Clyde (excluding Lanarkshire parts); shading on an indicator bar also indicates where a 'local' comparator is used.

n/a: data not available (usually due to lack of coverage) or cannot be calculated. In addition, for particular indicators where the number of cases is below five and not zero, the range is shown i.e. '1-4'. NB If the number of teenage pregnancies is in the range '1-4' the rate is suppressed to avoid possible disclosure.

Chapter 4

The energy use of the people of Paisley and Renfrewshire

Introduction

There is only limited information available on the energy use and greenhouse gas emissions in Paisley and Renfrewshire. Renfrewshire council recently reported through its Greener Renfrewshire group that it has calculated its carbon footprint using the REAP software.[14]

Carbon emissions

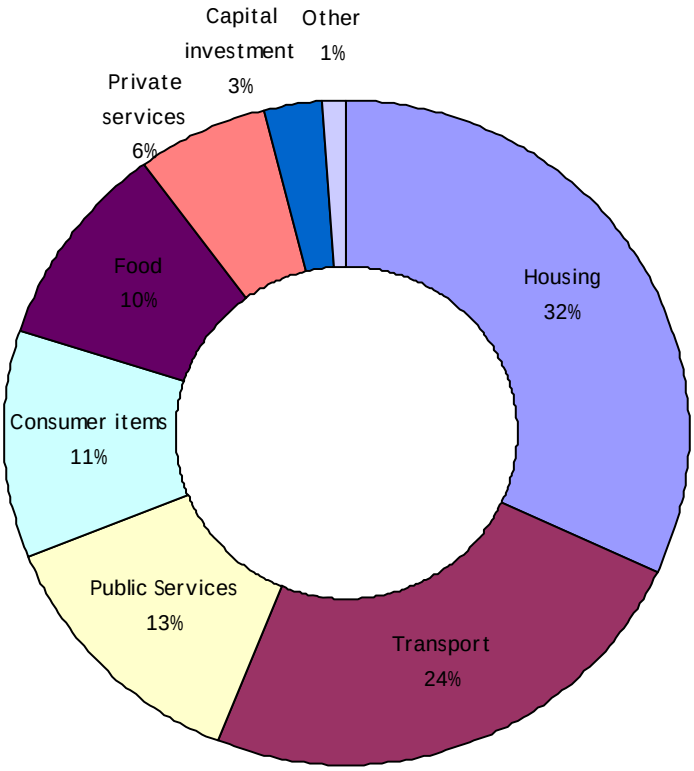
In the council report, the carbon footprint for Renfrewshire Council, the Scottish local authorities with the highest and lowest carbon footprints, and the all-Scotland carbon footprint are given (Figure 6). However, the REAP software is based on a series of assumptions based on the demographic and economic patterns in the area rather than a detailed knowledge of the industrial, domestic and social habits in the community. For example, it is not clear if the emissions associated with Glasgow Airport are attributed to Renfrewshire.

Figure 7 – Carbon footprint of Renfrewshire council and other benchmarks (source: Renfrewshire council taken from Resources and Energy Analysis Programme (REAP) from the Stockholm Environment Institute (SEI))

	2001 Carbon Footprint (tonnes CO_2 per capita)	**2008 Carbon Footprint (tonnes CO_2 per capita)**	**Difference Between 2001-2008 figures (tonnes CO_2 per capita)**
Renfrewshire Council	11.42	11.96	0.54
North Lanarkshire Council (lowest Carbon footprint)	11.40	11.54	0.14
Orkney Isles (highest Carbon footprint)	12.94	13.30	0.46
Scotland	11.71	12.60	0.89

Figure 8 shows that the biggest contributing sector to Renfrewshire's carbon footprint is housing (32%). Transport is the second biggest contribution (24%) followed by public services (13%) and consumer items (11%). Food, private services and capital investment make up almost all of the rest of the footprint. However, the limitations of the assumptions in the REAP software mean that the distribution of the carbon footprint across Renfrewshire has to be interpreted with some caution.

Figure 8 – Renfrewshire sectors responsible for the carbon footprint (source: SEI 2008)



Recently, the Scottish Government has suggested that Scotland's carbon emissions have dropped dramatically since 1990, and that Scotland is 'on-course' to meet its target of a 42% decline in carbon emissions by 2020. Much of this optimism is based on the non-inclusion of 'embedded carbon' in imports. Thus, as Scotland's manufacturing base shrinks, more goods and services are imported rather than made within the country. Therefore, the carbon emissions of Scotland, if these imports are excluded, can be seen to fall. Of course this is a misrepresentation of the true global picture since carbon emissions resulting from the actions of our communities are relevant wherever they occur around the planet.[15, 16]

Energy use

No evidence was identified to quantify the amount of energy use in Renfrewshire or the types of energy (e.g. oil, gas, electricity) used. Part of

this can be inferred from the carbon footprint (e.g. the transport sector is likely to primarily use petrol and diesel, and housing is likely to primarily use electricity – derived from coal, gas, nuclear and renewables – and natural gas).

Vulnerabilities

Renfrewshire, like all other communities in the 'developed' world, is vulnerable in many ways to oil scarcity. We import most of our food, and our water supply requires a huge input of electricity to clean it and pump it into our homes (Scottish Water is the single biggest electricity consumer in Scotland). Our transport and economic systems are tied into the globlised model whereby we trade currency, financial services, tourism, education and knowledge for manufactured goods, raw materials and, increasingly, services. Any stifling of this flow of trade, as would be expected with oil scarcity, would require radical and urgent economic and transport change. Most of our houses are dependent on gas or oil supplies for heating, and our electricity is largely dependent on gas, oil, coal and nuclear.

All of these matters are not peculiar to Paisley. However, the existence of Glasgow Airport, both as a major local employer and major polluter, is a particular challenge to the area. Although it has been claimed that the airport is a net generator of wealth for the community[17], in fact the more prudent use of money currently invested in and through the airport would generate many more jobs (and more sustainable jobs at that) elsewhere in the economy.[18] This is much the same as has been claimed for the Faslane nuclear base[19] despite the existence of a much more attractive economic alternative.[20]

Scottish and UK data

Both the UK Government and Scottish Government have produced data on the historical, current and projected greenhouse gas emissions.[15, 21] Some of these analyses have suggested that greenhouse gas emissions have fallen since 1990, but this excludes embedded carbon in imported goods and services – a very important omission during this period of economic globalisation.

Much work has been completed to outline the actions and developments necessary to achieve an 80% reduction in greenhouse gas emissions by 2050. Further scrutiny of these documents to consider the lessons for Paisley is merited. [21]

Future research

There is little in the way of reliable numerical data on Renfrewshire's carbon emissions, fossil fuel use or indeed about the economic drivers of the community. Our knowledge is limited to generalities and extrapolations from other communities and other populations, but we do know the appropriate direction of travel and the main issues for consideration.

Key next steps for generating an energy descent plan will be to properly quantify the sources of carbon emissions and users of fossil fuels.

Summary

Although we know relatively little about the specifics of carbon emissions and fossil fuel use in Paisley, housing, transport, public services, consumer goods and food are likely to be the main sources and the first targets for change. Further quantification of this is merited, but this should not delay action planning or moves to reduce emissions in the meantime.

Chapter 5

Energy descent pathways

Introduction

Through the Climate Change (Scotland) Act 2009 there is now a clear national ambition to reduce Scotland's carbon dioxide emissions. Scottish reduction targets have been set at 42% by 2020 and 80% by 2050. These targets do not include the emissions 'embedded' within imports to the country, nor do they subtract the emissions 'embedded' within exports to other nations. This is important because Scotland, in common with many other affluent nations, imports an increasing proportion of it manufactured goods which carry a large carbon footprint (e.g. steel, cement and food) and exports goods and services which have relatively small carbon footprints (e.g. financial services and banking).

Even if these limitations are ignored, many experts have argued that these targets are insufficient and, even if met and replicated around the globe, would not reduce our risk to below a 50:50 chance of climate chaos. Monbiot and Hillman, two prominent writers on this subject, have argued that a 90% cut in carbon emissions is required, and that the cuts have to occur early in the transition (since a linear trend would result in a larger carbon legacy than a radical early cut followed by smaller later cuts).[22] [23] The aim of this document is to help plan for a radical and urgent reduction in our carbon emissions and in our fossil fuel use.

To help this planning process, different possible means to achieving the overall reductions can be considered. This chapter considers what actions need to be taken for Renfrewshire to play its part in the overall reductions. It is similar to an exercise undertaken recently by the UK Government[24] with four important differences:

1. It considers fossil fuel supply to be much more constrained because of peak oil.
2. It considers an early and radical reduction of 90% of CO_2 equivalent emissions from the 1990 baseline as its aim.
3. It considers that it is not appropriate to wait for new technologies to arise before taking sufficient action to realise a 90% reduction.
4. It considers the social and cultural change in communities and the change within individuals' hearts that could accompany the transition.

The estimated carbon equivalent emissions per person in Renfrewshire in 2008 is 11.96 tonnes. Using this as a baseline, the target reductions for each sector can be calculated (Table 1).

Table 1 – Target emissions for Renfrewshire

Sector	Proportion of total emissions	Per capita CO_2 equivalent emissions in 2008 (tonnes)*	50% reduction target** (tonnes)	90% reduction target** (tonnes)
Housing	32%	3.8	1.9	0.4
Transport	24%	2.9	1.4	0.3
Public services	13%	1.6	0.8	0.2
Consumer items	11%	1.3	0.7	0.1
Food	10%	1.2	0.6	0.1
Private services	6%	0.7	0.4	0.1
Capital investment	3%	0.4	0.2	0.0
Other	1%	0.1	0.1	0.0
Total	100%	12.0	6.0	1.2

* The embedded carbon within imports is not included nor is it clear that factors peculiar to Renfrewshire (e.g. Glasgow airport) are included.
** These reductions are simply proportionate decreases on the 2008 data.

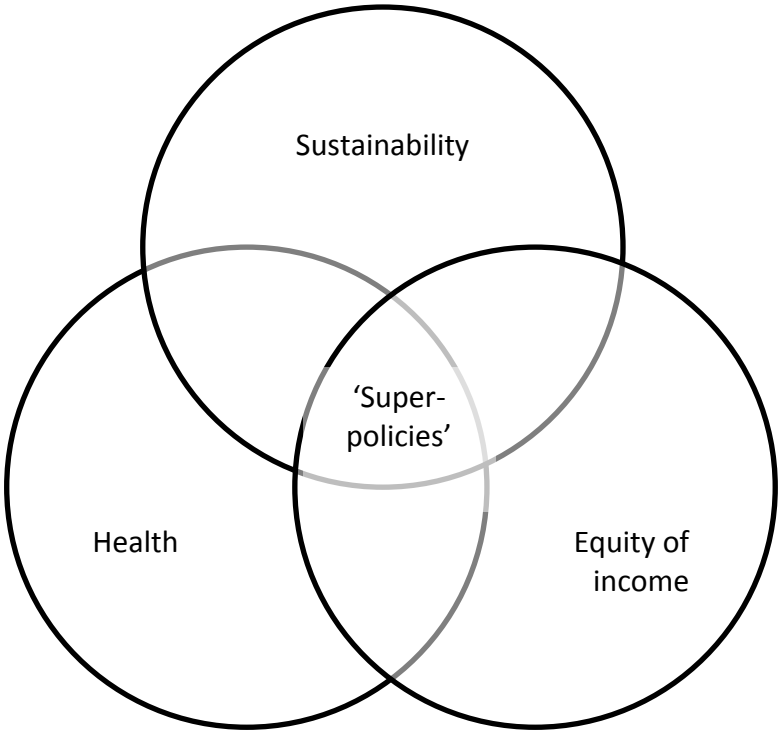
Co-benefits

Policies and actions which aim to reduce energy consumption are likely to have large impacts on non-environmental outcomes. The inter-linkage with the economy, transport and food production has already been discussed earlier in the report, but the impacts on culture, well-being, health and 'soul' have not.

It is possible that well-designed actions and policies to reduce energy consumption could reduce economic inequalities and generate health benefits. For example, carbon rationing or universal housing insulation, aimed primarily at sustainability, would simultaneously act to improve both health and economic equity (so-called 'super-policies' – Figure 9).

It is also possible that a poorly-designed set of actions and policies to reduce energy use might increase inequality or harm health. For example, carbon taxes which result in higher electricity bills might increase fuel poverty and increase the number of cold-related deaths if there is no attention paid to home insulation.

Figure 9 – The potential for energy policies and actions to impact on non-environmental outcomes



Possible energy descent pathways

The UK Government has produced a series of models and plans which would achieve an 80% reduction in emissions.[24, 25] Many of these solutions involve technological innovations and inventions that are either indicative (i.e. not yet invented) or are simply at the concept stage (and are not in production). However, the models demonstrate the scale of the challenge, the complex interplay between the different economic and social factors and the need for radical and large-scale interventions and policies.

The sections below details some possible interventions that merit some consideration as we move towards Energy Descent Action Planning in Paisley and Renfrewshire. These interventions are drawn from the government models and a wider literature from the environmental movement.

Housing

Housing contributes the largest proportion (32%) of Renfrewshire's carbon footprint of any sector. It is therefore vitally important that large and urgent reductions are made in this area. Fortunately, it is one sector where making large reductions in emissions can be relatively straightforward. However, very little change has thus far been achieved.

What works to reduce housing emissions?

Lighting and appliances [26]

One of the difficulties in this area is the continuous increase in the number, range and energy consumption of home appliances (amounting to an increase of 45% in number between 1990 and 2010). More efficient technology has become available for some functions (e.g. light bulbs) and this has limited the increase in total energy to 2% over the same period. The biggest reductions in energy use can be achieved by replacing all lights with LED lighting; replacing all appliances (e.g. washing machines, fridges and freezers) with the most energy efficient versions, reducing demand for home electronics and computing and ensuring that only the most efficient versions are made available. Careful use of lighting and appliances also has an important role to play.

Electricity [24]

Electricity production is one of the biggest overall concerns for Government with various options under consideration including nuclear, tidal, wind, wave, geothermal and hydroelectric power, and carbon capture technology. Although much of this is beyond the scope of local action, it is possible for Renfrewshire to make significant contributions to the production of electricity locally. These could include construction of wind farms, local hydroelectric schemes, tidal power from estuaries and rivers, and photo-voltaic (solar) panels.

Space heating, hot water and cooling [27]

Insulation is one of the simplest and most cost-effective means to reducing energy consumption. This includes loft, solid wall, cavity wall and floor insulation as well as draught-proofing and improved glazing (triple glazing being most efficient). A reduction in mean internal home temperature to around 16 degrees Celsius can radically reduce energy demand. All new homes could be built to 'Passivhaus' standards.[28] Improved use and infrastructure relating to hot water (e.g. showers in place of baths, installation of low-flow systems) is also important. Air conditioning has no role in a sustainable system in Scotland, but improved ventilation and shading (e.g. through the use of window shutters) can be very effective.

Water

Scottish Water is the single greatest user of electricity in Scotland. A reduction in demand for water by domestic and industrial users is therefore important in reducing the overall carbon footprint.

Is there a need for a housing audit in Renfrewshire?

We do not currently have a way of knowing which privately-owned houses in Renfrewshire require infrastructure investment or changes in behaviour (e.g. temperature settings, ventilation, use of appliances etc.). There is

better information available about Renfrewshire's council homes (over 14,000) which are currently undergoing refurbishment, although the impact of this on their carbon footprint is not clear. Ideally an audit of the carbon emissions (perhaps using gas and electricity bills as a proxy) and physical infrastructure (e.g. insulation coverage, heating systems in place) of all of Renfrewshire's housing would be available to allow planning of a comprehensive intervention in terms of infrastructure, use patterns, behaviours and consumption. Perhaps in the shorter term a series of more local audits could be carried out to investigate what needs to be done to achieve a 90% reduction in housing emissions.

Behaviours, attitudes, cultures and inspiration

Although there is clearly a need for changes to the physical condition of the housing stock in Renfrewshire, the biggest determinant of the environmental impact of the housing is the way in which the housing used. Thousands of individual decisions taken about the use of appliances, opening windows instead of turning down the heat, and numerous other activities all add up to generate the total environmental impact. However, individual decisions are heavily influenced by the cultural and social patterns prevalent within society (for example, the recent trend to have large wide-screen televisions at home), education and economic incentives.

To reduce the environmental impact of housing in Renfrewshire requires a step-change in the mindset of Renfrewshire's people, as well as infrastructure change.

Transport

Transport accounts for 24% of the emissions in Renfrewshire. This is no surprise given the dominance of road transport in moving goods and delivering services, exacerbated by the trend to locate retail, leisure, housing and other facilities at the edge of town on the main arterial road network.

What works to reduce transport emissions?

There are two ways of reducing carbon emissions in the transport sector: the first is to de-carbonise the fuels used (e.g. through the development of electric cars); and the second is to move away from personal motorised transport towards walking, cycling and public transport.

A decarbonisation of transport fuels requires a large increase in the development of alternative energy sources – energy sources which themselves would require to be renewable. This would mean, for example, that electricity production would be decarbonised and its supply massively increased in order to replace the fossil fuels used for road transport. This requires a very high level of technological development.[25]

The alternative, which implies that fewer, shorter, and less energy-consuming journeys would be needed, also requires a very significant degree of change. In addition to an expansion of cheap public transport and the creation of safe cycling and walking routes, the locations of retail, social and employment hubs would need to change, as would the production and distribution of goods and services (e.g. it would not be possible to produce and distribute food as we do now if refrigerated trucks were phased out). However public transport and the regular exercise of cycling and walking are undoubtedly beneficial for social interaction, health and well-being. It is this model of transport which is most likely to provide a sustainable future.

Planning

To achieve a shift in the dominant modes of transport, planning policy would need to prioritise walking, cycling and public transport by integrating future developments into a sustainable transport plan. Employment, retail and social venues would have to be accessible in this new model of transport, and the supply chains for goods and services would need to be redesigned.

Infrastructure

Currently, the roads network in Paisley and Renfrewshire is not well suited to the needs of pedestrians and cyclists. Car transport is prioritised and there are numerous physical and cultural barriers to alternatives. Simple changes such as a redistribution of road space to pedestrians, cyclists and public transport would be helpful, as would the provision of viable alternative modes of transport for the population (e.g. free public transport, increased number of bus routes and reopened railway lines).

Food

Food consumption in Renfrewshire accounts for 10% of the carbon footprint. Certain food types (such as meat and that sourced or processed abroad) account for a large proportion of this footprint. However, at present, there is insufficient local food production to provide for the local population. Efforts in other parts of Scotland (e.g. the Fife diet[29]) have succeeded in localising food production and in reducing carbon emissions. The local diet is also healthier (largely because it is less processed and contains a higher proportion of fruit and vegetables that an average Scottish diet) and has inspired greater community involvement in food production. Less food waste, and a reduced meat consumption (especially of beef) would also help to reduce the footprint.

The population of Renfrewshire almost exclusively (with the exception of a small number of allotment holders and gardeners) gets its food from supermarkets and retailers which import from across the UK and the world. If Paisley and Renfrewshire is to reduce the carbon footprint of its food the kind of work that has gone into the Fife diet would have to be replicated here. However, even that is unlikely to be sufficient, and a comprehensive re-evaluation of how we produce, consume, and think about food needs to

take place. In the short term, we need more facilities and advice for people to grow their own food and to trade locally produced food (such as through the Farmers' market).

Industry, goods and services

Taken together, the production and consumption of goods and services accounts for the largest proportion of the carbon footprint. This reflects the previous discussion of the importance of re-orientating the economy away from the production of goods and services which are currently the most profitable, towards goods and services which serve the needs of the population best and which are sustainable. Furthermore, the mode and location of production requires change to make supply chains and distribution networks sustainable (unlike the global chains and networks which currently dominate).

This is a mammoth task, but one which is not unprecedented. During the 19th Century the industrial revolution rapidly changed the goods and services produced by society. During World War 2, almost the entire economy was brought into the service of the national interest and re-orientated in the space of a year. We need to think now of how a change of a similar magnitude can be generated in service of sustainability.

The need for more local information

Much of the data and assumptions relating to the carbon and greenhouse gas emissions in Renfrewshire in this report are uncertain. This is because of a lack of data and a lack of clarity about the methods used to calculate the data in official reports. An important first step in beginning to plan an 'energy descent' is a clear picture of the total carbon (equivalent) emissions of Renfrewshire including:

- The actual carbon emissions of each sector in Renfrewshire based on actually collected data (e.g. electricity, fossil fuels and food consumed),
- Clarification of the contribution of important local carbon producers such as Glasgow Airport and the BASF (previously Ciba-Geigy) pigment plant,
- Clarification of the role of imported and exported embedded carbon (including electricity generation, manufactured goods etc.)

These are tasks that are difficult for the Paisley Transition Town group to complete alone. However, it is known that Renfrewshire Council are planning to undertake some limited carbon accounting for the area and it may be possible to build upon this with the input of additional academic expertise to provide a more complete picture of what is required to be done in Renfrewshire.

Summary

It is difficult at this stage to be clear on exactly the correct action to take and to advocate for sustainability. However, this chapter has outlined some possible guiding principles and, particularly for housing, given some concrete examples of actions that could be taken. The next chapter will discuss how we plan to involve the population of Paisley and Renfrewshire in generating a comprehensive plan that will inspire and guide action.

Chapter 6

How we are going about generating an Energy Descent Action Plan for Renfrewshire

In this chapter we make a first attempt to work out how we can reduce our carbon emissions radically and quickly enough to play our part in avoiding climate chaos, and how we can avoid economic and social chaos by reducing our dependence on fossil fuels. We hope that by involving and engaging people in a civic conversation on these issues we can generate ideas, thinking and solutions that could be sufficient to deal with the challenges ahead.

We held a series of public meetings and workshops across Renfrewshire during 2011 to try to these issues how we could collect and assess suggestions for making our contribution reducing greenhouse gas emissions and using the transition period to generate positive changes in our community. The group has worked together to identify initial steps on the road to sustainability, and invites comments, amplifications and further suggestions from all other interested individuals and groups. We hope that this will result in an improved foundation for a further edition of the Energy Descent Action Plan with greater participation from the wider community.

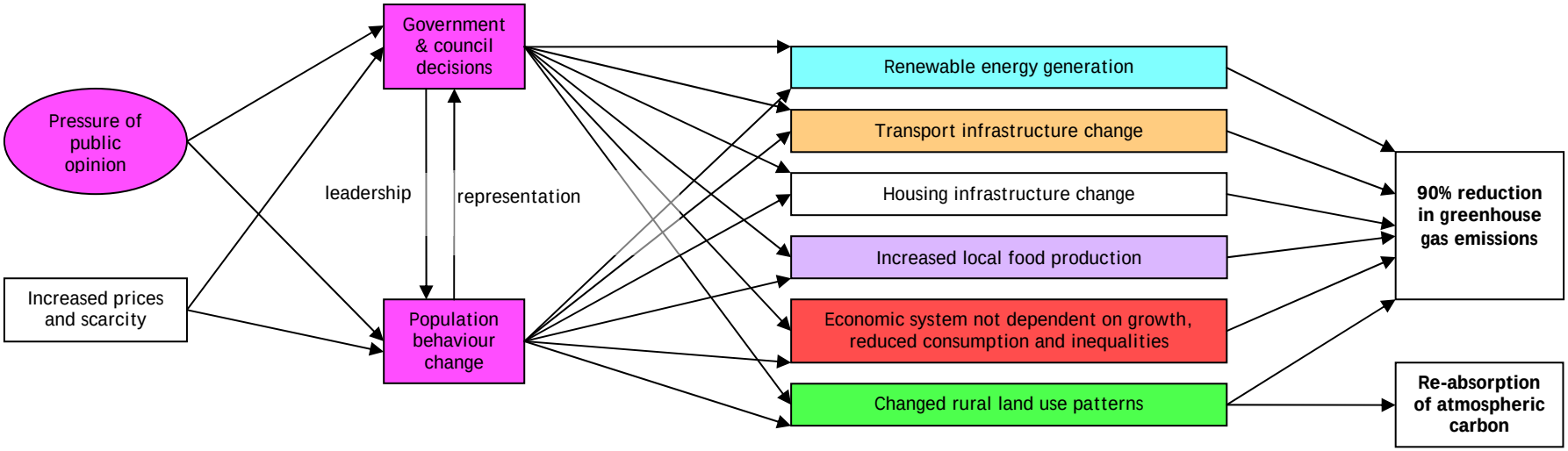
A journey to sustainability

As stated, It is difficult to come up with a full plan for making precisely the transition to sustainability, but we do know where we are going. Planned transition in which we act to reduce harmful consequences, maximise positive benefits and make a significant contribution to reducing greenhouse gas emissions would be better than a transition forced upon us by fossil fuel scarcity and climate chaos.

We are therefore clear where we wish this journey to end: we need to reduce our fossil fuel use to virtually zero and reduce our greenhouse gas emissions, (principally carbon dioxide) by 90% from the 1990 base by 2050 . We know that this will only be achieved if we radically change our production of energy (principally heat and electricity), run our transport systems, power our buildings, how we produce and consume our food, how our economic system works and how we use our land. Figure 10 summarises these key steps. It also proposes that there are three key factors which will generate a successful transition in all of these domains. The first is government and local council decisions (including policy decisions and decisions about investment); the second is population behaviour change; and the third is the context of increasing fossil fuel scarcity and rising prices.

The role of Paisley Transition Town is therefore to influence change by the central and local government and to influence changes in the way the local population behaves in such a way that sustainability is achieved in systems mentioned above. This is a complex and daunting task, and it is therefore necessary to break it down into smaller parts in order to examine what practically can be done and how. The next section therefore looks at each of the systems (energy production, building, transport, food, the economy and land use) in turn in more detail, before returning to the issue of how to influence change.

Figure 10 – The steps to making Renfrewshire sustainable



Buildings

In order to realise a decline in greenhouse gas emissions of 90% overall, it is necessary to achieve a similar reduction in building-associated emissions. Much activity is already happening in this area. Public housing is being improved with many better insulation and more efficient gas boilers, as is private housing, some of which are also being fitted with solar energy heating or photovoltaic panels. Renfrewshire Council is investing in the council housing stock, part of which will improve the energy efficiency of the heating systems and improve the insulation. Housing associations across Renfrewshire are similarly investing in their housing stock and building more sustainable new housing.

However, this activity is far from being sufficient to reduce housing-related emissions by 90% (from 1990 levels). Only 10% of Scottish homes meet building standards for insulation. Even the new housing now being build (whether by housing associations or privately) is not even close to achieving these reductions and the improvements in insulation are piecemeal. Only a small proportion of households have comprehensive insulation and even those do not achieved 90% reduction in emissions. This failure, combined with high energy prices, decreasing disposable income and the unnecessarily complex and unjust energy tariffs of the energy companies has led to rapidly rising fuel poverty levels across Renfrewshire.

Ten per cent of housing related carbon emissions are due to the production and assembly of construction materials. The VAT rates for new construction (0%) and housing improvements (20%) artificially promote replacement rather than upgrading of existing buildings, wasting their embodied energy. These tax rates need to be equalised.

Building standards for insulation of non domestic buildings need to be raised to at least those of housing, and a programme of retro fitting the existing stock of commercial, industrial and public buildings is required.
Figure 11 summarises the key steps that are required in our housing. The yellow boxes are directly related to housing whilst the other colours denote links to the non-housing sectors which are covered later. Energy generation within households or in local communities (e.g. through community heating schemes) are particular examples of this since housing is a key arena for generating sustainable energy.

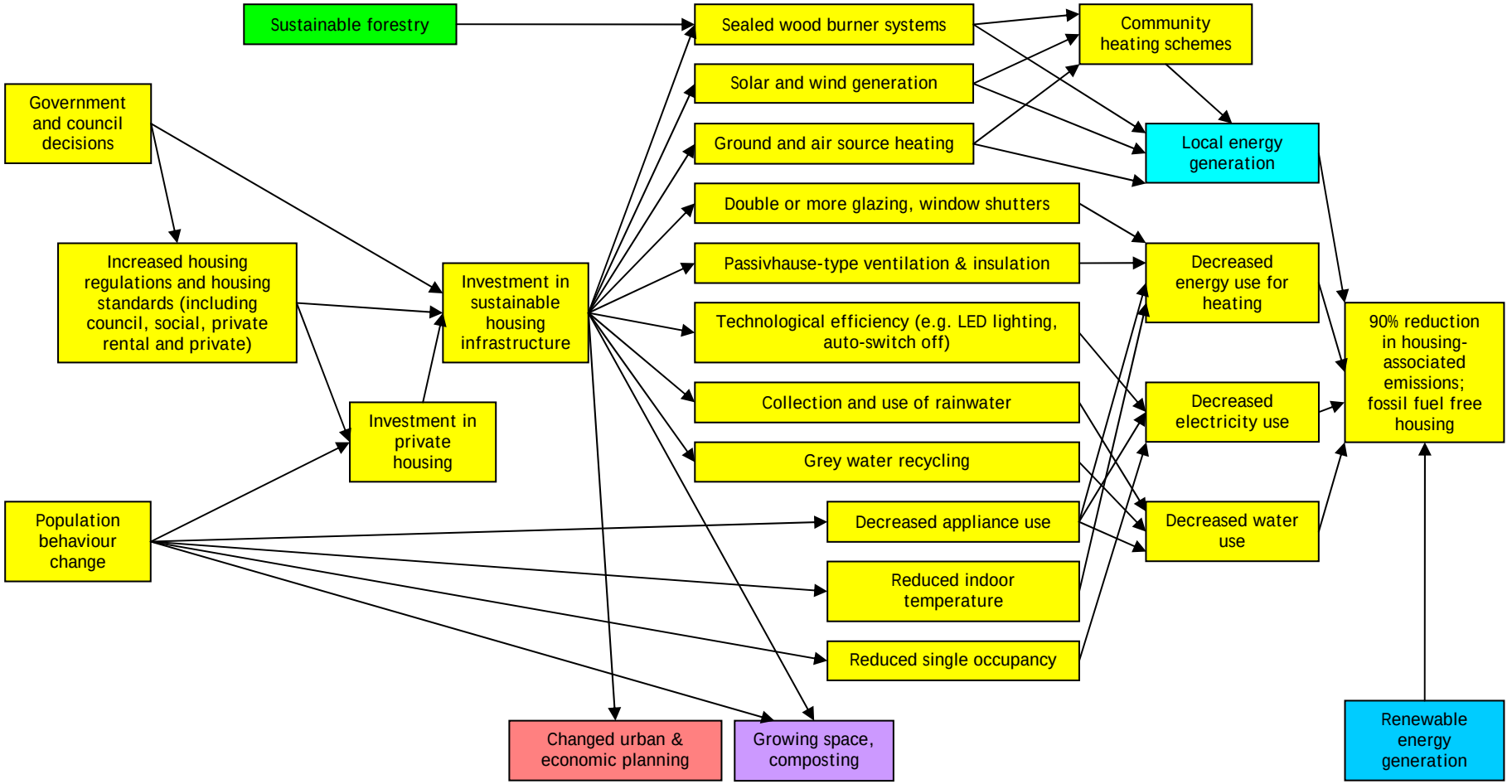
The most important actions are those which are likely to lead to a decrease in demand for energy for heating. In Germany, there is a term for housing which is so well insulated that human body heat and domestic appliances keep the temperature of the house sufficiently high - the 'Passivhaus'. To achieve this standard, insulation has to be universally applied across the house with heat exchange ventilation and elimination of 'heat bridges' (which conduct heat out of the house). This standard is achievable but not with the current aspiration level prevalent across Scotland.

A reduction in household electricity usage is required, and this needs more technological efficiency (e.g. energy efficient lights) and reduced use of

inefficient appliances (e.g. plasma televisions). The largest single electricity user in Scotland is Scottish Water (principally because of the energy used in pumping water) and so it is necessary to reduce demand for clean water by collecting and using rainwater and 'greywater' (e.g. by using bathwater for flushing toilets).

Behaviour change of the population is a key component of reducing housing emissions. This includes individual decisions we make every day (e.g. around the use of appliances), and other more fundamental choices (e.g. about how many people live within a single household).

Figure 11 – Reducing housing-associated emissions and fossil fuel vulnerability



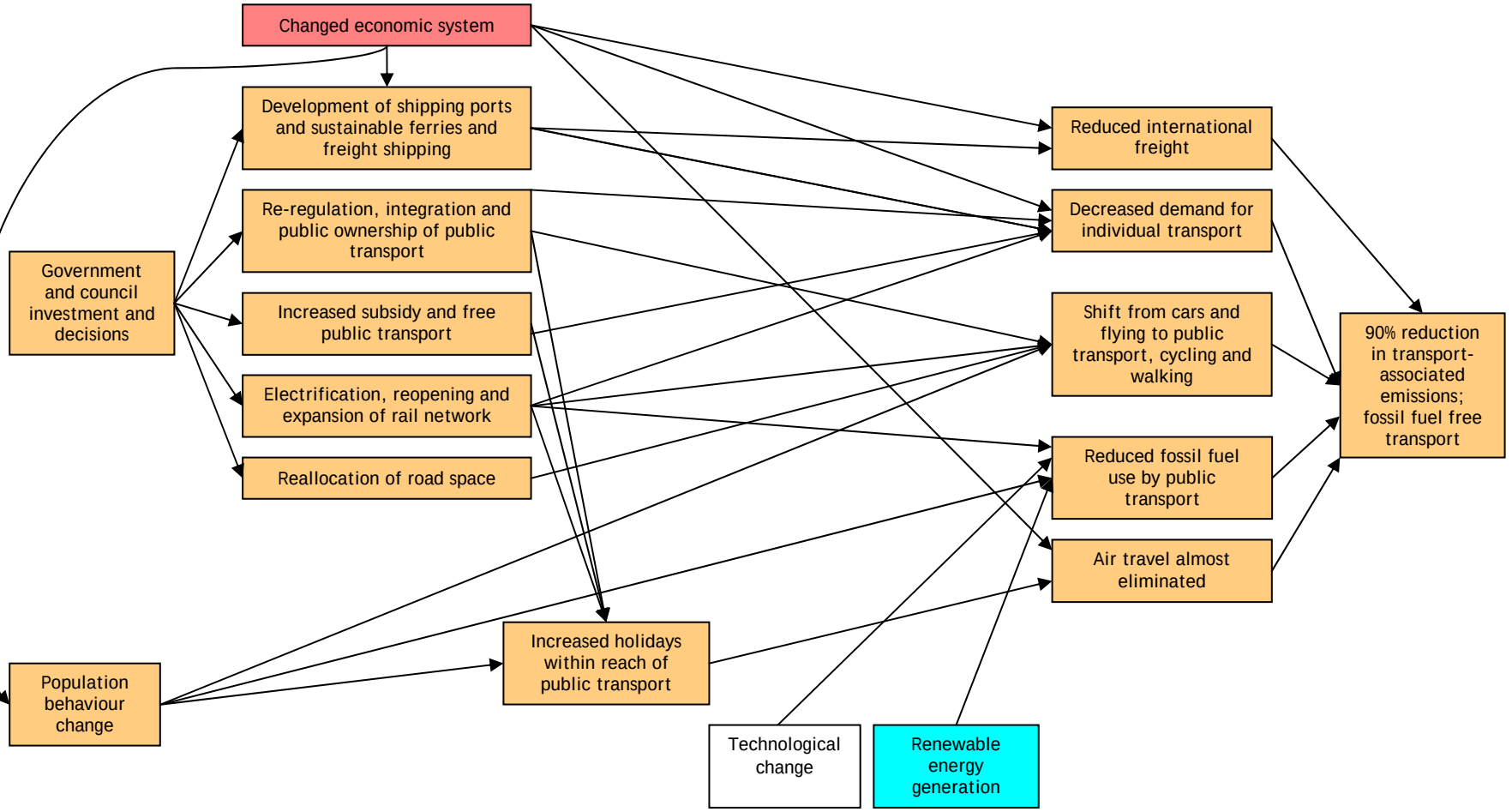
Transport

Figure 12 shows the actions required to realise a 90% cut in emissions within the transport sector. There are three main aspects to current use of transport: that required for the carriage of goods and for the delivery of services; transport used by individuals to get to and from work; and the transport used by individuals for pleasure. The first two of these are heavily influenced by the economic system and require this to become more localised and less dependent on international trade of goods and services that could be provided locally.

However, for many people, transport to and from work could be made more sustainable by switching from individual car transport to either public transport, walking or cycling. Cycling and walking are encouraged by the provision of high quality and safe infrastructure (as well as through changing the expectations of employers about the amount of travelling required as part of work), whilst public transport use is heavily influenced by price and availability. Investment by government and local councils, and changing the ownership and co-ordination of the transport sector, is essential. It is also important to reduce the emissions of the public transport sector by increasing electrification and efficiency of the current infrastructure. There are things that individuals can also do. Reducing individual car travel (e.g. through car sharing, working from home or setting up car pools) can all make an impact.

Travel by air is unsustainable and cannot achieve a sufficient or even significant reduction in emissions through technological change. This means that transport links especially with mainland Britain and to other countries need to be rethought, and the shift from air to rail, already happening, needs to be accelerated with higher speed rail links. Bus and coach travel being much more fuel efficient than car and plane, should be given priorities on our roads. Action will be needed to replace the many jobs associated with Glasgow Airport as it declines. Current shipping is not sustainable either and utilises large quantities of fossil fuels (although shipping remains more efficient at moving large quantities of freight that air travel). Although economic change and increased local production will help, there will be a need to revitalise our former shipping routes and redesign the types of boats that operates on them to make more use of wind and renewable energy Locally, the White Cart was made navigable mainly for small ship building, not freight or passenger transport. Freight ports are now all container ports; it is bound to be more energy efficient for freight to come and go to and from Renfrewshire by Greenock container port and rail.

Figure 12 – Reducing transport-associated emissions and fossil fuel vulnerability



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Food

Food production is a large source of greenhouse gas emissions and is highly vulnerable to fossil fuel scarcity – mostly because of the long supply chains (and associated transport costs), the reliance on farm machinery and artificial fertiliser and herbicides. This is already causing widespread hunger in poorer countries.

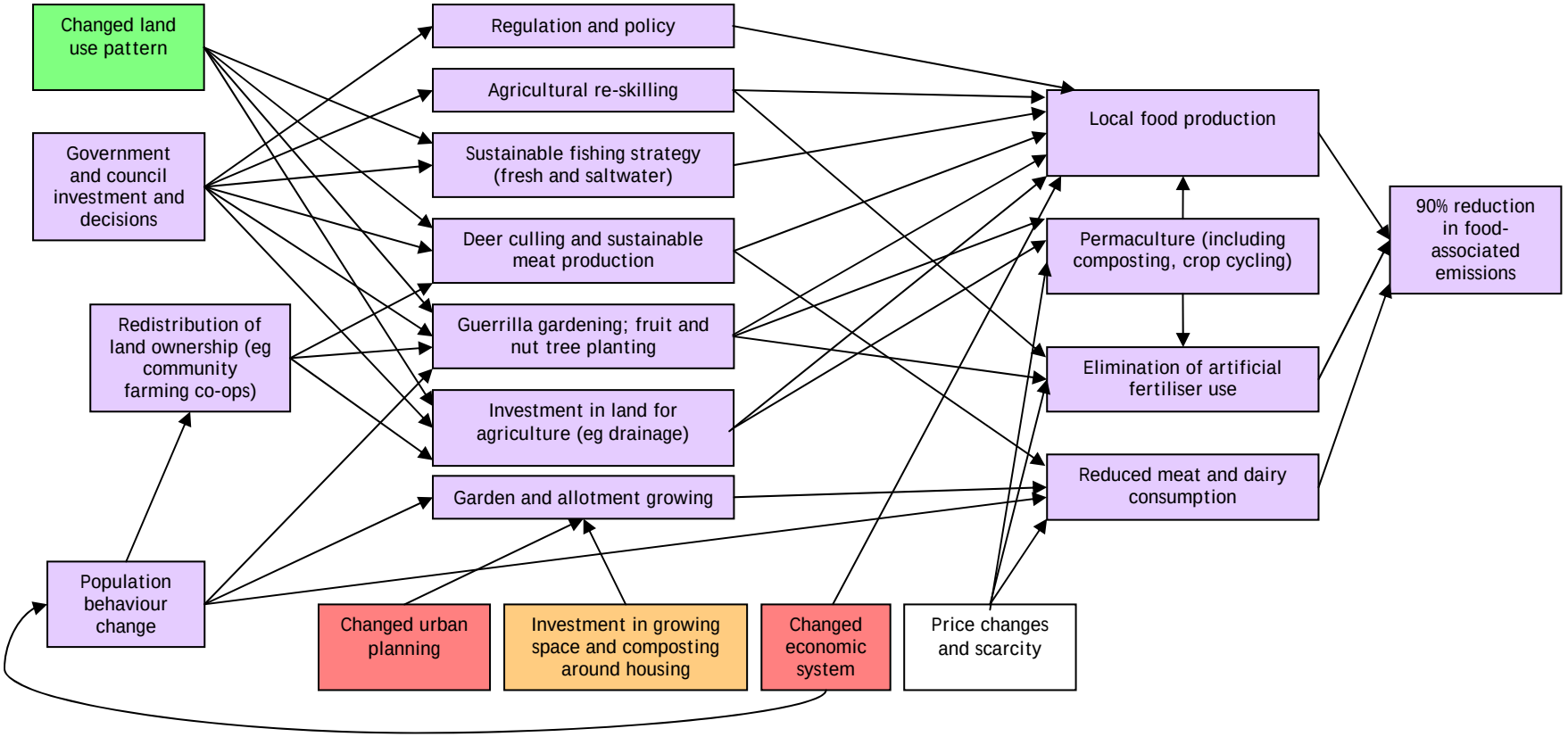
There are many things that can be done to make our food more sustainable. Local food production and distribution used to be the norm in Scotland, and the costly improvements of our lowland fields made in the agricultural revolution need to be maintained. Much can be done to create a sustainable and healthy diet based on local seasonal produce (as is being trialled in Fife using the 'Fife diet'). The maintenance of soil fertility requires the use of permaculture techniques (where food production is organised as part of a continuous system of recycling, reuse and integration) which has been a keystone of the Transition movement. However, this needs to be supported by huge shifts in land ownership and use, by changes to the economic system to meet the population's needs, a re-skilling of the population in cooking (including reduction in food waste), horticulture and agriculture, and changes to the policies which facilitate the current unsustainable food system.

It is perhaps in food production, however, that we have seen great potential for local action by communities. Allotments, garden sharing, seed sharing, creating new growing spaces, guerrilla gardening (growing in underused public spaces without waiting for permission) have all been talked about locally and nationally and could be early actions.

Australia, has tackled the problems of deforestation and desertification in some areas by reducing the population of kangaroos, who eat young saplings and do not have sufficient natural predators to control their numbers. The Scottish equivalent to kangaroo are deer (and to a degree, sheep). They prevent any natural regrowth of native forests in Scotland's uplands and deer are without natural predators. Deer numbers are the highest in 1000 years, But with coordinated culling venison could become a valuable part of the food chain.

The steps towards a sustainable food system are summarised in Figure 13.

Figure 13 – Reducing food-associated emissions and fossil fuel vulnerability



Rural land use

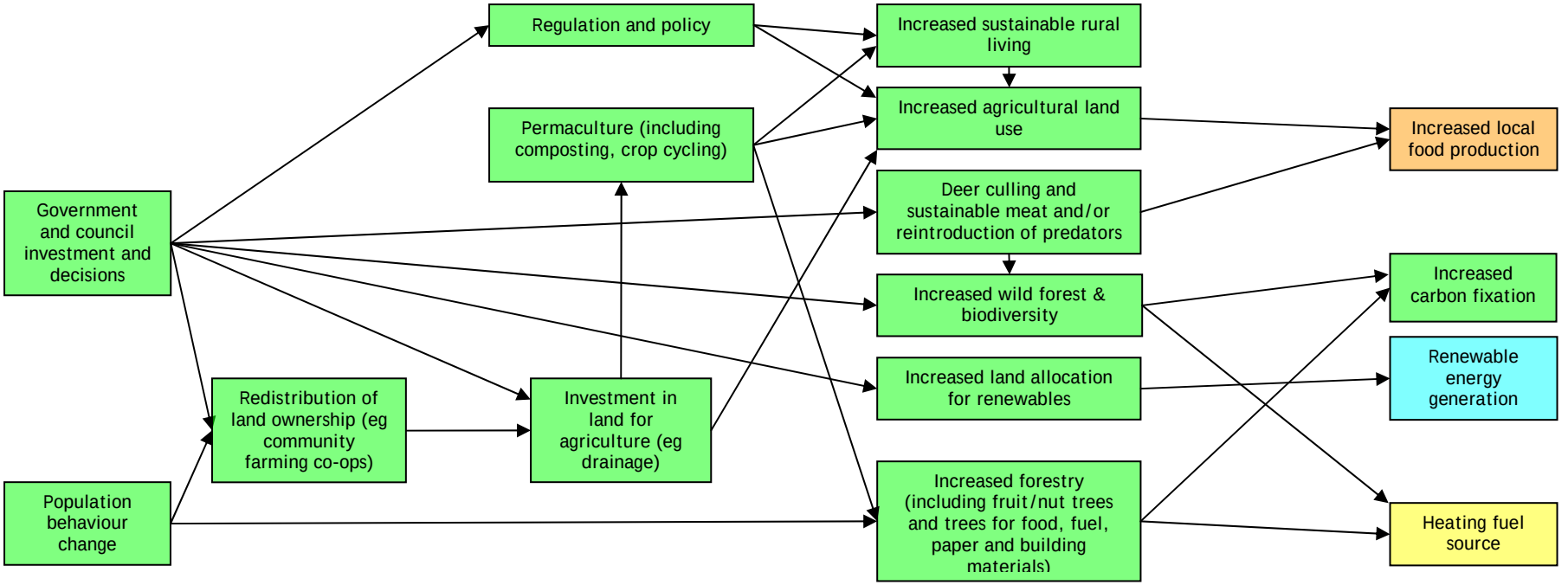
Thus far in the Energy Descent Action Plan we have focussed on the actions that would reduce greenhouse gas emissions in our communities. However, we can also reduce the concentration of greenhouse gases by re-absorbing some of the carbon dioxide already in the atmosphere and 'fixing' it once again in vegetation. We can also prevent carbon dioxide produced by power plants from entering the atmosphere if we can trap it underground. Neither is a substitute for keeping the concentrations of carbon already in the earth's crust, in the form of coal, gas and oil, 'fixed', but equally neither should be dismissed in the struggle to limit rising carbon dioxide levels.

The capture and underground storage of carbon dioxide (also known as carbon sequestration) is in its infancy. It requires favourable geological formations and so far there are just a handful of industrial-scale operations worldwide. The mainstay of carbon fixation therefore is an increase in forestry (Figure 14). We have already stated that there is a need to revitalise the local agricultural sector and use more of our rural land for growing food. The needs for growing food will take precedence, but it is unlikely that all of our rural land could ever be used for agriculture. Renfrewshire has several upland areas (the Renfrewshire heights around Muirsheil country park and the Gleniffer Braes) which are currently used largely for sheep grazing and some cattle grazing. Much of this land is unsuited to arable farming even with investment in drainage and permaculture to improve soil fertility. These upland areas were covered in forestry until the 15th Century, but came under increasing pressure as demand for timber rose for house-building and fuel. The hunting of various predators allowed the number of deer to increase and their presence and that of sheep has prevented any significant natural regrowth of the forests.

Other benefits of increased woodland would be the creation of a sustainable source of fuel, construction materials and paper manufacturing, and maintenance of biodiversity.

Such radical changes in rural land use require changes to the current economic regime which rewards mere ownership of land rather than making it productive. Radical land reform is needed to allow farmers and foresters to be owners rather than tenants of the land their tend.

Figure 14 – Carbon fixation and land-use



Economic change

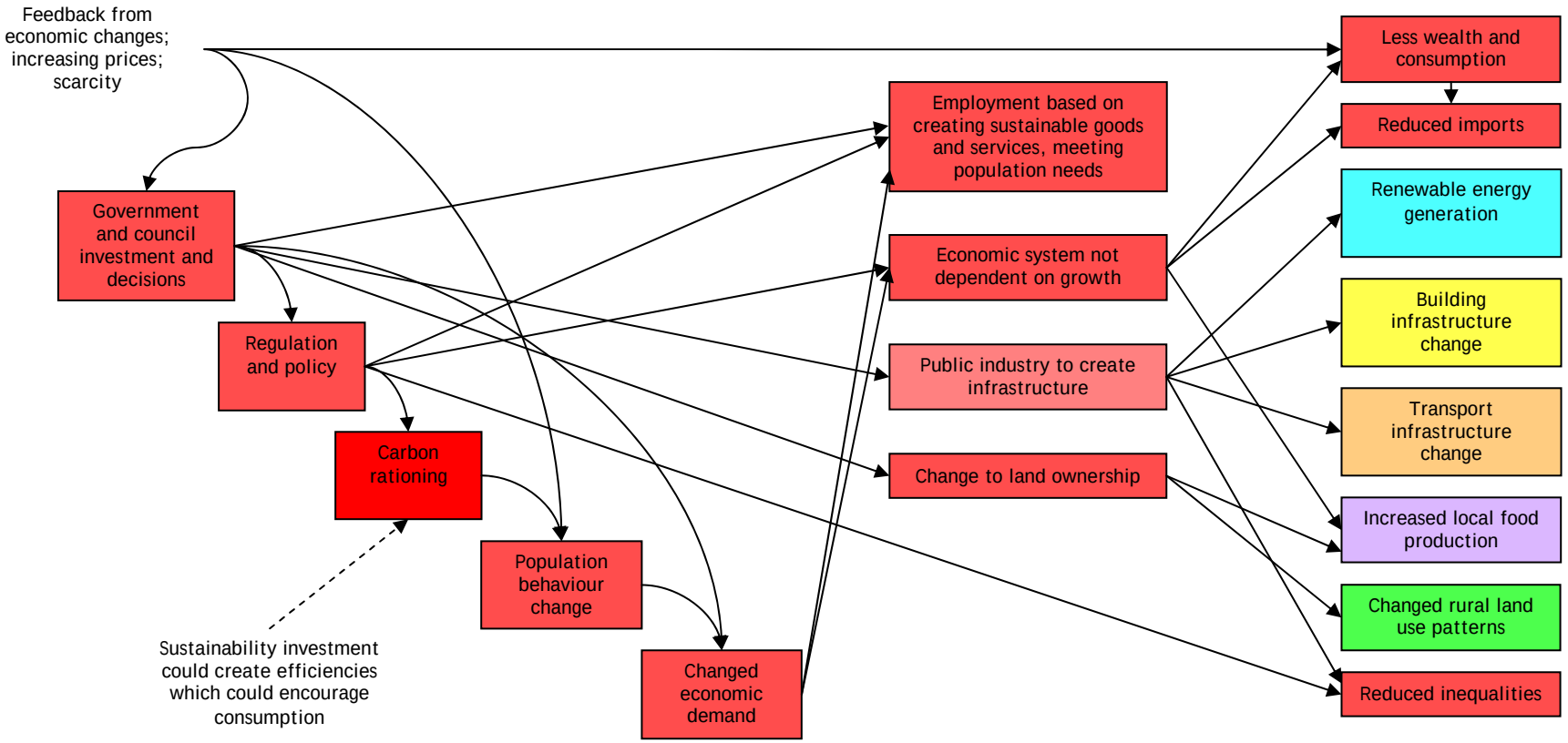
Many of the transitions in the sectors mentioned above (buildings, transport, food production and land use) are interdependent with economic change. This is perhaps the most controversial and least well thought through aspects of the transition, but is perhaps the most fundamental. In Energy Descent Action Plans developed in other towns and cities, suggestions have variously been made to develop local currencies, promote small local business and re-localise trade. These are all admirable, but are difficult to promote when market forces are driving changes in the other direction: towards global currencies, towards transnational corporations and towards globalisation of trade. How can we expect to change towards a more sustainable economic system whilst operating within these parameters?

Figure 15 illustrates some of the economic factors that are required to change to achieve sustainability. Changes in the other sectors are here represented linearly as emergent properties of the economic system (although there is of course a complex interaction between them all). In short, changes in the investment decisions of government, local councils, business and individuals are required. These investment decisions are in turn determined by the ownership and distribution of wealth, and the means of creating wealth. Regulations can make some differences to how the current system operates (e.g. by requiring house builders achieve higher standards of sustainability), but will not in themselves reduce incentives to 'externalise' costs such as greenhouse gas emissions to maximise profits.

Carbon rationing is used as an exemplar policy which can create a better incentive structure. By capping the total amount of emissions, and sharing these out evenly, investment and consumption decisions will become more sustainable and equitable. However, carbon rationing alone is not enough. For example, if it were to be introduced immediately poorer pensioners living in badly insulated housing would quickly find themselves in dire fuel poverty and unable to heat their homes. Carbon rationing therefore is only appropriate in a context whereby public transport alternatives are offered, insulation packages are applied universally and the economy localises to reduce the carbon content 'embedded' within consumer imports.

Another potential issue is the 'Khazzoum-Brookes' hypothesis. It suggests that increasing efficiencies (e.g. insulation) which reduce costs to individuals can actually increase consumption because people have more resources to spend. Therefore, energy efficiency programmes, and the other types of investment discussed in this plan, have to be accompanied by regulations, redistribution and caps on emissions in order to be effective.

Figure 15 – Economic change



Energy generation

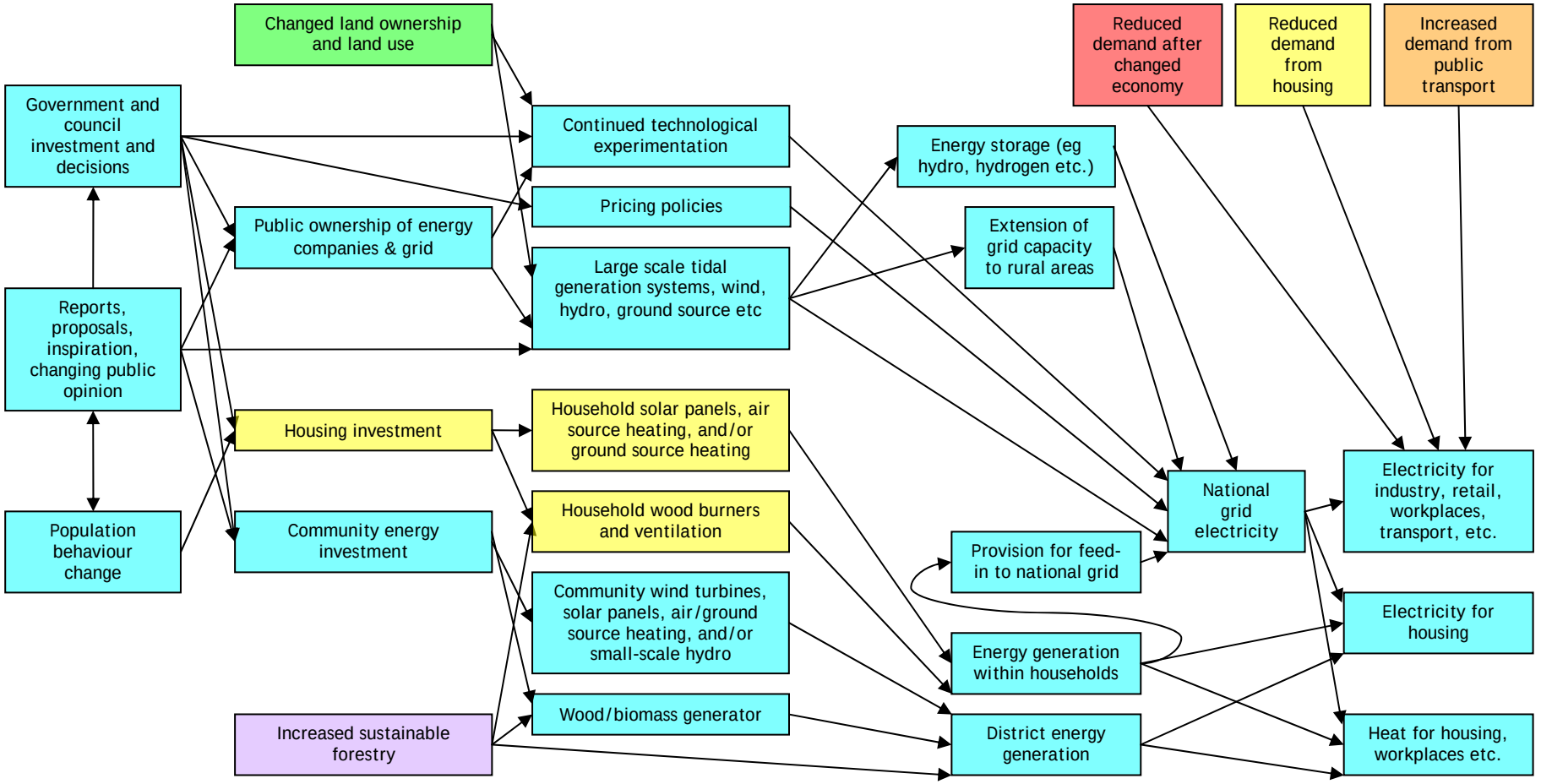
The entire premise of the need for an Energy Descent Action Plan is that the way in which we currently get energy is polluting the environment and is largely dependent on fossil fuels that are becoming increasingly scarce. Much of what we have discussed thus far has been a description of the ways in which we can reduce our need for energy, but it is also key that we find alternative and sustainable means of generating the energy that we will continue to need.

There are broadly two approaches to this: that technological fixes will create new sustainable means of generating energy, and the 'realistic' approach which suggests that we should plan on the basis of the technology currently at our disposal whilst taking advantage of any technological advances which are made. This plan adopts the realistic approach. We are not opposed to technological development – indeed many aspects of our current infrastructure urgently need such change. However, it is unwise to risk the future of our society, our the health and wellbeing on the uncertain hope that 'something will turn up'. There will be a continuing need for energy and there are a number of existing ways of generating this (e.g. hydro, wind, tidal, geothermal – including ground source heating, solar and sustainable biomass). Many of these need urgent investment to provide the necessary scale of energy generation and this is what is proposed in Figure 16. However, micro-generation in our homes and our local communities should also play a large part, and this too needs national infrastructural support (in terms of adjustments to the national grid and policies to encourage 'feed-in' from local energy producers).

The biggest objection to this approach is that many renewable energy sources (most notably wind) cannot 'base load' supply energy at a steady and reliable rate, which power stations require to meet their 'base load', the minimum reasonable customer demand. At the moment, Scotland gets its base load from a coal-fired power station at Longannet (with coal transported from Australia and Columbia) and two nuclear power complexes (at Hunterston and Torness). Some storage of energy for times of high energy consumption is possible (e.g. hydro-electric pumped storage and electrolysis of water to produce hydrogen for storage), but they are technically difficult and expensive options. We support replacement of this base load by investing in tidal energy which can provide reliable and substantial energy, combined with biomass and the use of stored energy. Scotland has several tidal races which could be used for this purpose (notably the Pentland Firth where 10 projects are already underway to harness 1.2 GW of its10GW potential in tidal and wave power).

'The direct actions the population of Renfrewshire can help to increase the sustainability of the energy we generate in and around our homes and communities.' We have a crucial role in persuading government decision-makers to invest in sustainable forms of large-scale energy generation.

Figure 16 – Sustainable energy generation



Creating change

The last few sections might have you in despair. There are so many things that need to change and so much to be done. What's more, so much of it seems to be things that the government need to do or which are so big and radical that it seems like we could never achieve them.

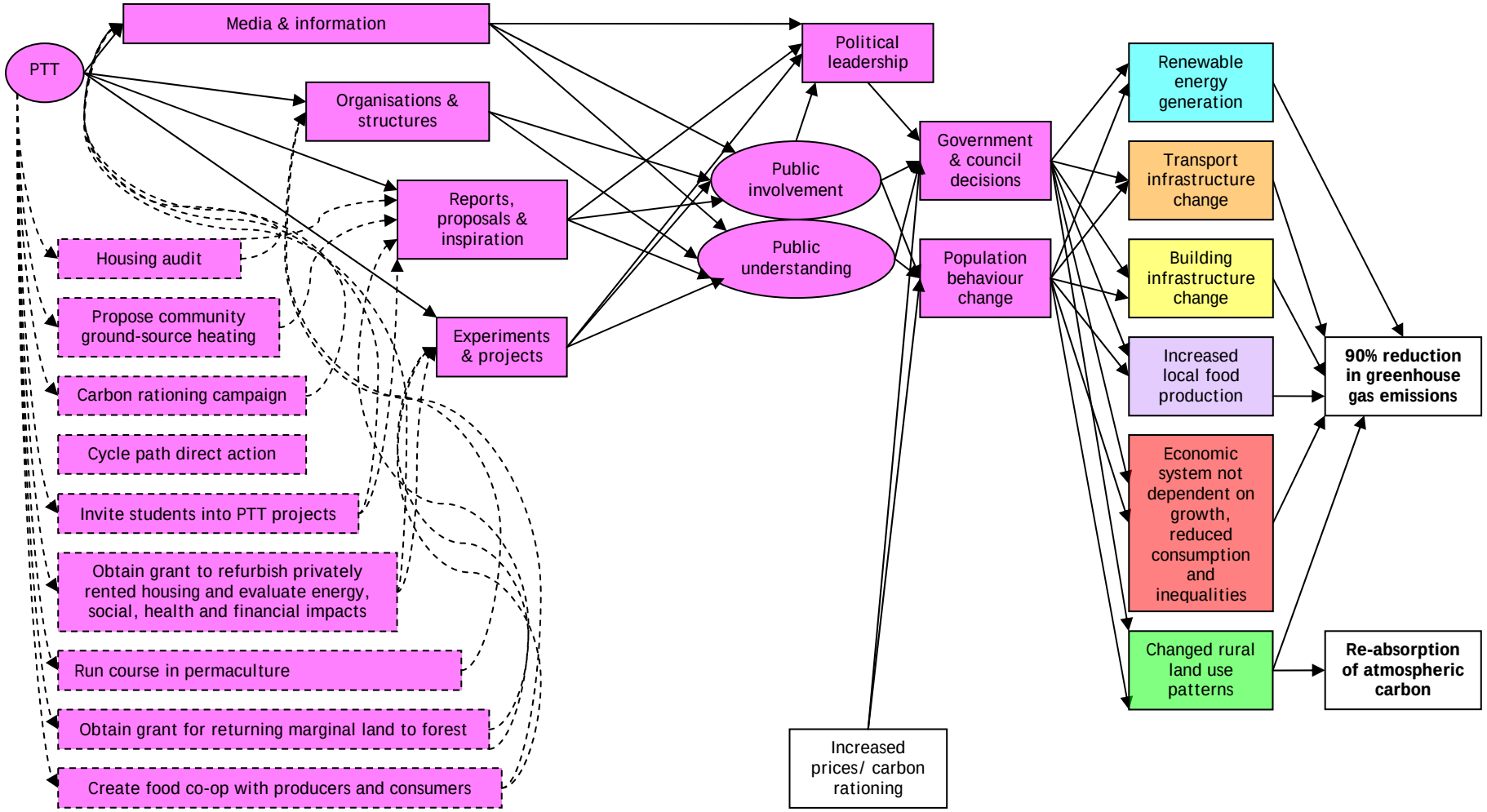
Although these challenges are huge, we do believe that we can inspire change if a sufficient number of people can be persuaded by our arguments. During the World War II, the entire British economy was completely transformed from producing domestic goods and services towards winning the war. From 1945 to 1950, whilst Britain was saddled with paying its debts built up to fight the war and to rebuild, it still managed to create and fund the welfare state and an entirely new infrastructure for the population. Fundamental change is possible if there is sufficient political will and popular support. Figure 17 tries to illustrate the key steps to creating the changes necessary to achieving a successful transition to sustainability. At the bottom left of the diagram are some illustrations of the actions that could be taken now by small groups in Renfrewshire to inspire the kinds of large changes illustrated in the sections above. What we see as key to changing the decisions of government and the local council is a change in the mindset of the population. If the ideas we are promoting in this plan were to be supported in Renfrewshire, this would either force the existing politicians to change and adopt these policies or those politicians would be replaced through elections by more sympathetic individuals and groups.

Changes in the behaviours and understandings of the public are themselves determined by the experiences of these individuals, by what is happening in their communities and by the information and explanations they receive through the media and personal contacts. It is therefore vital that we use all available opportunities to promote these ideas and make them widely understood in the community. Projects and proposals which provide real life experiences of the transition are also important.

Ideas and a growing popular understanding also need organisation if they are to result in significant change. Individuals are mostly impotent in the face of these big challenges, but pressure groups, as in the past, can exert a powerful influence on media, on public opinion, and thus on our decision-makers. We therefore have a role in creating suitable organisations or revitalising existing bodies which might take up this agenda.

Large changes can occur from seemingly small actions taken by small groups of people, particularly where they are able to link up with other like-minded groups in other areas. In Renfrewshire, this could involve: an audit of the need for housing insulation combined with a small project to install and evaluate it; launching a campaign for changes to policy (e.g. carbon rationing); taking direct action to redistribute road space towards cycling; inviting students at Reid Kerr college and the University of the West of Scotland to help us design and evaluate transition projects; establish a food co-op; or running a course on permaculture.

Figure 17 – Creating change: a role for Paisley Transition Town



Chapter 7

An Energy Descent Action Plan for Renfrewshire

This chapter is the result of all our discussions, meetings and readings about Energy Descent and how we can apply it to Renfrewshire. It lists what we think we need to achieve, when we need to achieve it and who can help the process. These actions have been taken from the figures in the previous chapter. The dates are not fixed, but as mentioned before, the sooner the targets are met the better for the planet. Most of the actions are listed for the near future. Adding changes for 2030 and beyond may not be immediately obvious and will become clearer as time passes and dependent on how much we are all able to achieve in the shorter term.

This is not an exhaustive list of changes and actions. There are lots of actions individuals can take for themselves, but also to influence local and central government to make the necessary 'big' changes. If everyone does their bit, we hope that the targets will be met well before the dates set in the EDAP.

By 2015	
Individuals	**Government, local + central**
Housing Emissions and Fossil Fuels	
Investment in private/rented housing	Increased housing regulations
Insulating homes	Investment in sustainable housing
Installing personal green energy	Subsidies for insulation
Production eg solar panels	Subsidies for solar panels
Decreased appliance use	
Reduce indoor temperature	
Reduced single occupancy	
Transport Emissions and Fossil Fuels	
Increase in holidays within reach of	
public transport	
Reallocation of road space, increase cycle lanes	
Food Emissions and Fossil Fuels	
Deer culling and sustainable meat production	
Guerrilla gardening	
Fruit and nut tee planting	
Increase composting	
Individual permaculture	
Carbon Fixation and Land Use	
Deer culling and sustainable meat production	
Increased composting	
Using organic household waste	
Economic Change	
Recycle more	
Buy and consume less	
Travel less often and less far	
Work locally	
Sustainable Energy Generation	
Household wood burners and	Pricing policies
ventilation systems	
Household solar panels	
Household ground source heating	

By 2020	
Individuals	**Government, local + central**
Housing Emissions and Fossil Fuels	
Domestic energy production eg solar panels	Solar, wind, wave energy generation
Technological efficiency, LED lighting, autoswitch off	Changed urban planning
Increase double glazing, window shutters	Increase public growing space
Food Emissions and Fossil Fuels	
Agricultural reskilling	Sustainable fishing strategy
Increase in garden and allotment growing	Investment in land for agriculture, eg drainage
Reduce meat and dairy consumption	Investment in land for agriculture, eg drainage
Carbon Fixation and Land Use	
	Increased forestry (including nuts and fruits) for food, fuel, paper etc.
Economic Change	
Reduce consumption	Increased subsidies for renewables
Buy less	Increased environmental regulation for companies
Recycle more	Public industry to create infrastructure
	Employment based on creating sustainable good and services
Sustainable Energy Generation	
	Increased land use for renewables
	Housing investment
	Large scale tidal, wind, hydro energy generating systems

By 2030	
Individuals	**Government, local + central**
Housing Emissions and Fossil Fuels	
Wood burning systems	Community heating scheme
Better household ventilation and energy conservation	Sustainable forestry
Use rainwater	90% reduction in housing CO2
Grey water recycling, eg bath water	Local energy generation
	Community wind turbines, small scale local hydro turbines.
	Wood, biomass energy generation
Transport Emissions and Fossil Fuels	
	Development of ports and shipping
	Electrification and expansion of rail network
	Reduced international freight
Food Emissions and Fossil Fuels	
Increased sustainable rural living	Change land use, increase community ownership, farming co-ops
	Changed urban planning
	Increased agricultural land use
Economic Change	
Individual energy production eg solar	Economic system not dependent upon growth. Stop using GDP as marker of progress
Panels and wind turbines	Change to land ownership (eg Eigg)
	Building infrastructure change
	Public ownership of energy companies and grid
Sustainable Energy Generation	
Community energy investment	Change land use and ownership
Feeding energy into the grid from homes	Increased sustainable forestry
	Energy storage, eg hydrogen etc
	Extension of grid capacity to rural areas

And Finally…

An Energy Descent Action Plan for Renfrewshire

This report outlines the first attempt to think through what is required in Paisley to make a successful transition to sustainability. We do not claim that we know all the answers, nor do we believe that this is the only successful means to achieving a positive outcome. However, it is a consensus in our group that the actions described are the most likely to achieve sustainability without contributing to devastating climate change and hardship due to fossil fuel scarcity.

It is also our belief that proactive measures can bring about positive change in our community. Health would improve because of a more active lifestyle, improved diet, redistribution of income and wealth, improved housing and a renewed sense of purpose and community. Community spirit would be enhanced because of the need to pull together and act collectively in the face of these challenges. Renfrewshire would once again become a vibrant county with culture and the arts flourishing as people rediscover their local community. People would be freed from the trappings of consumer culture and could re-engage with one another without feeling a need to judge or be judged by their level of consumption.

This is a future worth the massive efforts it will take to achieve it. This transition will also be a bumpy ride, with successes and failures along the way. More than anything though, this transition will be fun and exciting, as we begin to reap the rewards of acting collectively to create a better community for ourselves and our children.

We would welcome comments on this first draft, alternative ideas, and new members. To get in touch, please contact the Paisley Transition Town secretary:

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Links

A selection of the myriad relevant local, national, and international organisations (including government, local authority, charitable, voluntary and independent bodies) whose work and aims overlap with ours. Some are cited in references for previous chapters. For each there is a web address and an outline description. We do not claim that the descriptions are exhaustive, but we hope that they are not misleading.

AirportWatch
www.airportwatch.org.uk/

Umbrella movement uniting national environmental organisations, airport community groups, and individuals opposed to unsustainable aviation expansion, and its damaging environmental effects.

BTCV (formerly British Trust for Conservation Volunteers)
www2.btcv.org.uk/

Charity enabling hundreds of thousands of volunteers per year to engage in conservation work in urban and rural environments.

CartsGreenspace
www.cartsgreenspace.org.uk/index.html

Promotes community gardens, nature reserves, improving access, clearing waste ground etc. in Renfrewshire and East Renfrewshire.

Centre for Alternative Technology (CAT)
www.cat.org.uk/

Welsh education and visitor centre demonstrating practical solutions for sustainability. Covers all aspects of green living: environmental building, eco-sanitation, woodland management, renewable energy, energy efficiency and organic growing. Free information service.

Climate Challenge Fund
www.scotland.gov.uk/Topics/Environment/climatechange/howyoucanhelp/communities/ ClimateChallengeFund

Scottish Government initiative to support communities to tackle climate change by reducing their carbon emissions.

Coal Action Scotland
coalactionscotland.org.uk/

Explains dangers posed by coal, promotes alternatives, works with those involved, and challenges new coal exploitation from source to point of use.

DEFRA
www.defra.gov.uk/

Government Department for Environment Food & Rural Affairs

Energy Saving Trust (EST)
www.energysavingtrust.org.uk

Offers advice and financial help for planning home energy saving improvements.

Future Balance
www.futurebalance.org.uk/

A charity providing independent expert advice for sustainability. Works with businesses, community groups and public authorities to access, manage and distribute grant funding. Advises on ways to spend grants for lasting results.

Go Bike!
www.gobike.org/

A campaign to promote cycling in the Strathclyde area.

Grow in Glenburn (GIG)
www.thouard.co.uk/growinglenburn

An offshoot of PTT, an association of local growers sharing their interest in growing their own food and developing the community garden at Glen Park.

Green Gym (Paisley)
gg-renfrewshire@btcv.org.uk, Julie.Wilson@btcv.org.uk Tel: 0141 842 1330

A BTCV health initiative offering an outdoor alternative to conventional gyms - the opportunity to increase their physical activity levels through direct involvement in practical conservation activities.

Greener Renfrewshire
Helpline 0141 882 4448

A Renfrewshire Council group with representation from many environmental and other organisations, which monitors the council's response to Scottish Government requirements and acts as a conduit for proposals and projects in areas such as waste and re-cycling, transport, building, and green space.

Intergovernmental Panel on Climate Change (IPCC)
www.ipcc.ch

Established through the United Nations, tasked with reviewing and assessing the most recent scientific, technical and socio-economic information produced worldwide relevant to the understanding of climate change.

Lochwinnoch Local Energy Action Plan (LEAP)
www.lochwinnoch.info/community/leap

Car sharing, local produce, renewable energy...

Low Carbon Communities Network
lowcarboncommunities.net/

Promotes low and zero carbon technologies and lifestyles by linking to existing local groups and advising them on efficiency and effectiveness.

Oil Depletion Analysis Centre (ODAC)
www.odac-info.org/

An independent, UK-registered educational charity working to raise international public awareness and promote better understanding of the world's oil-depletion problem.

Paisley Freecycle

groups.freecycle.org/paisley-freecycle
Offer unwanted goods, get them free! Like eBay but no money!

Paisley Transition Town (PTT)
www.paisleytransitiontown.co.uk

Campaigns for reducing the carbon footprint of Paisley and Renfrewshire and for preparing the area for life in an oil-poor future.

Permaculture Association
www.permaculture.org.uk/

Permaculture design use the principles of the natural world to develop integrated systems that provide for our needs of food, shelter, energy and community in ways that are healthy and efficient, and independent of oil for power or for fertilisers.

Rainbow Turtle
www.rainbowturtle.co.uk/paisley_shop.php

Paisley shop offering a wide variety of fairl-trade food and drinks along with an extensive range of ecological household products. Many of these available as refills, so reducing waste packaging.

Renfrewshire Environmental Trust
www.retrust.org.uk/

Charitable trust, assists volunteers and community groups interested in improving greenspace, community gardens, wildlife habitats, walking and cycling routes.

Renfrewshire Growing Grounds Forum
www.cartsgreenspace.org.uk/id15.html

Set up in 2009 by Carts Greenspace, 35 organisations are represented, meets bimonthly, shares problems, issues, experience, skills and practical assets e.g. sources of manual labour, compost, plant materials.

Renfrewshire Outdoor Access Forum
www.renfrewshire.gov.uk/ilwwcm/publishing.nsf/Content/pt-cl-renfrewshireoutaccessforum

Renfrewshire Council body, under the provisions of the Land Reform (Scotland) Act 2003, with representation from outdoor leisure and sport groups, landowners and managers, community groups and national organisations. Advises on access rights, paths, rights of way and the Core Paths Plan, and offers help to parties in disputes.

Scottish Education & Action for Development (SEAD)
www.sead.org.uk/

Training, booklets and guides to help individuals, groups and communities reduce their greenhouse emissions. International links to developing countries.

Scottish Natural Heritage
www.snh.gov.uk/

Scottish Government funded body promoting the understanding, care and improvement of Scotland's wildlife habitats and landscapes, and its enjoyment and sustainable use.

Scottish Orchards
www.scottishorchards.com/

Helps plant and maintain fruit trees throughout Scotland

Stop Climate Chaos Scotland (SCCS)
www.stopclimatechaos.org/Scotland

A coalition of some 60 community groups, faith groups, environmental and foreign aid organisations pressing for government action. Played a key role in developing the Climate Change (Scotland) Act 2009, recognised as the world's strongest climate change legislation.

Sustainable Scotland
www.sustainablescotland.com/

Innovative approaches to sustainable development in Scotland. Weekly e-mailed newsletter. Now on Facebook and Twitter.

Sustainable Scotland Network (SSN)
www.sustainable-scotland.net/

A network of sustainable development officers and advocates from Scottish local authorities.

Sustrans
www.sustrans.org.uk/

A registered charity instrumental in developing the National Cycle Network, encouraging and developing sustainable transport.

Transition Scotland
www.transitionscotland.org

A network of communities working towards a future free of fossil fuel.

Glossary

Definitions and explanations of some key terms used in the text

Climate Change

A change in the weather over periods of time that can range from decades to millions of years. It can be a change in the average weather or the distribution of weather events, experienced over a period of at least several years. See Global Warming.

Carbon Dioxide (CO_2)

A greenhouse gas produced by living organisms and by burning fossil fuels. Carbon dioxide is absorbed by plant growth and by being dissolved in the sea. The rise in atmospheric concentration (currently approaching 400 parts per million) reflects an imbalance between its 'sources' and 'sinks'.

CO_2 Equivalent

The amount of carbon dioxide that would cause the same greenhouse effect as the actual CO_2 plus the other greenhouse gases. It is substantially more than the CO_2 alone. See Greenhouse Gases.

Energy Descent

Planned reduction in the use and dependence on non-renewable energy supplies (eg coal, nuclear, oil, and gas).

Fossil Fuels

Principally coal, oil, and natural gas, are non-renewable energy sources formed from plants and animals that lived up to 300 million years ago. Coal is the 'dirtiest' and gas the 'cleanest' in terms of carbon dioxide emitted for a given amount of energy released.

Global Warming

Caused by high levels of 'greenhouse gases' in the atmosphere. Scientific opinion is now overwhelmingly that human activity, particularly the burning of fossil fuels, is at least a major contributor to the rise in greenhouse gas levels and thus to global warming. Although the average global temperature is increasing, there are local variations and some regions may actually cool. Also rainfall patterns are changing and extreme events (e.g. hurricanes) expected to become more common. Thus 'global warming' can be a somewhat misleading term and 'climate change' is now preferred.

Greenhouse Effect

The warming effect caused by the presence of greenhouse gases in the atmosphere. Without it the Earth would be too cold to support its life, but human activity is driving it to dangerously high levels. (Confusingly, the 'greenhouse effect' has nothing to do with greenhouses, which work by suppressing convection currents.)

Greenhouse Gases

Atmospheric gases that absorb heat radiation which would otherwise escape from the Earth. The main greenhouse gases are water vapour, carbon dioxide, methane, nitrous oxide, and ozone. Methane is produced by rotting vegetation and by grazing animals, nitrous oxide by nitrate fertilisers and manure, and low-level ozone in photochemical 'smog'. All occur at much lower concentrations than carbon dioxide, but are far more potent in terms of their greenhouse effect.

Peak Oil

The moment that global oil production reaches its highest maximum. Production reached an all-time maximum in 2005, since when there has been a small decline and then a levelling-off. It is possible that we have not yet reached peak oil, because increasing demand and rising prices may lead to rapid exploitation of hitherto untapped reserves. But given that production has exceeded new discoveries ever since 1980, this is unlikely to be more than a 'last hurrah', after which decline would be all the more steep.

Tipping Point

Some effects of global warming act to moderate that warming. For instance, increasing temperatures and CO_2 levels promote faster plant growth thus improving the 'carbon sink' and slowing the temperature rise. This is called 'negative feedback' and is good news. But other effects cause 'positive feedback' - they act to accelerate the warming. For example ice caps reflect heat very well, so when they melt more heat is absorbed by the ground, and the melting of the Arctic permafrost releases huge quantities of methane - a powerful greenhouse gas. A tipping point is reached when the positive feedback outweighs the negative, for then even the most drastic human action, such as ceasing to burn fuels, will be unable to stop runaway warming. This scariest of scenarios is widely predicted if the temperature rises only 2^0C above pre-industrial levels - and we are nearly half-way there already!

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PAISLEY TRANSITION TOWN