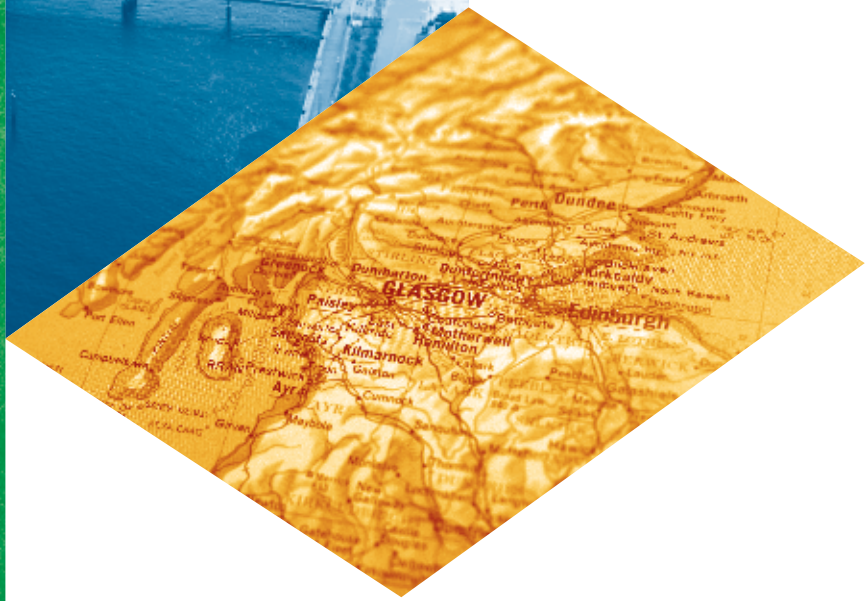
IBM's Smarter Cities Challenge

Glasgow

Report



IBM

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1. Introduction

The Smarter Cities™ Challenge

By 2050, cities will be home to more than 75 percent of the world's population, and wield more economic power and have access to more advanced technological capabilities than ever before. Simultaneously, cities are struggling with a wide range of challenges – to their finances, and to their ability to deliver services in areas as diverse as transportation, energy, clean water, education, social services, public safety and economic development.

Launched in 2010, the Smarter Cities Challenge is a competitive grant programme led by IBM Corporate Citizenship. The focus of the initiative is to enable up to 100 cities around the world to become more vibrant and hospitable places for their citizens. Glasgow is one of 25 cities to be awarded a grant in the first round. Each city participating in the Challenge receives a donation, primarily in the form of talent: the time and expertise of top-performing IBM executives from different functions and locations who will work closely with city leaders to deliver recommendations on a selected issue.

In the case of Glasgow, the chosen issue is Fuel Poverty, being one of Scotland's five key housing priorities. The Scottish Government has set a target to eliminate Fuel Poverty – defined as households that spend more than 10 percent of their income on all household fuel use – by 2016.

In Glasgow, despite considerable improvements in the quality and energy efficiency of housing stock in recent years, rising fuel costs, a projected growth in the city's population, and changing demographics and household composition mean that Fuel Poverty is increasing rather than decreasing. In its search for an effective long-term solution, Councillor Gordon Matheson, the Leader of Glasgow City Council, approached the IBM Smarter Cities Challenge team to investigate the options and recommend a way forward.

2. Executive summary

IBM's vision for Smarter Cities

As cities the world over wrestle to balance their relative challenges and opportunities, trillions of digital devices connected through the Internet are producing a vast ocean of data. All of this information – from the flow of markets to the pulse of societies – can be turned into knowledge because the necessary computational power and analytics are now available to make sense of it.

With this knowledge, cities could reduce costs, cut waste, and improve the efficiency, productivity and quality of life for their citizens. Despite the mammoth challenges presented by the economic crisis and increased demand for services, there are exciting opportunities for the development of innovative solutions.

In November 2008, IBM began a conversation about how the planet is becoming smarter, noting that intelligence is being infused into the systems and processes that make the world work – into things no one would recognise as computers, from cars and roadways to appliances, power grids, clothes and even natural systems such as agriculture and waterways. By creating more instrumented, interconnected and intelligent systems, citizens and policy-makers can harvest new trends and insights from data, providing the basis for more informed decisions.

As cities grapple on a daily basis with the interaction of water, transportation, energy, public safety and many other systems, IBM is committed to a vision of Smarter Cities as a vital component of building a Smarter Planet. A Smarter City uses technology to transform its core systems and optimise finite resources. At the highest levels of maturity, a Smarter City is a knowledge-based system that provides real-time insights to stakeholders, as well as enabling decision-makers to proactively manage the city's subsystems. Effective information management is at the heart of this capability, and integration and analytics are the key enablers.

Context and objectives

Whatever their particular challenges, cities now need to re-think their approach to the threats and opportunities that lie ahead for them; the need is more urgent than ever because of the biggest global economic crisis since the Great Depression.

A Smarter City is one that takes the urgency of the current economic crisis and the downward pressure on budgets to provide the impetus to overcome resistance to change. It turns problems into opportunities to reduce costs, improve services to communities, and make our cities smarter. This new approach to community transformation calls for leaders to use technology to inform and connect people. It requires a city to be viewed as a set of interconnecting systems, a vision that will drive integrated solutions and services focused on long-term city-wide results. The key to success is integration across traditional silos, so that the available intelligence can be fully exploited.

Glasgow overview

Situated on the River Clyde in the country's West Central Lowlands, Glasgow is the largest city in Scotland and has the third largest population of any city in the United Kingdom. Its current population is 580,690 in the City of Glasgow unitary authority area, with 1,199,629 people living in the Greater Glasgow urban area.

Glasgow is Scotland's commercial capital and in the last century was one of the world's leading centres of industrial manufacturing (notably shipbuilding), until its industries entered decline in the 1960s. Since the late 1980s, Glasgow has seen significant growth in the commercial and financial sectors. However, on measures related to income, health and education, Glasgow has 52 percent of the most deprived areas in Scotland. There is a striking contrast between the city's rich and poor areas; a World Health Organization (WHO) report found that men in one of the poorest parts of the city had a life expectancy of just 54, some 28 years shorter than that found in a wealthier area just 15 minutes' drive away.

As a city, Glasgow has both major opportunities and major challenges. It is the UK's largest retail centre after London and, as one of Europe's top 20 financial centres, is home to many of Scotland's leading businesses. It houses many municipal art galleries and museums, first-class sports and leisure facilities, excellent theatres, acclaimed restaurants, pubs and clubs, and beautiful parks. The city is able to attract significant public and private investment too – for example the Commonwealth Games which will be held in Glasgow in 2014.

At the same time, a range of factors including low incomes and poor-quality housing mean that Fuel Poverty in Glasgow has been rising in recent years, with current increases in fuel prices being only partially offset by rising incomes and an improvement in both home energy efficiency and the city's housing stock. Recent estimates suggest that as many as 35 percent of Glasgow households could be in Fuel Poverty. During the IBM Smarter Cities Challenge team's time on the project, Glasgow's largest energy supplier announced a 19 percent price increase to come into effect at the end of the summer, and other major utility companies have since followed suit. This threatens to place an ever greater number of Glaswegians in dire straits even before winter begins.

In 2010, the city launched the Sustainable Glasgow initiative, an ambitious city transformation strategy. Sustainable Glasgow is a partnership between local government, the wider public sector, higher education and industry, which links energy planning and regeneration planning. The scheme aims to make Glasgow one of Europe's most sustainable cities within 10 years. Glasgow currently emits around four million tonnes of CO_2 per annum through its energy use – around 8 percent of Scotland's total carbon emissions. The long-term trend is upwards unless action is taken.

Based on a detailed analysis of the city – its resources, infrastructure and pattern of energy demand – Sustainable Glasgow has taken a strategic approach to delivering a clean low-carbon energy infrastructure. This will lead to major reductions in Glasgow's carbon emissions.

Councillor Gordon Matheson is clear that the initiative must also deliver economic growth and help tackle social issues such as Fuel Poverty, noting that, "In order for Glasgow to be a sustainable city, it must tackle social inequality. Everyone must benefit; no one should be left behind." The Sustainable Glasgow strategy clearly indicates that a major change is required to achieve a large-scale reduction in carbon emissions – delivered in part by significant projects and investment, engagement with citizens, communities and employers alike; and by putting in place strong and supportive public policies.

These opportunities complement each other and will result in tangible projects that will benefit people and businesses in Glasgow:

- Delivering jobs
- Attracting new businesses
- Helping tackle Fuel Poverty
- Reducing carbon emissions
- Making Glasgow a cleaner city
- Helping develop communities
- Making Glasgow a leader in sustainable urban living[1].

There is recognition that evidence-based solutions are needed to balance delivery of different policy objectives.

Defining the problem

Fuel Poverty

The Scottish Government defines Fuel Poverty as follows: "A person is living in Fuel Poverty if, in order to maintain a satisfactory heating regime, they would be required to spend more than 10 percent of their household income (including Housing Benefit or Income Support for mortgage interest) on all household fuel use."

In its Scottish Fuel Poverty Statement, the Scottish Government has pledged the following: "Our overall objective in relation to Fuel Poverty is clear. We are committed to ensuring, so far as reasonably practicable, that people are not living in Fuel Poverty in Scotland by November 2016."[2]

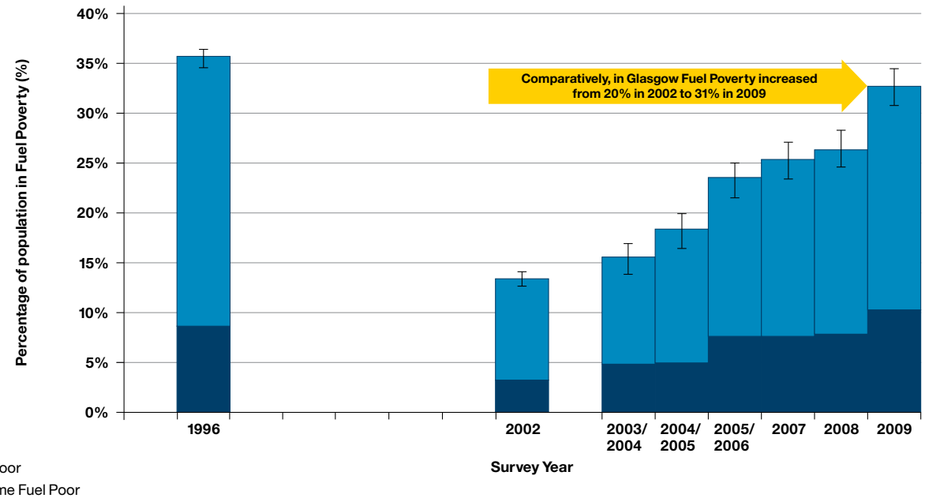


Figure 1
Increasing Level of Fuel Poverty in Scotland since 2002

Central heating is an important factor in reducing condensation, improving comfort for occupants, and contributing to enhanced energy efficiency in homes. Upgrades to the thermal fabric of homes has also contributed to improved energy efficiency. Between 1991 and 2009, the percentage of dwellings with full central heating rose from 62 to 95 percent. Fuel poverty fell sharply between 1996 and 2002, due in the main to rising incomes and falling fuel prices. However, Fuel Poverty has been mounting in more recent years, largely because current increases in fuel prices are only being partially offset by rising incomes and energy efficiency increases. In 2009, 33 percent of Scottish households were in Fuel Poverty, compared to 13 percent in 2002.

The challenge: alleviate Fuel Poverty

Glasgow established a Fuel Poverty Partnership in 2007, bringing together key organisations from the public and voluntary sectors, utilities and housing providers with a shared aim to eliminate Fuel Poverty in the city. This partnership had already developed plans and taken actions in line with the city's Fuel Poverty Strategy. The team of five IBM consultants who worked on the Smarter Cities Challenge engaged with the Executive Director of Development and Regeneration Services and members of this partnership to take a fresh look at the Fuel Poverty problem in light of the changes implemented since 2007 and the impact of 2011 economic factors.

Reframing the problem

The team decided to refocus its efforts beyond reducing the percentage of those living in Fuel Poverty towards determining what it would take to bring *Affordable Warmth* to the citizens of Glasgow.

The sheer volume of people affected by rising energy costs and inefficient energy use makes the lack of Affordable Warmth a serious community problem for Glasgow. It threatens the city's standing among other European cities, as hard currency flows not into its shops and the local economy but rather out of the community through its un-insulated walls. The team also found that the city would need to address the community's lack of 'energy literacy', to achieve Affordable Warmth and meet its 2020 carbon reduction targets.

Conclusions

The challenge of becoming a Smarter City is daunting, with new issues emerging on a regular basis. Cities need to have systems in place to be able to plan proactively for changes to come. No city can be truly sustainable – economically, environmentally or socially – unless it is energy-literate. Affordable Warmth is the key to social sustainability, while energy literacy is a mainstay of economic and environmental sustainability. Glasgow will achieve Affordable Warmth for its citizens if it becomes the most energy-literate city in Europe, through city- and community-wide efforts.

The IBM Smarter Cities Challenge team determined that, by setting a goal for Glasgow to become the most energy-literate city in Europe, the city could substantially reduce the amount of money wasted on inefficient energy use, and inject cash back into the local economy in the form of increased disposable income. This would create new jobs and make the city more attractive to relevant investors; most importantly, this strategy would achieve Affordable Warmth.

Throughout this report we use the term 'energy literacy' – by which we mean the ability of householders to understand their energy usage and to take action to manage it efficiently, ideally reducing energy costs. Actions to achieve energy literacy might include making energy meters easier to read, producing energy bills that are easier to understand, establishing a programme to ensure householders understand how to control their heating systems etc.

Priority recommendations

The team set out the following recommendations as a starting point, to build momentum quickly and stave off any additional problems arising from the upcoming energy price increases. These are representative of a list of 60 recommendations which can be found in Appendix 1.

Adopt an approach of providing Affordable Warmth rather than reducing Fuel Poverty

While the Fuel Poverty target is an arbitrary percentage and focuses on attacking a number, attaining Affordable Warmth is a tangible social goal required by everyone.

Appoint Affordable Warmth champion

Given the complexity of the situation, the challenging Government targets and the range of possible solutions, it will be imperative to have a champion who can successfully drive the required initiatives forward.

Create city-wide energy literacy

Glasgow should set a goal to become the most energy-literate city in Europe. Energy advisors are doing excellent work with the people they reach, but it is essential that the entire city increases its level of understanding on efficiency. This will only be possible if groups collaborate and learn from one another to amplify their message.

Sustainable Glasgow: the brand for Affordable Warmth

Make Sustainable Glasgow the trusted advisor, the collaboration catalyst, and governance owner to drive change. Make the name a recognisable brand with which Glaswegians identify for Affordable Warmth and energy literacy.

Introduce predictive analysis tools to Sustainable Glasgow

Throughout the sessions and interviews, the team demonstrated that it is now possible to identify and react to the critical tipping points in Glaswegians' lives using structured and unstructured (narrative) data. The data captured can then be used to segment the population, track issues and react proactively.

Seek Policy Changes that encourage/require Energy companies to share user data

Energy policy is set at a national level in the UK. As Scotland's largest and most progressive city, Glasgow should take the lead in proposing key policy changes. For example, when energy companies become aware of clients that are likely to slip into Fuel Poverty, it would help if there was legislation in place to encourage energy companies share this information on a confidential basis with local housing authorities. Early intervention can be key to avoiding health issues related to Fuel Poverty.

3. Approaching the Fuel Poverty Challenge

Identifying the issues and solutions

Seeing that the lack of Affordable Warmth affects more than those who spend over 10 percent of their income on energy, the IBM Smarter Cities Challenge team focused on what it would take to bring Affordable Warmth to all the citizens of Glasgow. The vast numbers of people affected by rising energy prices and the lack of efficient energy usage has made this a problem for the community as a whole, with its accompanying effects on the local economy – not to mention the city's standing on the European stage. Moreover, without seriously addressing its lack of energy literacy, the team considered Glasgow would be hard pressed to meet its 2020 carbon reduction targets.

By setting a goal to become the most energy-literate city in Europe, Glasgow will be able to reduce expenditure through greater energy efficiency. Money will flow back into the local economy through increased disposable income, which in turn will create work and make the city attractive to investors.

The team approached the challenge from four perspectives: People, Process, Place, Policy.

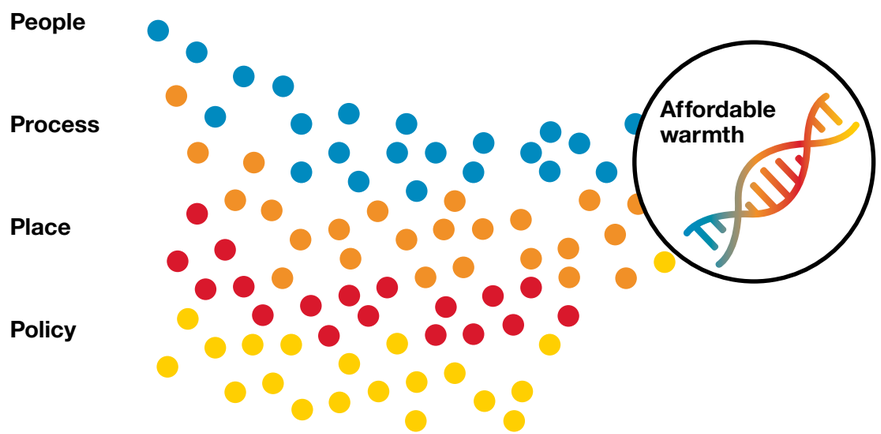


Figure 2
DNA of Affordable Warmth – all of these items are constituents of the DNA of Affordable Warmth

The IBM team

The IBM Smarter Cities Challenge team assigned to Glasgow comprised five IBM specialists drawn from complementary disciplines:

Anna Topol is the Chief Technology Officer for the Energy and Utilities Industry working in the Systems and Technology group, New York, USA.

Sharon Moore is a Public Sector Integration Architect, working in Scotland.

Ian Abbott-Donnelly is the Chief Technology Officer in Europe for IBM's Big Green Innovations, working in Peterborough, England.

Susan Sanchez is an Energy and Utilities Consultant from Louisville, Kentucky.

Graeme McKay is the Director of the Ontario Public Sector in Toronto, Canada.

These individuals were supported locally by Ronnie Melrose, IBM's local representative on the Sustainable Glasgow Steering Group, and Mark Wakefield, IBM UK's Corporate Citizenship Manager.

The process

The team spent three weeks in Glasgow, working alongside colleagues at the City Council, and met with more than 100 individuals from across the spectrum of organisations concerned with Fuel Poverty. These included representatives from energy companies, charities, advice bureaux, government organisations, universities and individual consumers. (A list of stakeholders can be found in Appendix 7.)

The team presented their findings at a meeting co-hosted by the Leader of the Council Gordon Matheson; Executive Member for Business and the Economy at Glasgow City Council, Bailie Liz Cameron; and the Director of Regeneration, Gerry Gormal. More than 75 people attended and took part in a collaboration exercise, aimed at sharing information and providing additional input for the final report. The team collected almost 30 additional "suggestion cards"[3] and have included some of the comments in this report. (Bailie Cameron's speech is attached in Appendix 3.)

4. People

Ian's story – an illustration

Ian is 60 years old and receives seven different monthly benefits and credits for various disabilities. He lives with his wife, who is blind in one eye, and their six-year-old daughter. The family has lived in a well-kept, spacious pre-1919 tenement flat since last summer. The flat has high ceilings and large picture windows, from which the kitchen gets much of its natural light.

At his old flat, Ian had an account with one utility company, payable via direct debit on a social tariff. When he moved into his current flat, there were pre-payment meters with a different company. Because of his disabilities, he called the supplier and, at a cost of approximately £110, had the equipment switched back to the traditional credit meter, reinstating the direct debit.

According to regulation, meters need to be read only once every two years (although in practice Energy Companies typically do so once a year). Both utility companies and various other organisations recommend that the consumers read their own meters and report if estimated readings are inaccurate. In Ian's case, when he first moved in the electricity company estimated its readings based on initial sample usage. However, due to Ian's age and disabilities coupled with his wife's slight stature and limited vision and the fact that the meters were 10 feet off the ground with small numbers on the dials, he did not supply these readings.

Ian suspected that the tariff with his new supplier might not be as advantageous as the previous one. He called a housing energy efficiency advisor to look into the matter. Ian had been paying £30 for electricity and £50 for gas via monthly direct debit. He had never missed a payment with the previous supplier. The advisor, when calling the utility company to check the tariffs on Ian's behalf, was encouraged to take a reading. The call centre agent passed the phone to another representative who requested that the advisor recheck the numbers, certain there had been a misreading. It turned out that while Ian and his family had overestimated their electricity consumption by about £70, they had underestimated their gas usage by £1,100.

There were a number of variables that had contributed to this situation. It had been a very cold and long winter, and there had been fuel price increases at a time when Ian's family's energy consumption had risen. Ian was on a different tariff to the one he had been used to. The new flat was larger and did not have double glazing. The heating system was 13 years old and had few regulators. With no instructions, Ian did not know how to operate it, so left the heating on around the clock. There were no working thermostats in the flat. Curtains in the living room were thin. There was no shower, only a bath. The large kitchen window took in all the morning sun, so Ian thought nothing of opening the windows to cool the room. All the while, Ian thought his monthly payments were covering his heating costs.

Glasgow is served by a number of gas and electricity suppliers with well over 100 tariffs to choose from. While there are online aggregator tools to help customers decide which tariff is best, the process is complex, with frequently changing results. While Ian's case is currently in hand and the utility company may now apply a more beneficial tariff retrospectively, this family will now be in debt to the supplier for years to come, unable to switch to an alternative source to take advantage of better rates. Having survived for years on benefits, Ian cannot take advantage of deregulation and is now in a long-term cycle of Fuel Poverty.

Unfortunately, while the means existed to ensure Ian and his family were able to live in Affordable Warmth, they were too complex or not well enough explained. The goal in the future is to ensure that these measures are made readily available and accessible to families and individuals – in good time, before they spiral into a situation from which they are only able to escape with difficulty.

Ian is just one of the Glaswegians living with Fuel Poverty that the team spoke to through meetings arranged both by the Glasgow Housing Association and the Glasgow Home Energy Advice Team (G-HEAT). When the team met with the stakeholders and people in the community, they found consistently recurring themes including:

1. A lack of understanding of home energy tariffs
2. A lack of understanding of energy-saving techniques
3. Home energy systems that were too complicated to operate
4. Meters that cannot be read
5. Long delays when dealing with the energy companies.

Home energy tariffs

- In Glasgow, there are two primary energy organisations supplying both gas and electricity to the home market. In addition, there are a significant number of energy resellers. In total, the sales plans or "tariffs" through which consumers can purchase gas or electricity number more than 100. Choosing the right tariff is both time-consuming and confusing. To the vulnerable in society, the task becomes impossible without help, usually from family members or local social services.

Energy-saving techniques

- From both the people the team visited and the social agencies supporting them, it became clear that energy-saving techniques in the home were either not widely known or misunderstood. Lack of knowledge about the energy efficiency of electrical appliances and electronics was an issue. Some believed that it was more energy efficient to leave a portable electric heater on "low" all the time rather than switch it off. Others believed that using small portable electric heaters was less expensive than using a central gas boiler and radiators throughout the home, which may not be the case. There was little knowledge in some homes of the fact that using gas is less expensive than electricity when heating a home.
- Simple measures including use of heavier curtains to prevent heat loss from windows, and shelves over radiators to disperse heat closer to the ground where it is needed were rarely in place, in many cases due to a lack of knowledge of such benefits.

Home energy systems that are too complicated to operate

- Complex heating systems with multiple settings were found often to lead to homes that are too hot at some points during the day and too cold at others. Those with energy storage heaters that operate at night when energy tariffs are at their lowest, while storing heat for use the following day, appear to face the most challenges. Homes are typically too warm first thing in the morning causing clients to open their windows, and then too cold at night, forcing them to add extra expensive heat during the evening.

Unreadable meters

- Astoundingly, some homes had energy meters for both gas and electricity in places that were inaccessible without considerable effort. In some cases, these were out of doors and at ground level, or even slightly below ground level, forcing clients to lie on the ground to read them. Others were mounted more than eight feet from the floor on internal walls, inaccessible without a ladder.
- Once a meter has been accessed, the buttons and read-out screens often make it difficult to understand what the actual energy consumption figures are. This is especially true of meters that measure multiple fuel rates with the ability to provide different "time of day" pricing. These meters often require more than eight button-pushes to provide the read-outs to understand the client's energy consumption.

Long delays when dealing with the energy companies

- The team observed that clients have suffered long delays in receiving invoices from energy companies when moving from one residence to another. In one case, the client had not received an invoice in almost two years. When it was finally delivered, it had neither the proper address nor the client's correct name. A neighbour had been kind enough to hand-deliver the bill, which by that time amounted to more than £1,500.
- Many clients no longer have landlines and are reliant on mobile phones with expensive air-time plans. When these clients attempt to contact the energy companies to enquire about their bills or tariffs, they cannot afford to wait on hold for extended periods.

Health (life expectancy) across Glasgow neighbourhoods

The state of Glasgow's health can be clearly seen in its life expectancy estimates. Poverty is an important contributory factor. While many parts of Glasgow are deprived, there are some affluent areas, with notable differences in health between the two: male life expectancy is 13-14 years higher in the least deprived areas compared to the most deprived areas in the city, while the equivalent gap for women is 8-9 years. In January 2010, the Institute for Public Policy Research (IPPR), one of the UK's leading progressive think-tanks, maintained that the continuing problem of Fuel Poverty contributed to the deaths of 36,000 people in 2009 in the UK – 49 percent more than in 2007-08. IPPR identified two key actions that need to be taken to help mitigate this Fuel Poverty:

- Prioritising energy efficiency measures such as insulation, over financial assistance with paying fuel bills;
- Making the most of technological innovations such as smart meters, micro-generation technologies and community-scale heating.

By improving the health and wellbeing of local citizens, achieving Affordable Warmth will contribute to reduced healthcare spending.

People recommendations

Appoint Affordable Warmth Champion

The team met with more than one hundred individuals from more than 30 organisations, but no single person had been given the lead role in of eliminating Fuel Poverty. With 2016 now fewer than five years away, there needs to be a major coordination of effort if Glasgow is indeed to fulfil the Scottish mandate. In addition, Glasgow's housing stock, with its ageing, complex and in some cases inefficient heating units and measuring tools that are difficult to read, will significantly hamper Sustainable Glasgow's efforts if the situation remains as is. Affordable Warmth must be addressed or Glasgow will find it difficult to meet its targets. Added to rising energy costs, all of this is serving to create a "perfect storm" for significant financial deprivation on a city-wide scale.

A designated champion for Affordable Warmth will be able to coordinate efforts, accelerate collaboration and focus on amplifying messages so that progress can be made immediately.

Seek Policy Changes that encourage/require Energy companies to share user data

When energy companies become aware of clients that are likely to slip into Fuel Poverty, it would help if there was legislation in place to make energy companies share this information on a confidential basis with local housing authorities. Early intervention can be key to avoiding health issues related to Fuel Poverty.

Identify and share good practices

Trends can be identified and sliding situations averted by tracking repeated actions taken by G-HEAT and local housing authorities as they seek to reverse Fuel Poverty for other clients. If this information is shared other residents will be able to benefit by taking similar measures themselves. Video these actions, put them on YouTube or other social networking sites. Let residents know how to access them.

Warn consumers of potentially excessive consumption, for example by using SMS

Almost every resident has a mobile phone and SMS text messaging is a cheap, easy and direct means of communication with a known individual. When energy utility companies become aware of high energy consumption in a home the tenant or homeowner could be alerted by an SMS text message.

Provide assistance to private landlords and tenants to understand their responsibilities and their entitlements

Provide assistance to help private tenants and landlords understand their responsibilities and entitlements. Make the Scottish Housing Quality Standard apply to ALL residences and add enforcement where required.

Deliver regular ward-level Affordable Warmth data to local politicians

Empower local politicians (Glasgow Councillors) with Fuel Poverty data on their wards. Knowing the Fuel Poverty status of a ward's constituents could have significant impact on council policy. For example, if a large percentage of constituents are living in Fuel Poverty, the relevant councillor would be almost sure to make it a high-priority agenda item. The data exists today, but in many cases are not itemised by ward and are out of date.

Connect those in need with those who can help most quickly

Create trusted sources of information that can be easily accessed in the local community. Ways to speed up such contact include:

a) Volunteer community meter readers who check in on the vulnerable to ensure estimated readings are not wildly inaccurate;
b) Creating a network of local, trusted advisors in buildings and neighbourhoods by word of mouth, by posting area-specific case studies;
c) Creating crowd-sourcing apps through which Glaswegians can volunteer their data.

5. Process

Themes and findings

The Complexity

Achieving Affordable Warmth is a complex process; seeking and offering help within Glasgow is no simple task. This is demonstrated in the following figure, which includes just some of the stakeholders and affected parties.

As identified in the People section, all kinds of residents are looking for Affordable Warmth, whether in social or privately rented housing, or asset-rich but income-poor.

A number of sources such as the Climate Challenge Fund or the Energy Assistance Package have made some funding available for Affordable Warmth; some cater for individuals and others for supporting organisations. However awareness of these is not widespread and entitlement can be unclear.

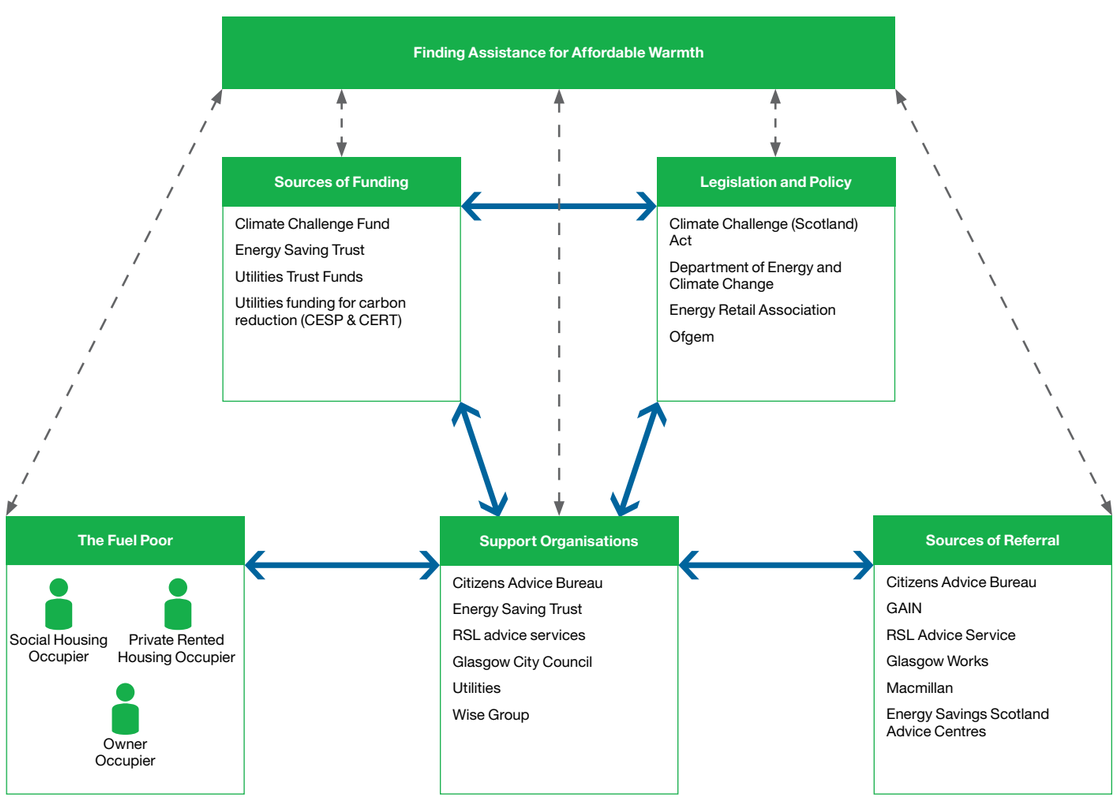


Figure 3
The Complexity of the Process

While legislation exists at both the Scottish and UK Government level, currently only Social Housing has to conform to particular housing standards (see section on *Policy*). Although private landlords are expected to register with the local authority, this is difficult to enforce and it is difficult to implement energy efficiency standards for this group.

A plethora of organisations exist, all with the aim of addressing if not eradicating Fuel Poverty. These may be self-funded, supported by local government, or even exist within the utility companies. Knowledge of these bodies is limited; Glaswegians may not be aware of their presence, while some are not even known to one other. Assistance is delivered through different channels: in the home; in surgeries; over the phone; and online. With help available from so many different sources, it is difficult to know where to go to get it.

While any of the above groups may identify a citizen of Glasgow as being in need of assistance, they may not necessarily be able either to provide the help themselves or refer them to those that can. The hand-off between organisations may be clumsy or delayed, with opportunities for referrals between groups in the same organisation often missed.

Each of the contributors to the Affordable Warmth system is interconnected, but there could be improved clarity about each others distinctive roles, and how these might complement each other, to maximise their individual and collective impacts.

Inflection points

Life progresses step by step with major changes caused by events, or inflection points. The Turning Point Programme defines an inflection point as "an event that changes the way we think and act. It is a moment of dramatic change for an individual, an organisation or society at large"[4].

In city life many people live from pay cheque to pay cheque with no financial safety net. When an inflection point occurs, caused by changes such as the loss of health or job, individuals and families are forced out of their financial comfort zone and into poverty. Very rarely do these people realise that poverty is a trap – ie that, even if their situation improves, they have very little chance of getting out of poverty quickly.

Consider Jessie who is asset rich – she owns a house – but has no disposable income. As she becomes a pensioner she can no longer afford to pay her fuel bills for such a large and energy-inefficient home and slips into Fuel Poverty. Statistics show that 65 percent of pensioners in the UK are in Fuel Poverty[5].

There are at least six common categories of inflection point which may force an individual or family into Fuel Poverty. These are illustrated in Figure 3 and include:

- Retirement;
- Experiencing temporary unemployment, perhaps due to illness or caring for a poorly relative;
- Losing a partner and becoming a single parent;
- Living on the borderline, where it is easy to slip into poverty when the cost of living increases dramatically;
- Losing benefits as a single parent due to the children's changing status (for example as they move out of education);
- Being a tenant whose assessed tariff and standing charges are drastically lower than actual fuel/energy usage.

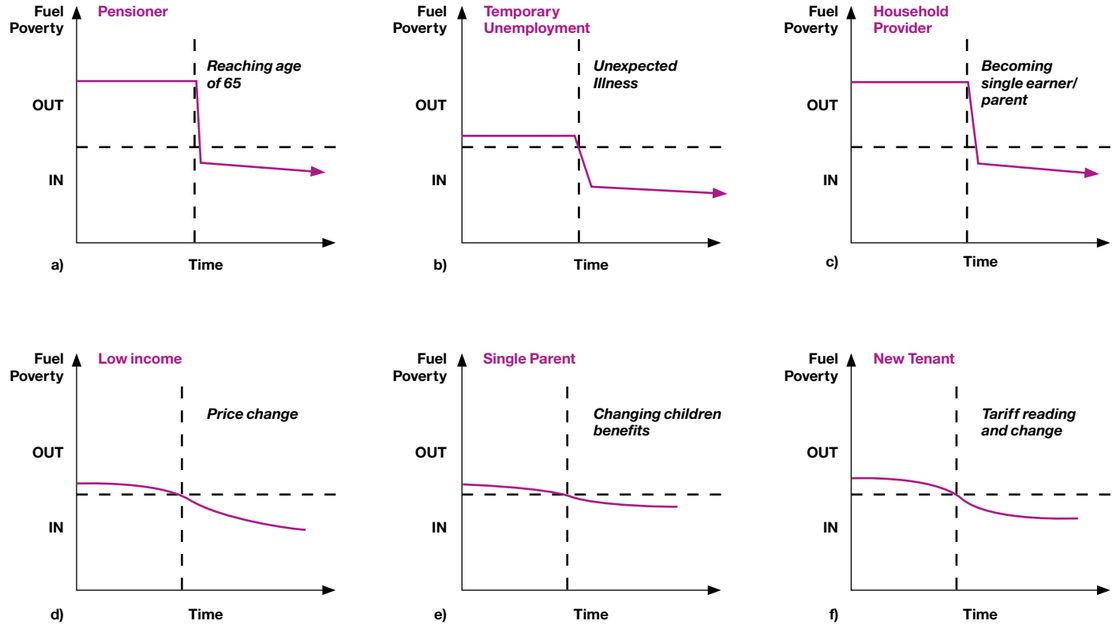


Figure 4
Examples of inflection points and their impacts on Fuel Poverty

Process recommendations

Sustainable Glasgow: the brand for Affordable Warmth

Sustainable Glasgow should become the brand for Affordable Warmth and the guide for all organisations working on this goal. This would encourage citizens to see Sustainable Glasgow as a trusted advisor with a common strategy implemented across the city. Last but not least, it would control progress towards Scottish national targets by all participants.

Effective governance provides clarity in decision-making and accountability while ensuring programme investment delivers expected business value.

Sustainable Glasgow should govern Affordable Warmth and Energy Literacy initiatives in order to:

- Help Glasgow **derive full and sustained benefits** from Affordable Warmth initiatives;
- Be that essential connector between strategy, management and personnel in the various organisations that are required to **realise the affordable warmth objectives**;
- Ensure appropriate systems are in place to allow Glasgow-based organisations to **put their Affordable Warmth strategies into effect**;
- Enable collaboration, coordination and **consistent execution** across the various organisations;
- Provide consistent guidance for Affordable Warmth planning, management, performance and **continuing improvement**;
- Facilitate **problem-solving** across boundaries of business relationships;
- Provide a **traceable link from strategic intent** to execution of Affordable Warmth programmes.

Sustainable Glasgow needs to define step-by-step processes that ensure proper and standardised implementation of all Affordable Warmth initiatives, enabling increased efficiencies and improved cycle times with clear expectations.

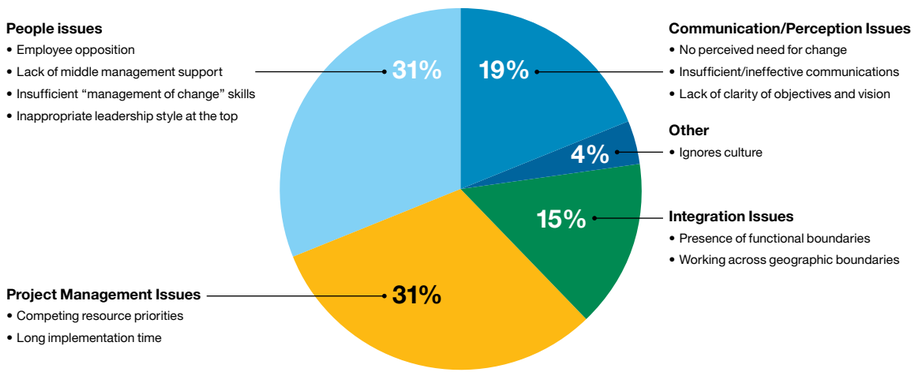


Figure 5
Why Projects Fail – IBM survey of 500 Global Organisations

Trusted advisor

Besides governance Sustainable Glasgow should be the coordinating focal point for help and advice for Glasgow citizens, adding clarity and simplicity to their search. It should not be a substitute for existing organisations who provide support for those in need of Affordable Warmth; instead, Sustainable Glasgow has the potential to become the first point of contact via multiple channels to direct and support the vulnerable.

Thus each organisation which aims to address Affordable Warmth must work in partnership with Sustainable Glasgow to ensure their resources are accessible to the given target group.

The combination of city-scale governance and collaboration will result in success and credibility in Glasgow. Sustainable Glasgow will earn the trust of Glaswegians, and as a brand will become synonymous with Affordable Warmth.

Implement a maturity process for achieving Affordable Warmth

Sustainable Glasgow, within its governance activities, will define the process necessary to achieve Affordable Warmth in the city. We propose five key steps which will make Glasgow mature as a city, as well as some other recommendations for implementation.

The development of the economy, the creation of new jobs and an overall return on investment goes hand in hand with this strategy, as seen in the following illustration which outlines the process and corresponding growth.

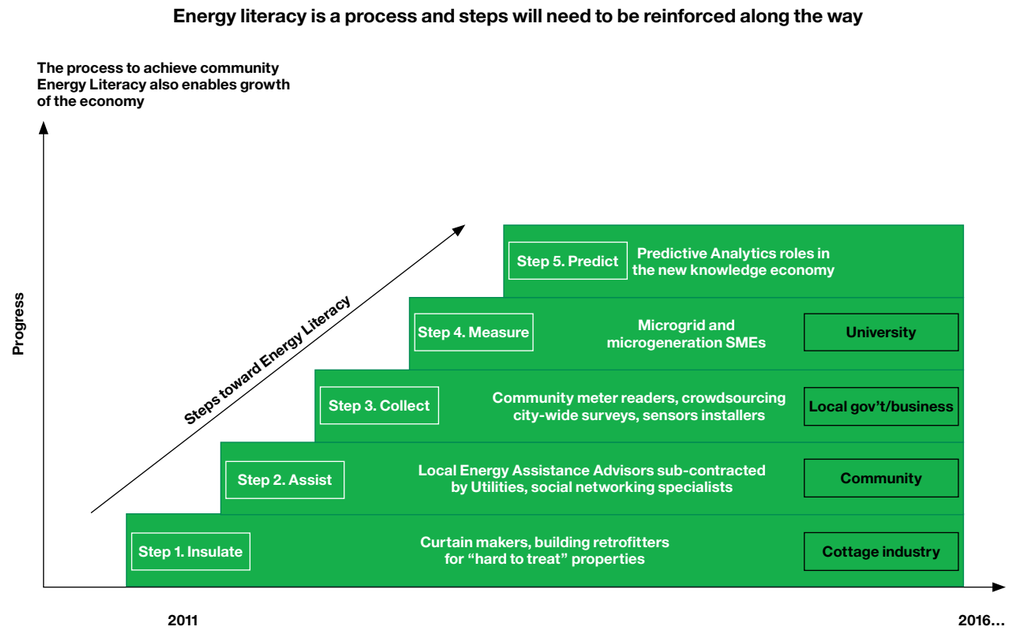


Figure 6
Overall Affordable Warmth process and economic growth

Step 1. Insulate
The first action necessary to achieve Affordable Warmth is to make homes energy efficient.

Many of the social housing associations in Glasgow are pursuing this target, but with existing standards likely to be raised, the process is liable to have to be repeated. Furthermore, these standards are not enforced in the privately owned housing sector.

Energy efficiency standards enforced upon landlords
It is recommended that Glasgow City Council enforces landlord registration, and that a standard is introduced for energy efficiency in privately rented properties. To reduce the short-term impact of such a policy, this could be implemented with a staggered approach: for example a low standard to be achieved within one year, a medium standard within three, and a high standard within five years.

Step 2. Assist
Giving advice can be done both proactively and reactively. Step 5 deals with targeting proactive help, focusing on providing assistance once a person has been identified.

Integrating processes for assistance across Affordable Warmth organisations
We recommend integration of existing processes within and between those organisations working to achieve Affordable Warmth. This is particularly necessary for referrals: existing processes must be extended so that once a referral is made from one organisation to another, the second organisation reports its results back to the originator and completes the circle.

Including external organisations in the referral processes
Many people who experience an inflection point in life contact various organisations to help understand their benefits, to apply for new ones, or to get medical or legal advice. Our recommendation is that these social workers, welfare benefit officers, health providers, Citizens Advice, the Police, educators and other support organisations are given the means to make a real-time referral to Affordable Warmth advisors.

Capture data from external organisations to identify those who have hit an inflection point
It is possible to discover a person who has recently reached an inflection point, for example someone who has just begun to collect Job Seekers Allowance or their pension. This data could be sent directly to Affordable Warmth organisations or to Sustainable Glasgow and combined with additional available data (such as housing conditions in the area occupied by the individual). If the resulting report shows that they live in highly inefficient homes the most suitable energy solution can be applied.

Use of a common case-management tool across all groups providing assistance
A common case-management tool used across organisations to support the automation of referrals can successfully help in the process of bringing energy advisors into the home when they are required. Groups participating in the Glasgow Advice and Information Network (GAIN) currently use such a common tool, and many of these groups also participate in aid for Affordable Warmth.

Simplifying the process of assistance in the home with mobile devices
Energy advisors should be armed with a mobile device and enter the data directly via an electronic form, for greater speed and efficiency than would be achieved using paper. The advisor will also be able to show the resident how to access available help online so that they can find instructions on setting a thermostat or reading a meter if needed.

Engage a social networking subject matter expert
Although some customers have limited access to the Internet, many now have smartphones. Glasgow City Council must adopt more pervasive technologies wholeheartedly in order to amplify the availability of its services. The subject matter expert can gather white papers, search for good practices, post and request data on various sites with a common interest in Affordable Warmth, and engage the community by sharing hints and tips via social media – for example by creating a Facebook page for Sustainable Glasgow Affordable Warmth, encouraging further community participation and the sharing of good ideas.

Local housing authorities sharing good practice in real time
Simple online tools such as Facebook and LinkedIn can allow similar-minded organisations to share their innovative ideas and best practices in real time. Any organisation can start up an online community, usually at no cost.

Energy literacy must be delivered through a variety of mediums – YouTube, print, web, local TV, smartphones and tablets for example, and must be reinforced on a regular basis through a variety of channels.

Increase collaboration across energy assistance organisations, and achieve process improvements, through regular meetings
Plan regular (for example quarterly) meetings with advisors on the ground, to discuss a topic and collaborate on developing solutions.

Physically advertise the energy advice visits
Before and during personal visits to an area, appropriate notices should be put up, advising that local help will be available – with the relevant details and contact information.

Ask citizens who have received helpful assistance to post a short message in a local store or community centre
A number of discussions which took place during this challenge made it clear that there is no substitute for word of mouth when communicating the positive impact of energy aid. Harnessing such feedback will help reinforce a sense of community and the value of a trusted advisors' network.

Partnering of utilities with Affordable Warmth organisations
Given that utility-specific advisors are the least trusted of all sources of available help, energy companies would do well to partner with organisations already providing independent energy advice: for example, they could use G-HEAT advisors and compensate them, or contribute to a fund which would meet the costs of energy advisors across the city.

The knowledge that the utilities write off significant sums of money in uncollectable debt every year makes such a strategy particularly justifiable. A positive use of the funds recouped would be to proactively assign some of them to this initiative.

Both executives and mid-level managers from the utility companies should attend some of the community advisors' in-home visits
With greater collaboration between independent advisors and the utility companies, there is an excellent opportunity for policy-makers to educate advisors on guidelines and procedures while in turn understanding from advisors and customers what kind of support is needed from the utilities. It should be noted that both G-HEAT and GHA have said they would welcome the exchange and have stated that it should be an ongoing, bi-directional educational process.

Step 3. Collect
In order to progress we recommend that Sustainable Glasgow should resolve data protection restrictions on information already collected by using innovative ways to collect the details needed to target assistance and calculate results.

Engage volunteer community meter readers
Volunteer community meter readers could be trained to read meters and will go round communities in Glasgow, take meter readings, submit them to the utilities on behalf of the residents, and prevent people from getting into difficulties. Another benefit is that the data can be passed on to the Council to assist with calculating the true cost of Affordable Warmth and targeting resources more effectively. In an effort to establish trust the meter readers should revisit the same communities and become familiar faces in the area.

Crowd-sourcing data
The task of gathering energy consumption data can be passed on to the community in Glasgow. This can be easily achieved through a smartphone application, or even via an Affordable Warmth webpage. For those without the technology forms can be included with regular council tax reminders; alternatively student volunteers could be deployed citywide to knock on doors and request the data.

Step 4. Measure
Many measures can be taken to achieve Energy Literacy and Affordable Warmth. For example Glasgow City Council already attempts to estimate the number of people affected. Where more real-time data is collected, there is opportunity to more accurately calculate:

- The true figure for Affordable Warmth, based upon the definition of Fuel Poverty;
- The true cost of Affordable Warmth across council-provided services and the NHS, the Police, Education, employers and other organisations;
- The success of the assistance provided;
- The true return on investment, resulting from the actions performed by Sustainable Glasgow.

Measure prevention, not treatment
As Glasgow's experience grows, and its efforts to achieve Affordable Warmth mature it will be possible to measure the success of proactive intervention – ie preventing citizens falling into Fuel Poverty – rather than merely the success of reactive treatment.

Install environmental sensors
Sensors can be deployed in the homes of the older population; if low temperatures are detected for a sustained period of time with a potential risk to health an alert can be sent to a nominated individual or organisation, allowing further investigation and action.

Warn consumers of potentially excessive consumption, for example by using SMS
Where a utility is able to identify and track a property's energy consumption (through smart meters or pre-payment meters), that utility can send an SMS message to warn the consumer that they are reaching their pre-set warning/ consumption limit – before cutting off the lights.

Step 5. Predict
The impact of the Affordable Warmth efforts really begin to manifest themselves in the Predict stage of this process, where enhanced intelligence about real consumption can be used to extrapolate potential scenarios before they develop.

Armed with advance knowledge Glasgow will have an unprecedented opportunity to target services, preventing further households slipping into fuel poverty. In this way Glasgow would be able to exploit its new knowledge to create a positive impact for the city on a number of different levels – from reducing citizens' debts and growing their disposable income to reducing the demands on healthcare services caused by Fuel Poverty.

Introducing predictive analytics tools to Sustainable Glasgow
Sustainable Glasgow can capitalise on existing unstructured data – ie the free-form notes made by energy advisors during their home visits, and during calls from those in need of Affordable Warmth.

Having collected data from the community, Sustainable Glasgow can use predictive analytic tools to examine near real-time and historic, structured and unstructured data. Unlike traditional statistical analysis, these tools do not require the user to know exactly what they are searching for but can be used to spot trends in data. These trends can then be used to develop accurate models that will be able to predict when an individual or household is likely to hit an inflection point and drop into Fuel Poverty. Intervention becomes better targeted: citizens can avoid dropping into Fuel Poverty by being moved on to a different tariff; an energy advisor can be dispatched to assist them; relevant environmental sensors can be added to their homes; or insulation improved within the home – and so on.

Preparing for expected inflection points
If a specific change is expected, such as a rise in fuel prices, the city could map information available to areas with incomes just above the poverty line and estimate the speed at which the specific price change would affect the given group of people. The locations which would be affected most quickly could then be further analysed, perhaps by applying energy efficiency ratings, to identify those most likely to benefit from an energy advisor's help. Data on city dynamics is paramount in this situation.

6. Place

Data used to illustrate Affordable Warmth and areas of risk are taken from trusted sources (surveys and studies) but there is also potential for a more real-time view, as is covered below through a consideration of "Place" – ie location-specific issues.

The aim here is to give Glasgow City Council the tools to more effectively identify potential areas of intervention, and establish what the return on investment might be across the city. This involves 3D mapping of Glasgow, showing improvement potential and related analytics and insights. It also considers crowd-sourcing as a means of capturing the necessary data to tackle Affordable Warmth in good time and with pinpoint accuracy.

Like any city, Glasgow has a keen sense of place and a long history of change. However this change typically comes in fits and starts and leaves a complex trail of architecture, lifestyles, businesses and data. Much of this complexity has a direct effect on Fuel Poverty and prevents people from having Affordable Warmth as part of their healthy living and work space.

Of the various drivers of Fuel Poverty, "Place" is a significant contributor. Questions Glasgow should ask in scoping the challenge include:

- Has the city developed the industry and jobs that thrive today?
- Does the city have alternative economically viable sources of energy that can be used for heating?
- Is the population ageing rapidly?
- What proportion of residents live alone?
- To what extent is the housing stock energy-efficient or could it be easily upgraded?
- Is the social housing sector strong, well organised and actively investing in efficiency improvements?
- Is the private housing sector vibrant and investing in improvements or does it hide many problems, being unmanaged and unregulated, and failing to invest sufficiently in energy efficiency measures?
- To what extent is there a growing trend of older people (65+) being property/asset rich but income poor? Do they lack the capital and knowledge to invest in energy efficiency measures?
- Does the shape and connectivity of the city create pockets with little investment?

Many of these issues are recognisable in Glasgow.

At a national scale, the Scottish Government has committed to becoming a country with 100 percent renewable electricity by 2020. This will represent a very significant change in the energy-generating landscape. Achieving this will demand a high rate of progress with significant changes in the way the country produces and consumes electricity. It will have an important influence on Glasgow, not only in the manner with which the city sources its energy, but in the economic opportunity it presents to industry and the knowledge economy to develop new solutions and business models.

It is all too easy to misjudge the impact of Fuel Poverty on a city. The problem is often over-simplified, being seen as something that only affects the poor or unemployed in run-down areas. In reality, this is far from the case.

In Glasgow, the issue of Fuel Poverty is found to have an impact on the city as a whole, with almost 35 percent of households directly affected according to some city estimates.

Indirectly, Fuel Poverty affects the entire city by:

- Taking money out of the economy;
- Forcing energy companies to act as "social services" by writing off significant losses – these are then redistributed in the form of an increased energy bill to all local citizens and businesses;
- Creating health issues (such as asthma) and "bed blocking", resulting in a diminished health service and increased health costs;
- Consuming a significant percentage of the city's disposable income – without value, as heat leaks from walls and money from the city economy. With significant rises of around 20 percent in electricity prices planned, this is real money lost to the local economy.

Locating appropriate data on Place and how it performs can be difficult; however there are increasing opportunities to work around this. The data needs to be more granular, and more immediate, with more analysis to give useful insight on the ground to those working on Affordable Warmth.

To achieve the sustainability targets the city has set itself, Glasgow must learn rapidly not only how to accept and maximise its environment, but also come to understand Glasgow's place in the context of its wider ecosystem. Affordable Warmth and CO_2 reduction of 30 percent by 2020 go hand in hand.

One of the most profound changes the city needs to make is to share data openly to enable collaboration on a city-wide scale.

Place-based solutions

What could the future look like in relation to Affordable Warmth in Glasgow?

According to the Scottish Housing Condition Survey 2009, the type of house does not make much difference to Fuel Poverty, whether owner-occupied, privately rented, or managed by a housing association or local authority. Each sub-sector sees about 30 percent of occupants suffering from Fuel Poverty. The important conclusion from this data is that this problem is found not just in the social housing sector; it applies across the city. Action should be taken therefore to understand the hidden problem of Fuel Poverty in the private sector and the specific inflection points that cause it, so that new, effective advice and measures can be created that will be effective here.

There is a great need for a city subject to constant change to understand "Place" in much more detail, but in such a way that is not as demanding as might have been the case in the past. This demands ready access to up-to-date information which is put in context, allowing decision-makers to understand how the city works and how it is changing.

Open, shared, integrated data is key to creating actionable information. The city should gather data at postcode level and even create the opportunity for citizens to share data at household level. Getting this data close to real time would also be a major step forward. For example, for someone at significant risk of Fuel Poverty it might be worth offering a sensor/smartphone app that could track temperature, energy consumption, tariff and location. If this was done on a city-wide scale, it would uncover sufficient detail to then apply highly targeted advice and practical intervention.

Importantly, this must be done in a way that is transparent and permission-driven. Typically, if data-sharing is seen to help, people will willingly offer their data.

When organisations find it difficult to provide data (often because they do not have the capacity, or a conducive culture), going directly to the source of the data can be very effective. Asking people to be sensors, capturing data via text on a smartphone is now a very practical option.

The creation of a data-sharing platform (along the lines of London Data Store) would be a great improvement. Although much of the necessary data is not subject to Data Protection – whether about buildings, assets and performance – care is still needed. An open platform allows those with data to share it easily and quickly. This gives those with the expertise and processing power to analyse the data and create new applications that are of value to the city.

Exploring the manner in which the city tells its story is a very novel way to understand Place. Gain insight into the words the city is using; explore the patterns hidden in free-form comments (for example about help given by heating advisors). It is possible to learn (discovering through algorithms) what is really happening around Affordable Warmth from non-numerical data. Some of this can be formal text fields the city is using; another useful source is informal comment found elsewhere in the social networking space.

Place recommendations

Capture private sector data (rented or owner-occupied properties) to enable suitable advice and targeted intervention

Action needs to be taken to understand the hidden problem of Fuel Poverty in the private sector, and its specific inflection points. Some new types of advice and interventions should be created that would be effective within this section of the city. To gain an accurate understanding of this hidden issue, exploring existing data could be valuable along with targeting new data collection through campaigns or by simply asking people for the relevant information.

Open data sharing: create a city-wide platform

Create a city-wide platform to enable information to be shared across sectors quickly, professionally, in fine detail and with appropriate metadata (allowing related content to be linked, and quickly found during a search).

Better data resolution and timeliness

Move from using only historical data to gathering data for at-risk groups at a postcode level and with people's explicit permission at a household level. In addition, a "city laboratory" district fitted with real-time sensors for house temperature and energy consumption would reveal important information on how to tackle the problem of Fuel Poverty on a city-wide scale.

Deliver regular ward-level Affordable Warmth data to local politicians

Simply displaying Affordable Warmth data at a ward level will enable politicians to understand and act on the evidence. Currently much of this data is hidden to them. This can have a significant impact on understanding the effects of current policy and policy development.

Narrative text processing

Begin to understand the unique characteristics of Glasgow by exploring the patterns in its formal and informal text-based data. Advanced tools for doing this are being used to understand things like brand image. Using them to understand Fuel Poverty is now a practical option.

SAP app

Energy efficiency rating data is needed for the private housing stock. The process uses a tick-box approach. People could be trained and data could be collected at community level through a smartphone application.

An initiative to address "hard-to-treat" properties

Historic red sandstone houses present many challenges for heating and insulation. Through sponsorship (possibly by the energy companies), a world-class competition could be established and based in Glasgow. At one level it could be for a design, or on another level it could be implemented and tested in a few showcase houses. The competition could establish strong links with leading universities in Scotland.

Revealing the improvement potential for housing stock

During the Smarter Cities Challenge, the IBM team used a sample dataset of 2,000 properties to illustrate what is possible. This work could be extended to the 20,000 houses for which Glasgow has data today, and a campaign to fill in the data gaps could be put in place. A return on investment model for this data would be a useful step forward. Getting this data in the hands of local advisors could also be very useful to target their efforts, especially during the summer months when immediate demand is less intense.

Using social networking tools such as YouTube and Linked.In to distribute data about place

Jamie Arnott, a Principle Officer at Glasgow City Council, has a perceptive set of data and narrative to show which local areas are in flux (see Figure 7). Most areas are stable; the key thing is to find the areas that are changing; those areas that are getting better (yellow) because of proximity to the West End and good transport links; or infrastructure upgrades. Such areas may simply need to be nurtured, requiring lower levels of attention and investment.

Other areas showing progressive decline (marked red) need intensive attention and innovative intervention. Tackling these decaying areas early, before they sink too far, is vital to minimise long-term costs to the city.

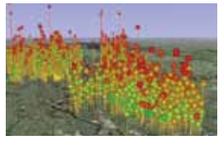
The key is that through analytics and understanding the narrative of these areas, their improvement or decline can be very accurately predicted at a city level, allowing targeted, pre-emptive action.

Using tools like YouTube and LinkedIn to distribute Place-based data

Much of the insight a city has is hidden in reports, on paper maps and in the heads of a few people. Information about Place can now be easily and cost-effectively distributed to both public and professional groups through new online tools at almost no cost. Glasgow needs to use these tools to amplify the good work it has begun. With appropriate governance, channels such as YouTube and LinkedIn should be opened up for city workers to use. A revolution is under way whereby cities are using such forums everywhere – except in their own departments. Careful management can unlock the potential of these tools to the city's advantage, creating a "digital" place for the city which enables the physical place to run much more effectively.

New housing for people 65+ who are single, still independent, but currently in inefficient housing.

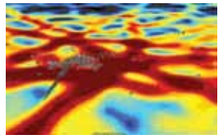
The over 65s need the option to move to more suitable places in their local community rather than staying in expensive homes where their income is tied up and getting caught in Fuel Poverty.



SAP Improvement Hotspots:
SAP Potential – SAP Actual = SAP Improvement Hotspots

- Lots of room for improvement
- Some improvement potential
- Good performance

Source: Energy Health Check, April 2008 to March 2011



Showing how insight is created into the vibrant parts of the city that will attract investment in buildings because they are connected.

The "map" also suggests areas where Fuel Poverty is likely to exist simply because of the shape of the city with its isolated pockets.

Sample of leading-edge work on centralities which provide new city-wide insight.

Source: Paola Pasino, GCC and University of Strathclyde

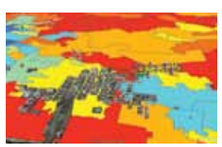
Finding the most difficult places for Affordable Warmth is a vital part of understanding how people fit into place

Top 100 most deprived area
Top highest Job Seekers Allowance claims
Top 100 dependants per working adult

- Area has 3 indicators
- Area has 2 indicators

Finding the difficult places for Affordable Warmth – sample of innovative work combining people and place data to understand Fuel Poverty risk in ways never seen before.

Source: James Arnott, Glasgow City Council



Putting existing data into a new context (e.g. Google Earth) can enable the data to be much more readily accessible.

Source: James Arnott, Glasgow City Council

Figure 7
Examples of data analysis and visualisation showing improvement hotspots as identified by Glasgow's SAP app

Urban information engineering – creating expertise in Glasgow on Glasgow data

A partnership between universities and the city to tackle the challenges of Fuel Poverty could bring together the insights of the council and the expertise and computer processing power of the universities. This combination would link social, economic and environmental topics with engineering and entrepreneurship, to create a cross-disciplinary approach to understanding Fuel Poverty and Affordable Warmth data. Sustainable Glasgow could be the governor of such an initiative.

Implement simple-to-understand building sensors – ambient orbs and glowing plugs

It is possible to quickly and easily show people in real time how much energy they are using via a simple light that glows red when energy usage is intense and green when it is minimal. This could be monitored at household or socket level[12].

Create an app to show when meters are broken, inaccessible or have not been read for a long time

The aim should be to display accurate data on actual usage which is easily accessible to consumers in a timely fashion, but not to rely too heavily on residents having to monitor and report on their own consumption. Apps can help utilities and independent energy advisors to intervene.

Figure 8
Example of iPhone APP for taking meter readings

Making use of Glasgow's assets to drive toward Affordable Warmth

Glasgow has some great resources that could play a useful part in promoting enhanced, proactive energy consumption monitoring, and education on a wide-reaching scale. Opportunities include:

- **World-class conference centre** – Hold a world-class conference on the topic of Affordable Warmth.
- **Lots of brown-field sites within the city** – This gives space for new types of housing to replace the most inefficient housing stock. Few cities have this room to manoeuvre.
- **A history of trail-blazing and making major changes in the city** – Affordable Warmth is one of the key issues of our time. What is needed is coherence on this topic on a city scale, as with the "Miles Better" campaign.
- **The three Glasgow universities and numerous colleges** – Such institutions are at the forefront of the knowledge economy and should be engaging with the city's problems, creating new solutions and spinning off new businesses using Glasgow as a test bed.

Creating an online place for the city to collaborate is an increasingly important opportunity. While the initial take-up may be slow, the everyday importance of this way of working is increasing as more and more people use such tools.

7. Policy

Although Fuel Poverty is defined as a proportion of income to expenditure on household heating in reality – due to various data privacy limitations – it is understood and measured in different ways by different public and private organisations. The only consensus on Fuel Poverty in Glasgow is that it is high and likely to get worse in the near future. Appendix 4 describes in detail the historical background to the development of Fuel Poverty. A pivotal event was the introduction of national and local directives, including the UK Fuel Poverty Statement in 2001 and the Scottish Fuel Poverty Statement of 2002, where Fuel Poverty was noted as one of five key national housing priorities.

Fuel poverty in its broadest context is driven by changes in income, housing quality and energy provisioning. As each of these items is described by separate and often multifaceted directives and regulations held at various government levels (EU, Westminster and Holyrood), the policy around Fuel Poverty is necessarily complex. In order to track progress of these three Fuel Poverty measures, selected surveys and studies have been set up by the Scottish Government and local authorities. A short description highlighting key indicators and surveys is included in Appendix 5.

Household income

Information related to low disposable household income and employment is held by Westminster. Since household income data is not easily accessible due to privacy policies, the Scottish Index of Multiple Deprivation (SIMD) has been used to quantify changes related to the population's income and employment. Loss of employment is a key driver of household income levels. In addition, household income provides a measure of poverty levels and has an impact on Fuel Poverty. In general for those with low incomes the cost of heating a property demands a greater proportion of total income. Thus information on loss of employment and income is considered critical input in Fuel Poverty evaluation.

The latest Scottish Government unemployment figures as measured by SIMD 2009+1 (with data from 2008 and 2009) indicate that unemployment has risen to 13.1 percent nationally with increases in all the large Scottish cities. 19.2 percent of Glasgow's working age population (over 75,000 people) are unemployed, the highest rate of any local authority in Scotland[6]. In a drive to increase overall income and the proportion of income earned by the three lowest income deciles, the Scottish Government established a Solidarity Target, with a directive to achieve this target by 2017[7]. "In 2009/10 the lowest three income deciles received 13 percent of that income. This percentage has remained at 13 or 14 percent for every year since 1994/95 when measurements began. However, since 2004/05, this figure has been gradually but consistently decreasing, suggesting that the distribution of income is becoming less equal"[8].These latest SIMD updates (SIMD 2009+1) with data covering 2008 and 2009 (the effects of the economic downturn) show that while unemployment has risen nationally to 15.6 percent, in Glasgow it has grown to 26 percent, affecting over 150,000 people and the city now has the highest rate of any local authority in Scotland[9].

Energy efficiency of the household

Policy on the energy efficiency of the home has been devolved to Holyrood, but various directives coming from the EU and UK level are also instrumental. In the Scottish Fuel Poverty Statement of 2002, the Scottish Government described partnerships that needed to be established within local areas between local authorities, voluntary bodies and the energy companies in order to achieve the 2016 Fuel Poverty target. A review published in November 2006 provided a progress update.

To examine the advances in achieving Fuel Poverty targets, the Scottish Government published a Review of Fuel Poverty in Scotland on 22 May 2008[10]. Similarly in Glasgow, a Fuel Poverty Strategy Monitoring Report 2006/07[11] was submitted to the Development and Regeneration Services Policy Development and Scrutiny Committee on 29 January 2008. Both documents highlighted that improvement in the energy efficiency of houses is critical to address Fuel Poverty. It drives the amount of the energy that must be purchased to heat the home adequately.

In particular, both the thermal quality of the building (insulation) and the efficiency of the heating source have been identified as critical measurable indicators, playing a positive role in a sustainable strategy and partially offsetting the fuel price changes.

Successive Scottish House Condition Surveys show improvements in overall housing conditions, indicating that the proportion of dwellings with condensation or dampness, or failing the Scottish House Quality Standard (SHQS), are falling. However, the most recent figures for 2009 show that 62 percent of both social housing and private sector housing falls short of the SHQS and just under half (44 percent) of dwellings have some need of urgent repair. In addition to the fact that these numbers are far from optimistic, up-to-date data is not available, often being 2-3 years out of date.

The hope is that additional regulations for all social landlords (to ensure that all their dwellings pass the Scottish House Quality Standard by 2015), and for all private landlords (to produce the Energy Performance Certificates for any properties that are for sale, rent or construction) will help to drive the Fuel Poverty agenda further. In addition, the Scottish Government continues to supply new programmes to address Fuel Poverty. Most recently, on 6 April 2009, a new Energy Assistance Package was announced to replace the Warm Deal and the Central Heating Programmes. This new initiative, managed by the Energy Saving Trust in partnership with existing advice providers and energy providers, was put in place to tackle Fuel Poverty more holistically and provide a single solution with measures to improve the home, access energy efficiency advice, energy-tariff advice, and advice on income maximisation.

Policy recommendations

The summary of our findings on policy concentrates on the ability to address the "cost of privacy", and to continue the rapid transformation towards achieving Affordable Warmth in Glasgow.

Upon evaluation of the Fuel Poverty policy and available data (various indicators), two sets of recommendations have been identified:

- The short-term opportunities related to work around the current policy;
- The long-term opportunities focused on active participation in creating and striving for a new policy enabling Affordable Warmth.

Short-term strategy around current policy

Glasgow-specific policy recommendations to enable Affordable Warmth:

New meters to be installed only in accessible places

In order to help customers read their meters and increase their chance to participate in energy literacy activities, the utilities need to be responsible and accountable for the appropriate installation of the meters (accessible for everyone, including those with mobility problems).

Agree Pre-Payment Meters have lowest available Tariff
A discount will encourage more customers to request pre-payment, enabling them to manage an increasing monthly cost and derive the benefits of the direct debit discount. For their part, utilities will be able to increase their cash flow.

"Safe" level of heating introduced to all social housing properties
This would require social housing associations to provide heat to those affected by Fuel Poverty in their properties in extremely cold weather (details on temperature level to be determined). This recommendation would ensure warmth for poor people in specific low-temperature conditions.

Identification of best areas for Affordable Warmth education and advice
Use available data combined with innovative analysis techniques (3D, structured and unstructured data mining) to identify high-risk areas in Glasgow which would gain most from Affordable Warmth advisor visits and energy literacy programmes.

Open data-sharing: create a city-wide platform
To work around the information privacy problems, it is recommended that:

- An open data platform is created: along the lines of the London Data to enable individuals to volunteer their own information;
- Social networks are harnessed encouraging open conversations on the cost of fuel and effectiveness of housing efficiency measures;
- University Student Volunteering bodies are engaged to recruit Glasgow student volunteers who could provide advice and collect data relevant to Affordable Warmth improvements

e.g. Data of specific value include meter reading data, information on tariffs and meter problems, income and employment information, plus subjective feedback and hot points around energy issues.

Long-term strategy

The following recommendations are intended to mark out Glasgow as an energy literacy leader, proactively engaged in the national energy forums, supporting and helping to drive through new proposals related to Affordable Warmth.

Utilities to share consumption data with local authorities
Since quantification of Fuel Poverty would greatly benefit from the ability to analyse energy and gas consumption data, this recommendation pushes for access rights to such data to be given to the local authority.

Lobby for Energy efficiency standards to be applied to private landlords
It is recommended that Glasgow City Council should lobby for landlord registration, and that a minimum standard for energy efficiency in rented properties is introduced to improve private housing conditions and bring them up to social housing standards. To reduce the immediate impact of such a policy, staggered goals could be put in place, with for example a low standard to be achieved within one year, a medium standard within three, and a high standard within five years.

Enforcement of smart meter targets (by 2015)
Even though national targets exist to implement smart meters by 2015, there is no enforcement policy motivation for energy/gas companies to act upon this directive. The recommendation is therefore to push for enhanced policy that not only delivers the target but also specifies the utility's obligations and responsibilities more clearly.

Cap on the number of tariffs
The tariff environment is very complicated, not only because it is hard to compare rates between different companies, but also because there are so many of them. The team proposes tariff simplification and creating a limit on the number of tariffs a utility is allowed to have.

Enforce a minimum period of 2 years before consumers can be asked by a utility to move to a new tariff
Continual changes in tariffs greatly complicate the understanding of energy consumption. As in the telecommunications industry, there should be a contractual obligation for the utility not to change a customer's tariff within a designated period of time (the team proposes two years). It is suggested that this policy applies to cases where the tariff is increasing.

8. Conclusion

Heralding a warm, bright, sustainable future

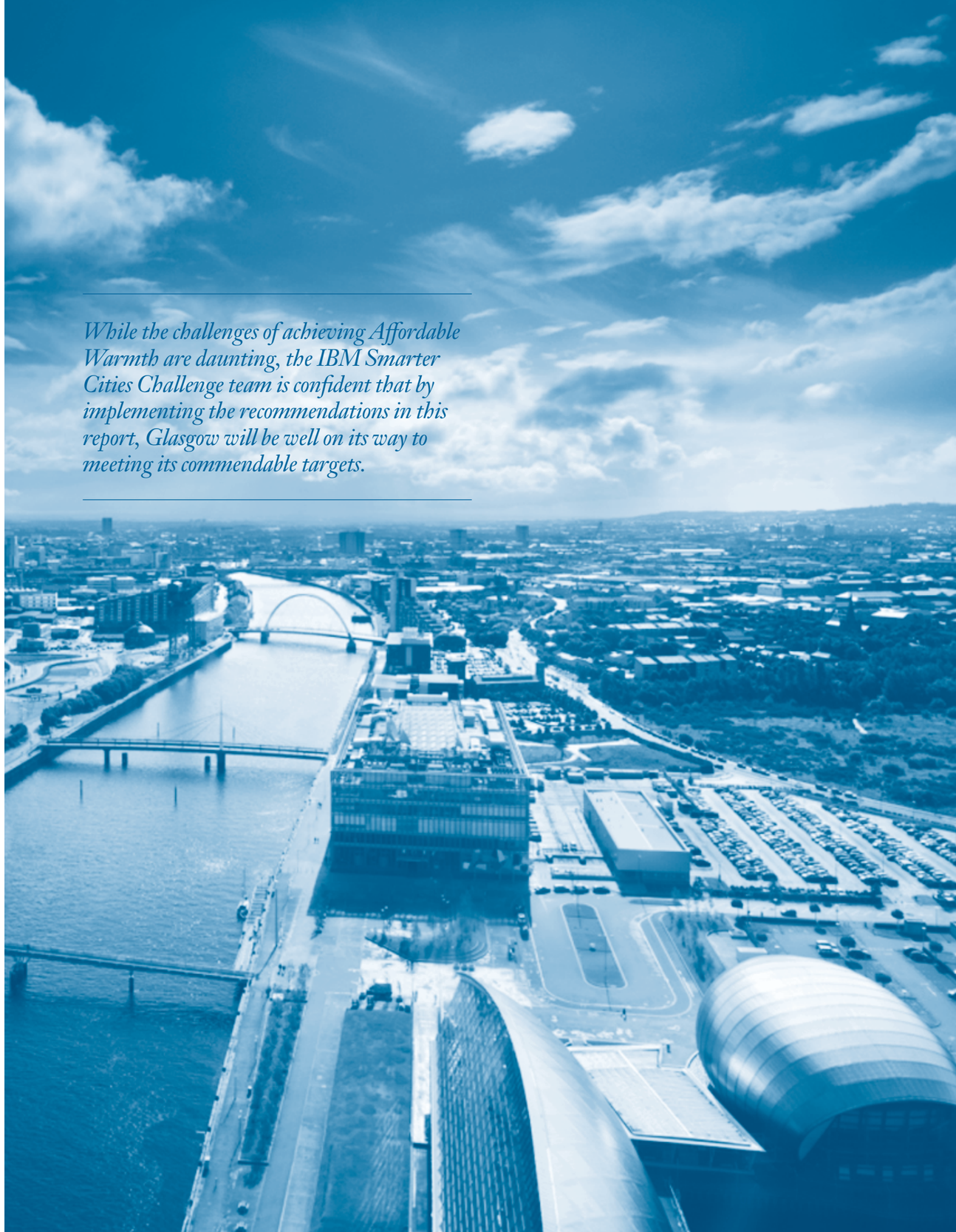
Glasgow has an ambitious and dynamic vision for its future, in which it is seeking to turn historical disadvantages associated with challenging demographics and an inclement climate into impetus to create a healthier, warmer and more cash-rich population which in turn will drive the economy and drive the city's onward prosperity.

Crucially, the city has already come a long way in identifying and facing up to the many challenges involved. This is paving the way for transformational change, harnessing the latest technological innovations and their potential for enabling dynamic, rich information access, advanced collaboration and consumer empowerment.

For Glasgow, sustainability has to deliver more than environmental targets – sustainability must also deliver economic growth and help tackle social issues within the city. Sustainable Glasgow has been clear in its message that delivering large-scale carbon reduction emissions requires major change. These would be delivered in part by large-scale projects and investment, and also through engagement with citizens, their communities and employers and by the establishment of strong and supportive public policies.

As Glasgow becomes a Smarter City it must use this collaborative process to optimise its operational value, build its brand, maximise societal value and drive innovation.

Glasgow is a great city with a proud heritage of innovation and intellectual leadership. While the challenges of eliminating Fuel Poverty and achieving Affordable Warmth are daunting, the IBM Smarter Cities Challenge team is confident that by implementing the recommendations in this report, Glasgow will be well on its way to meeting its commendable targets.



Appendix 1

Consolidated recommendations

In the main report, the IBM Smarter Cities Challenge team has outlined priority recommendations in the pursuit of Affordable Warmth, under each of the four main dimensions suggested for transformation: People, Process, Place and Policy. Each of these pillars of change depend in turn on a strong foundation of energy literacy, and an ability to establish and harness new, deeper knowledge about energy consumption gained from rich, real-time information. Access to good data and the provision of stepping stones towards a city that is instrumented, interconnected and intelligent are critical to success.

A fuller, consolidated list of recommendations follows below. Comprehensive implementation of these recommendations in all areas will enable the city of Glasgow to deliver Affordable Warmth to its citizens, boost the local economy through improved cash flow, and be a model for Europe.

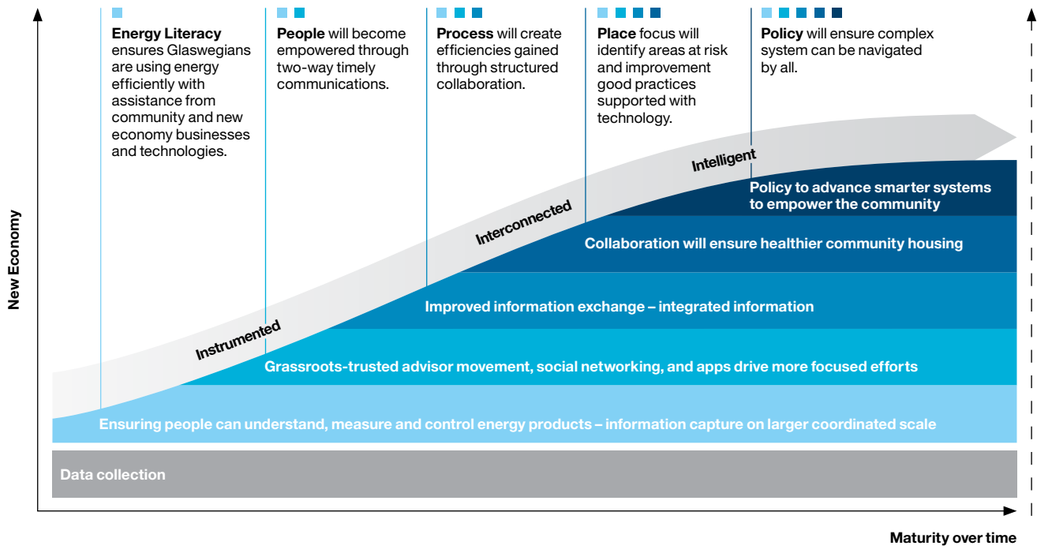


Figure 9
The Journey to Affordable Warmth

People

1. Adopt an approach of providing Affordable Warmth rather than reducing Fuel Poverty
While the Fuel Poverty target is an arbitrary percentage and focuses on attacking a number, attaining Affordable Warmth is a tangible social goal required by everyone.

2. Name a champion for Affordable Warmth
With the deadline of 2016 now less than five years away, there needs to be a coordinated effort if Glasgow is indeed to make inroads towards fulfilling the national Scottish mandate for eliminating Fuel Poverty, which means assigning key people to drive focused initiatives. A champion will be able to coordinate efforts, accelerate collaboration and focus on amplifying messages so that change can be felt immediately.

3. Create city-wide energy literacy
Fuel poverty is a community issue, not restricted to one social class. With rising energy costs, all Glaswegians are going to be affected in some way. Soon, this will be a problem for working families and the middle class. The problem will be felt by private homeowners, renters and those in social housing. If the local economy is to remain resilient, and if targets of 30 percent carbon reductions are to be met, all Glaswegians need to receive messages about the goals and benefits of various methods of energy efficiency.

4. Energy literacy must be delivered through a variety of media
Not all Glaswegians have access to the Internet, so Glasgow needs to harness the widest possible range of communication channels to reach those affected or potentially at risk, from online tools such as YouTube, Facebook and LinkedIn, to more traditional channels such as print; local television; to smartphones and tablet computers. Messages must be reinforced on a regular basis through the same variety of channels.

5. Glasgow should segment the community by, for example, age, housing type and benefits, for use in predictive analysis
This will also help in choosing the right "channel" with which to deliver the message. TV, direct mail, email, text, social networking, billboards and newspaper advertisements should all be used for getting the message out.

6. Provide "silver surfer" sessions for older people
To assist those with limited or no knowledge of the Internet, volunteers could run workshops in libraries, community centres, schools and further education services.

7. Community warmth centres
Encourage activities for the elderly and disabled in heated community centres. This is not only for reasons of social interaction, but also so that they have a warm place to go during the day, can turn their own heating down and save both money and carbon resources. The centres should be easily accessible and within walking distance.

8. Deliver data on Affordable Warmth at ward level to include and influence politicians
Knowing the Fuel Poverty status of a ward's constituents could have a significant impact on a council's policy. Simply by being able to see Affordable Warmth data at ward level, politicians will be able to understand and act on the evidence.

9. Provide assistance to private landlords and tenants to understand their entitlements and their responsibilities.
It should be mandated that dwellings be inspected annually with accompanying reports on their Fuel Poverty status, and that the Scottish Housing Quality Standard applies to ALL residences, with enforcement where required.

10. Energy Companies share information when they become aware of "inflection points"
When energy companies become aware of clients who are likely to slip into Fuel Poverty, energy companies should be compelled to share this information on a confidential basis with local housing authorities – early intervention can be key to avoiding health issues related to Fuel Poverty.

11. SMS service to warn of high consumption
When energy utility companies become aware of high energy consumption in a home, the tenant or homeowner could be warned by an SMS text message, averting problems at the earliest opportunity.

12. Create a "predictive bill" app
Create a smartphone application which will allow Glaswegians to enter their tariffs and consumption data from invoice, and then predict future bills.

13. Capture readings from inaccessible energy meters wirelessly so that these can be accessed by a phone
It is costly to move a meter from its existing location, but some are in poorly accessible places. By capturing readings wirelessly, the occupier can still track their consumption without the necessity of moving their meter.

14. Assemble a team of university Behaviour Studies students to ask citizens what a monitor should say and design it accordingly
Energy monitors may seem simple to some, but for many, programming and using them correctly is a challenge.

15. Learn from Scottish Opera and other organisations noted for their ability to communicate
Scottish Opera has impressive experience in spreading the word. Over 16,000 nine-year-olds across Scotland know the Renewables song and the lessons learned from the McWasters; harness this experience as an accelerator to amplify messages throughout Glasgow.

Process

16. Sustainable Glasgow: the brand for Affordable Warmth
Sustainable Glasgow should govern Affordable Warmth and energy literacy initiatives to:

- Help Glasgow derive full and sustained benefits from Affordable Warmth initiatives;
- Be the essential connector between the strategy, management and personnel of various organisations to realise the intent of the Affordable Warmth objectives;
- Ensure appropriate systems are in place to enable Glasgow organisations to put in place their Affordable Warmth strategies;
- Enable collaboration, coordination and consistent execution across the various organisations;
- Provide continuous guidance for Affordable Warmth planning, managing, performing, and improvement;
- Facilitate problem-solving across boundaries of business relationships;
- Provide a traceable link from strategic intent through to Affordable Warmth programmes execution.

Sustainable Glasgow needs to define step-by-step processes that ensure proper and standardised implementation of all Affordable Warmth initiatives, enabling increased efficiencies, improved cycle times and clear expectations.

Sustainable Glasgow should be the first point of contact, via multiple channels, directing the vulnerable along a supportive route. (There is potential for the city's new City Centre Service Desk to assist with this contact.)

Thus, each organisation which aims to address Affordable Warmth must collaborate with Sustainable Glasgow to ensure their resources are accessible to the appropriate demographic.

The combination of city-wide governance and collaboration will result in success and credibility in Glasgow. Sustainable Glasgow will earn the trust of Glaswegians, and as the brand becomes synonymous with Affordable Warmth.

17. Implement a maturity process for achieving Affordable Warmth
Sustainable Glasgow, within its governance activities, will define the process necessary to achieve Affordable Warmth in the city. Five key steps are recommended within this process which will mature Glasgow as a city: insulate; assist; collect; measure; and predict.

18. Increase collaboration across energy assistance organisations, and achieve process improvements, through regular meetings
Regular meetings with advisors to discuss a topic and "speed-dating" sessions can help spread the word quickly and effectively. A minimum of 40 attendees should be invited to such events.

19. Local housing authorities share good practices in real time
Simple online tools are available on the Internet (like Facebook and LinkedIn) that allow like-minded organisations to share their good ideas and practices as they become available in real time. Any organisation can start up an online community, usually at no cost.

20. Integrating processes for assistance across Affordable Warmth organisations
Integration of existing processes within and between those organisations working to achieve Affordable Warmth is advised. This is particularly important for referrals: existing processes must be extended so that once a referral is made from one organisation to the next, the second organisation reports its results to the first, thereby completing the circle.

21. Include external organisations in the referral processes
Many people who go through an inflection point in their lives contact various organisations for help in understanding their benefits and applying for new ones, or to get medical or legal advice. These social workers, welfare benefit officers, health providers, Citizens Advice Bureaux and other support organisations should be provided with the means to make real-time referrals to Affordable Warmth advisors.

22. Capture data from external organisations to identify those who have hit an inflection point
It is possible proactively to identify a person who has just reached an inflection point, for example someone who has just begun to collect Job Seekers Allowance or their pension. Their data could be sent directly to Affordable Warmth organisations or Sustainable Glasgow, and combined with additional existing data (for example housing conditions in individual's area). If the resulting report shows that they live in highly inefficient homes, they could be targeted with the appropriate energy literacy solution.

23. Partnering of utility companies with Affordable Warmth organisations
There is also potential for utility companies to join forces with the organisations already providing energy advice. Since the utilities typically write off several millions in uncollectable debt every year, it is in their interests to help address the problem.

24. Use of a common case management tool across all groups providing assistance
A common "case management" tool used across organisations to support automation of referrals can be of great use to energy advisors needed in the home. Groups participating in the Glasgow Advice and Information Network (GAIN) currently use such a common tool, and many of these groups also participate in aid for Affordable Warmth.

25. Physically advertise the energy advice visits
Before and during personal visits to an area, appropriate notices should be put up, advising that local help will be available – with the relevant details and contact information.

26. Both executives and mid-level managers from the utility companies should attend some of the community advisors' in-home visits
This is an excellent opportunity for those policy-makers to educate advisors on guidelines and procedures and in turn understand from them and their customers what kind of support is needed from the utilities. Both G-HEAT and GHA have said they would welcome the exchange and are keen to see an ongoing, bi-directional educational process.

27. Simplifying the process of assistance in the home with mobile devices
Energy advisors should be armed with a mobile device such as a tablet so that they can enter data directly and efficiently via an electronic form into a software application. The device would also allow the advisor to show residents how to access available online help, if they need to view instructions on setting a thermostat or reading a meter.

28. Engage community meter readers
Community meter readers are trained to read meters in Glasgow's communities, submit readings to the utilities on behalf of residents, and prevent people from getting into trouble through consistently underestimated bills. One benefit is that the data can be passed on to the council to help calculate the true cost of Affordable Warmth and target resources more effectively. These positions could be paid or voluntary. In an effort to establish trust, meter readers should revisit the same communities and become familiar faces in the area. Trusted people who already make visits, such as carers, could help here.

29. Engage a social networking subject matter expert
This specialist can gather white papers, research good practices, and post or request data on various sites with a common interest in Affordable Warmth. They can engage the community by sharing hints and tips via social media, such as creating a Facebook page for Sustainable Glasgow and Affordable Warmth which will further encourage community participation and the sharing of good ideas.

30. Ask citizens who have received helpful assistance to post a short message in a local store or community centre
During a number of discussions in this challenge, it became clear that there is no substitute for word of mouth when communicating the successes of energy assistance. Word of mouth builds up community and a network of trusted advisors.

31. Install environmental sensors
Sensors can be deployed in the homes of older people; if low temperatures are detected for a certain period of time and there is risk to health, an alert can be sent to a nominated individual or organisation enabling them to react appropriately.

32. Measure prevention, not treatment
As Glasgow gains knowledge and maturity in its efforts to achieve Affordable Warmth, it will be possible to measure the success of preventative action, preventing citizens from falling into Fuel Poverty in the first place.

33. Introducing predictive analytics tools to Sustainable Glasgow
Sustainable Glasgow can capitalise on existing unstructured data, free-form notes made by energy advisors during their home visits and calls from those in need of Affordable Warmth. Having collected data from the community, Sustainable Glasgow can use predictive analysis tools to examine near real-time and historic, structured and unstructured data. Unlike traditional statistical analysis, these tools do not require the user to know exactly for what they are searching and can be used to spot data trends.

These can then predict when an individual or community is likely to hit an inflection point and fall into Fuel Poverty, leading to better targeted intervention: citizens can be prevented from falling into Fuel Poverty by moving them on to a different tariff, dispatching an energy advisor to help them, or by adding the relevant environmental sensors to their homes, improving their home insulation and so on.

34. Prepare for expected inflection points
If a specific change such as a rise in fuel price is anticipated, the city could match information available on those areas with incomes near the poverty line and estimate the speed at which a specific change in price would affect that group of people. Those locations most rapidly affected could be further analysed, perhaps through energy efficiency ratings, to identify those most likely to benefit from an energy advisor's help. Data on city dynamics is of particular importance in this situation.

35. Treat data as a city-wide asset (stewardship and roles)
Data should be considered a city asset and managed just as any other city asset with ownership, metrics and policy around it.

36. Publish performance metrics and accountability
Current key performance indicators (KPIs) should be reviewed and new ones developed to support Affordable Warmth and energy literacy targets. The city should share and publish these to demonstrate progress and encourage participation to drive down emissions and increase Affordable Warmth.

Place

37. Capture private sector data (rented or owner-occupied properties) to enable suitable advice and targeted intervention
Action needs to be taken to understand the hidden problem of Fuel Poverty in the private sector and its specific inflection points so as to create some new types of advice and interventions that are effective within this sector. Exploring existing data could be valuable along with targeting new data collection either through campaigns or by simply asking people for the relevant information in order to gain an accurate understanding of this hidden issue.

38. Open data-sharing: create a city-wide platform
Create a city-wide platform to enable information to be shared across sectors quickly, professionally, in fine detail and with appropriate metadata to enable intelligent linking and rapid search.

39. Better data resolution and timeliness
Move from using only historical data to gathering data for at-risk groups by postcode, and with people's explicit permission at a household level. In addition, a "city laboratory" district fitting real-time sensors for house temperature and energy consumption will reveal important information to tackle the problem of Fuel Poverty throughout the city.

40. Crowd-sourcing data
The task of gathering consumption data can be outsourced to the community in Glasgow. Enlist the suggested "Affordable Warmth champion" to promote the use of the "Glasgow Energy app" (already developed) which can record key consumption data and post it immediately on to a map. To those without the necessary technology, forms can be included with regular council tax reminders. There could also be a volunteer campaign where students offer their services to collect this data on a previously unseen scale.

41. Narrative text processing
Begin to understand the place that is Glasgow, by exploring patterns in the various forms of data it has access to, using advanced tools to spot trends, challenges and opportunities.

42. SAP app
Energy efficiency rating data is needed for private housing stock – the process is a tick-box approach. People could be trained and data could be collected at community level using a smartphone app.

43. Revealing the improvement potential for housing stock
During the Smarter Cities Challenge, the IBM team used a sample dataset of 2,000 properties to illustrate what is possible. This work could be extended to 20,000 houses for which Glasgow has data today, and a campaign to fill in the data gaps could be established. A return on investment model for this data would be a useful step forward. Getting this data in the hands of local advisors could also be very useful to enable them to target their efforts, especially during summer months when immediate demand is less intense.

44. Use predictive analysis to understand which areas are getting better and which are getting worse
Glasgow City Council is already using mapping techniques to determine and show which city areas are in flux. This will enable the city to focus its efforts and resources where they are needed most, in tackling Affordable Warmth.

45. Using social networking tools such as YouTube and Linked.In to distribute data about place
Much of the insights the city has is hidden in reports, on paper maps and in the heads of a few people. With appropriate governance, social media channels including YouTube and LinkedIn need to be opened up for city workers to use. There is a revolution going on with cities using such forums extensively – except in their own city departments. Careful management can unlock the potential of these tools to the city's advantage, creating a "digital" place that allows the physical place to run much better.

46. An initiative to address "Hard to Treat" properties
Glasgow's pre-1919 red sandstone properties are difficult and costly to make energy efficient. Local academia and research organisations should be invited to participate in a challenge to find an economic solution to insulating these properties. This could be sponsored, particularly with the assistance of the energy companies. Once the solution is clear, local people can develop the skills to put it in place.

47. New housing for those aged 65+ who remain single and independent, but are currently in inefficient housing
Rather than staying put and getting caught in Fuel Poverty because of a lack of disposable funds, there needs to be an attractive option open for pensioners to move to suitable places in their local community.

48. Urban information engineering – creating expertise in Glasgow on Glasgow data
A partnership between universities and the city to tackle Fuel Poverty could combine the insights of the council with the expertise and processing power of local universities. This association would link social, economic and environmental topics with engineering and entrepreneurship to create a cross-disciplinary approach to understanding the data around Fuel Poverty and Affordable Warmth. Sustainable Glasgow could be the governor of such a topic.

49. Implement simple-to-understand building sensors – ambient orbs and glowing plugs.
People can be shown how much energy they are using in real time via a simple light that glows red when energy usage is intense and green when it is minimal. This could be monitored at household or socket level.

50. Create an app to show when meters are either broken, inaccessible, or unread for a long time
A vital part of the strategy to eradicate Fuel Poverty by giving everyone access to Affordable Warmth must be to avoid reliance on the individual consumer to manage their own energy consumption. Alerts should be set in place to warn of unusual behaviour, such as failure to log meter readings.

51. Making use of Glasgow's assets to drive toward Affordable Warmth
As an established innovator and leader, Glasgow should draw on its rich assets to take its message to the broadest possible audience, from using its world-class conference centre to host key events, to forging strategic links with local universities, thereby harnessing the latest techniques in knowledge gathering and collaboration, as well as advanced computing resources.

52. Use GPS to track vehicle movements of energy advisors
Satellite-based global positioning systems can be used to track those areas visited most by energy advisors, and to demonstrate visually to Glaswegians that their areas are actively being helped.

Policy

53. Agree Pre-Payment Meters have lowest available Tariff
Issuing, say, a 5 percent discount could encourage more customers to request a direct debit pre-payment as a way to manage a growing monthly cost. It is in the utilities' interests to promote such schemes, as they improve their own cash flow.

54. New meters to be installed only in accessible places
To help customers to read their meters and increase their chance to participate in the energy literacy activities, utility companies need to be responsible and accountable for the appropriate installation of meters (to be accessible to everyone, including those with mobility problems).

55. Utilities to share consumption data with local authorities
Quantification of Fuel Poverty would greatly benefit from the ability to analyse energy and gas consumption data, which in turn requires that access rights to such data are awarded to the local authority.

56. Lobby for Energy efficiency standards to be applied to private landlords
It is recommended that Glasgow City Council should enforce landlord registration, introducing the same minimum standard for energy efficiency across the board. Standard requirements can be raised gradually if required.

57. Enforcement of smart meters targets (by 2015)
Even though national targets exist to implement smart meters by 2015, no policy motivation exists to enforce energy/gas companies to act upon this directive. The recommendation is therefore to push for enhanced policy that not only provides the target but also specifies the utility's obligations and responsibilities more clearly.

58. Cap on the number of tariffs
The tariff environment is very complicated not only because it is hard to compare tariffs between different companies but also because there are so many of them. Tariff simplification should be the aim, with a limit to the number of tariffs utilities are allowed to have.

59. Enforce a minimum period of two years before consumers can be asked by a utility to move to a new tariff
As in the telecommunication industry, there should be a contractual obligation for utility companies to fix a customer's tariff for a specific period (two years seems reasonable).

60. "Safe" level of heating introduced to all social housing properties
Social housing associations should be required to provide heating in the event of extremely cold weather (at a temperature level to be determined) to those affected by Fuel Poverty.

Appendix 2

Proposed roadmap

To translate the list of recommendations into a possible roadmap, items have been arranged according to three colour codes:

- **Green** – Items which Glasgow City can progress within its direct sphere of influence
- **Blue** – Items which Glasgow and willing partners can achieve through collaboration
- **Red** – Items which are controlled beyond Glasgow, whose implementation is influenced by others.

We recommend this initial roadmap as a starting point to develop a plan of action involving all the relevant parties

	Start Now 2011	Short Term 2012-2013	Medium Term 2014-2016	
People	1 Adopt Affordable Warmth, rather than reduce fuel poverty 2 Appoint Affordable Warmth Champion 3 Create city-scale energy literacy 5 Segment Community Data 6 Silver Surfers" Energy sessions 7 Community Warmth Centres 15 Scottish Opera amplification	4 Deliver energy education through multiple channels 8 Deliver ward-level Affordable Warmth data to local politicians 9 Ensure private landlords and tenants know rights and responsibilities 12 Create predictive bill app	10 Energy companies share inflection point information 11 SMS service to warn of high consumption 13 Capture hard to read meters wirelessly 14 Uni team design energy monitor	• Advanced case management and enterprise-wide workflow
Process	16 Sustainable Glasgow – brand it 18 Collaborate quarterly 19 Share good-practices real-time 20 Integrate assistance processes 25 Physically advertise site visits 28 Community Meter readers 29 Engage social network SME 30 Citizen postings of assistance	21 Include external orgs in referral process 22 Capture external data 24 Use common case mgmt tool 52 Equip advisors with mobile devices 27 Assist with mobile devices 32 Measure prevention, not treatment 33 Use Predictive analytic tools	17 Implement a maturity process 23 Partner utilities & Affordable Warmth orgs 26 Utility execs go on in-home visits 34 Have roadmap for inflection actions 35 Treat data as a city-wide asset (stewardship and roles) 36 Publish performance metrics and accountability	31 Install environmental sensors 41 Analytics of narrative data
Place	37 Capture Private Sector Data 45 Use YouTube and LinkedIn 42 Create a SAP energy app 39 Better resolution data 49 Implement simple building sensors - glowing plugs	38 Create city open data platform 43 Reveal city-wide improvement potential 44 Predict trends in fuel poverty 50 Develop app to highlight unread meters	40 Develop use of Crowdsourcing data 46 Initiative for hard to heat homes with Universities 48 Develop Urban Information expertise with Universities 51 Use Glasgow Assets to drive Affordable Warmth	47 New era efficient lifestage housing for 65+
Policy	38 New avenues to collect more data	53 Pre-payment meters have lowest Tariff 54 New meters be installed only in accessible places 55 Utilities to share consumption data with local authorities	60 "Safe" level of heating introduced to all Social Housing properties	56 Lobby for energy efficiency standards to be applied to private landlords 57 Enforcement of smart meters by 2015 58 Cap on the number of tariffs allowed 59 Require a minimum of 2 yrs before user can be forced to a new tariff by utility

■ Glasgow can implement ■ Sustainable Glasgow and willing partners ■ Need to influence others

Figure 10
Affordable Warmth Transformation Roadmap

Appendix 3

IBM Smarter Cities – Sustainable Glasgow

Presentation event on findings from Fuel Poverty study

Speech by Bailie Cameron,
Executive Member, Development and Regeneration Services, Glasgow City Council

"Glasgow's Fuel Poverty Strategy in 2005 adopted the UK and Scottish target of eliminating Fuel Poverty as far as reasonably practicable by 2016. Based on information from the Scottish House Condition Survey 2007/09 and projecting forward, it is estimated that around 95,000 householders in Glasgow are currently in Fuel Poverty.

"Energy prices have been the main driver of increases in Fuel Poverty, outstripping income growth and improvements to the thermal efficiency of the housing stock. Though prices dipped after peaking in late 2008, they have now started to rise again. The recently announced price increases will have a significant impact on levels of Fuel Poverty. It is estimated that for every one percent increase in energy costs, a further 1,000 households in the city will be driven into Fuel Poverty.

"Median household income in Glasgow is also low and it is likely that the dramatic rises in energy costs will have a disproportionate effect on the city. So, despite the fact that the city has the most energy-efficient housing stock in Scotland, the proportion of fuel poor in the Glasgow will probably be similar to that of Scotland as a whole, equating to around 33 percent of households, with around 20 percent of this group in extreme Fuel Poverty, that is those people who have to spend more than 20 percent of their household income on fuel. The impact of slow economic growth on employment coupled with increasing energy costs make the 2016 target a considerable challenge.

"Glasgow's Fuel Poverty Strategy identified advice and information as being a key means of mitigating Fuel Poverty, and reducing its impact on vulnerable households. In March 2010 the city Council launched a Fuel Poverty Advice Team in partnership with the Scottish Federation of Housing Associations, the Glasgow and West of Scotland Federation of Housing Associations, the Glasgow Advice and Information Network, and the Wise Group, who are our delivery partners. The team has been branded as G-HEAT (Glasgow Home Energy Advice Team). Funding was obtained from a number of sources including the Fairer Scotland Fund, Scottish Power Energy People's Trust and the Scottish Government's Wider Action Fund. The team aims to deliver face to face advice in the home to vulnerable households in the city.

"The Standard Assessment Procedure or SAP is the Government's recommended system for the energy rating of dwellings. Since 2002 the energy efficiency of Glasgow's housing stock has improved at a much quicker rate than that of Scotland as a whole. From a common value of 60 in 2002, Glasgow's mean rose to 71 in 2008, while the Scottish mean only increased to 63. The 2007-09 Scottish House Condition Survey indicated that 85 percent of the social housing sector and 76 percent of the private sector in this group in Glasgow are rated in the band (60–100).

"This gives an idea of the scale of the specific problem facing Glasgow and indeed the task that has faced IBM."

Appendix 4

Historical background to Glasgow policy on Fuel Poverty

Fuel poverty was first described in 1988 by Dr Brenda Boardman. In 1990, to promote energy efficiency in response to growing Fuel Poverty, Glasgow City Council developed a policy planning framework, known as Glasgow Action for Warm Homes. The policy set out an affordable fuel cost concept as "a target of 10 percent of net disposable income, based on benefit levels, which should be the maximum total household expenditure on all fuels". Furthermore, in 1995 a Glasgow Energy feasibility study was concluded and the Home Energy Conservation Act (HECA) was implemented by Glasgow City Council. This focused on enablement of schemes and partnership arrangements to maximise the savings and associated benefits for city residents.

However, with growing energy prices, the Fuel Poverty problem became one of five key national housing priorities and resulted in the introduction of national and local directives including the UK Fuel Poverty Statement in 2001 and Scottish Fuel Poverty Statement in 2002 (http://www.scotland.gov.uk/Resource/Doc/46951/0031675.pdf).

These documents define a fuel-poor household "as one which needs to spend more than 10 percent of its income (including Housing Benefit or Income Support for mortgage interest) on all fuel use and to heat its home to an adequate standard of warmth. This is generally defined as 21°C in the living room and 18°C in other occupied rooms." In addition, the Housing (Scotland) Act 2001 gave local authorities responsibility for alleviating Fuel Poverty by targeting strategies and resources that would have a direct impact on achieving HECA targets.

In summary, the policy on Fuel Poverty focused on three main issues: 1) low disposable household income (policy reserve of Westminster); 2) high price of domestic fuel (policy reserve of Westminster); and 3) poor energy efficiency in the home (policy devolved to Holyrood but with several directives coming from EU and UK levels).

Various commissioned studies and new directives led to a ballot of tenants in April 2002 which resulted in majority agreeing to the transfer of housing stock from Glasgow to the Glasgow Housing Association (GHA) and securing £1.5 billion of investment over a period of 10.5 years. The transfer was completed in March 2003. Strategy and objectives for improving the energy efficiency of its housing stock and dealing with Fuel Poverty were further defined by both Glasgow City Council in 2005 (through Glasgow's Fuel Poverty Strategy) (http://www.glasgow.gov.uk/NR/rdonlyres/1F04CE37-1992-4370-BBF6-E1BBE3378156/0/LHS_fuel.pdf) and GHA in 2006 (through Sustainability Strategy). Additionally the Glasgow Fuel Poverty Partnership declaration was signed in 2007 between key organisations from statutory and voluntary sectors, utilities and housing in order to achieve better outcomes in the fight to eliminate Fuel Poverty. Key partners included the Wise Group, the Scottish Federation of Housing Associations, West of Scotland Forum of Housing Associations, Glasgow City Council, the Scottish Government and the Scottish Power Energy People Trust. This partnership sought to improve communications between these organisations, and establish a regular Forum and a review of the Fuel Poverty action plan "to eliminate Fuel Poverty as far as is reasonably practicable by 2016" (adopted from UK and Scottish targets). In addition, on 31 October 2008, Glasgow City Council's Executive Committee agreed a report proposing to establish a Fuel Poverty Advice Team (http://www.glasgow.gov.uk/NR/rdonlyres/7BF55442-C0D1-41A5-A5E0-A813B0E117B3/0/FuelPovertyreportoct08.pdf) for the city. On 18 March 2010, Glasgow launched its Home Energy Advice Team – G-HEAT (http://www.g-heat.org.uk) – to provide advice and support on energy-related issues to the city's fuel-poor households, in their homes.

Appendix 5

Background information on surveys and data currently quantifying changes in the Fuel Poverty level

The data used by interested parties, and by IBM in this report, comes from a variety of established sources.

As its name suggests, the National Employment Strategy provides employment statistics while the National Sustainable Strategy on energy efficient houses concentrates on environmental targets and challenges. In addition, national regulations related to the energy market and renewable energy targets address aspects of energy provisioning.

In order to quantify the Fuel Poverty-related activities and provide measurable results of the actions taken to address Fuel Poverty, the Scottish Government has instituted various surveys and indicators. These include the Scottish Social Surveys, Scottish Index of Multiple Deprivation (SIMD), Scottish House Condition Survey (SHCS), and the Scottish Household Survey (SHS).

Additional data relating to housing conditions (such as dampness or condensation) comes from the Scottish Housing Quality Standard (derived from SHCS), and from the Energy Performance Certificate which provides information on Standard Assessment Procedure Rating, often called EER (Energy Efficiency Rating). Links to these data collection tools and sources are listed right.

The Scottish Social Surveys (SSS)
http://www.radstats.org.uk/no097/Gayleetal97.pdf

Scottish Index of Multiple Deprivation
http://www.scotland.gov.uk/Topics/Statistics/SIMD

Scottish House Condition Survey (SHCS)
http://www.scotland.gov.uk/Topics/Statistics/SHCS/shcsdatadevelopment

The Scottish Household Survey (SHS)
http://www.scotland.gov.uk/Topics/Statistics/16002

The Scottish Housing Quality Standard (SHQS)
http://www.scotland.gov.uk/Topics/Statistics/Browse/Housing-Regeneration/TrendDampness

The Energy Performance Certificates (EPC)
http://www.energyperformancecertificatesscotland.co.uk/epc-glasgow-dea.htm

Appendix 6

List of stakeholders who participated in the Fuel Poverty engagement

Organisation	Name	About
Energy Action Scotland	Norman Kerr Barbara Atterson	Energy Action Scotland (EAS) campaigns for an end to Fuel Poverty in Scotland and is the only national body with this sole remit. EAS seeks to develop and promote effective solutions to the problems of homes that are cold, damp and expensive to heat.
Glasgow Centre for Population Health	Russell Jones	The Glasgow Centre for Population Health (GCPH) was established in 2004 as a resource to generate insight and evidence, to create new solutions and provide leadership for action to improve health and tackle inequality. GCPH is a partnership between NHS Greater Glasgow and Clyde, Glasgow City Council, and the University of Glasgow, funded by the Scottish Government.
Citizens Advice Bureau	Gwynneth James	The Scottish Citizens Advice Bureau (CAB) Service is made up of: • Citizens Advice Scotland (CAS) – a national umbrella body that provides essential services to Scottish Citizens Advice Bureaux; • Citizens Advice Bureaux – independent, local charities that are members of Citizens Advice Scotland. Bureaux provide advice and information to people in need in more than 200 locations. The Citizens Advice service aims: • To provide the advice people need for the problems they face; • To improve the policies and practices that affect peoples' lives.
Scottish Power	Ann Loughrey Head of External Business and Company Secretary of Scottish Power Energy Peoples Trust.	Energy Utility http://www.energypeopletrust.com/content/
SSE (Scottish and Southern Energy)	Annette Sloan Manager, Vulnerable Customers Support Team Frances Muller Head of Priority Services	Energy Utility
Poverty Alliance	Peter Kelly	The Poverty Alliance acts as the national anti-poverty network in Scotland, working with voluntary organisations, policy-makers and politicians at Scottish, UK and European levels.
Glasgow City Council (GCC) – Corporate Policy	Duncan Booker Corporate Policy – Health	
GCC – GAIN	Alasdair Watt Financial Inclusion Team – GAIN Manager	GAIN (Glasgow Advice and Information Network) is a network of agencies that provide free, confidential and impartial debt advice. GAIN includes voluntary agencies, Citizens Advice Bureaux, legal, housing and independent money advice agencies.
Alembic Research	Bill Sheldrick	Independent consultant specialising in energy efficiency and Fuel Poverty. A Trustee of Scottish Power's Energy People Trust.
Thenew Housing Association	Mairi-Claire Rafferty	Thenew Housing Association is one of the larger housing associations in Glasgow with more than 3,000 homes under management.
G-HEAT	Graeme Mullin Project Manager	G-HEAT is the Glasgow Home Energy Advice Team, established to provide face to face advice to vulnerable households in Glasgow on energy-related issues.
Energy Saving Trust	Mark McArthur and Janet Robertson	The Energy Saving Trust is a non-profit organisation that provides free and impartial advice on how to reduce energy consumption.
GCC – Development and Regeneration Services	Paola Pasino Architect	
GCC – Sustainable Development	Geoff Duke Project Manager, Sustainable Glasgow	Sustainable Glasgow is a city-wide partnership to make Glasgow one of the most livable in and sustainable cities in Europe. It brings together partners from the public and private sectors to work with citizens, communities and businesses. The City is committed to reducing its carbon emissions by 30 percent within 10 years and building a greener and more sustainable future for Glaswegians.
Scottish Enterprise	Terry Hogg	Scottish Enterprise's function is to identify and exploit opportunities for economic growth by supporting Scottish companies to compete and build globally competitive sectors, attract new investment and create a world-class business environment.
Glasgow Housing Association	David Fletcher Assistant Director of Regeneration	GHA is the largest Housing Association in Glasgow, formed in 2003 following a transfer of Glasgow City Council's housing stock after a ballot of tenants.
Glasgow Housing Association	Maureen Mulvey Energy Manager	As above
Glasgow Housing Association	Alex McGuire Executive Director of Development & Regeneration	As above
Shettleston Housing Association	Chris Cunningham Director	Shettleston Housing Association owns and manages affordable homes in the communities of Shettleston, Springboig and South Greenfield.

Organisation	Name	About
The Wise Group	Brian Canning Head of programme delivery	The Wise Group is a social enterprise with a reputation built since 1983 on devising and managing efficient, innovative and flexible ways into work.
GCC – Development and Regeneration Services	Jamie Arnott Principal Officer	Responsible for analysis of data relating to employment and deprivation in Glasgow.
GCC – Development and Regeneration Services	Bill Brown Principal Officer	Staff member of Housing Services Division of DRS within the housing strategy section, deals specifically with issues relating to energy efficiency and Fuel Poverty.
GCC – Development and Regeneration Services	Bill Potts City Plan Project Manager	The City Plan is a statutory plan that the Council produces every five years. It provides the planning framework for all development in the city.
GCC – Development and Regeneration Services	Gerry Gormal Executive Director of Development and Regeneration Services	Executive Director of Development and Regeneration Services which brings together a wide range of staff, finance and other resources, to drive forward Glasgow's ongoing renewal. There are seven Core Service areas: • Building Control and Public Safety • Economic and Social Initiatives • Housing Investment • Planning Services • Project Management and Design • Property • Transport and Environment
Glasgow City Council	Councillor Gordon Matheson Leader of Glasgow City Council	Leader of Glasgow City Council.
Glasgow City Council	Bailie Elizabeth Cameron Executive Member for Development and Regeneration Services	Deputy Lord Provost, Glasgow City Council.
Scottish Government	Stephen Garland Unit Head, Sustainability and Strategy	The unit responsible for delivering the Scottish Government's main programmes designed to alleviate Fuel Poverty
Scottish Government	Archie Stoddard Unit Head, Implementation and Delivery	The unit responsible for delivering the Scottish Government's main programmes designed to alleviate Fuel Poverty
Scottish Government	David Cormack Scottish House Condition Survey	Responsible for the Scottish House Condition Survey and carries out much of the analysis relating to energy efficiency and Fuel Poverty.

Appendix 7

Acknowledgements

In addition to the stakeholders listed in Appendix 6, many others made valuable contributions to the understanding of this complex subject and informed our thinking throughout. Apologies if we have missed anyone.

Thanks to all for your assistance.

Name	Organisation
Alasdair Watt	Glasgow City Council
Alex McGuire	Glasgow Housing Association
Amanda Waugh	Glasgow City Council
Andrew Sime	IBM UK
Andrew Tweedie	East Renfrewshire Council
Ann Loughrey	Scottish Power
Anna Topol	IBM USA
Annette Sloan	Scottish and Southern Energy
Archie Stoddart	Scottish Government
Bailie Liz Cameron	Glasgow City Council
Barbara Atterson	Energy Action Scotland
Barbara Cheyne	Scottish Power
Beth Reilly	Thenew Housing Association
Bill Brown	Glasgow City Council
Bill Potts	Glasgow City Council
Bill Sheldrick	Alembic Research
Brenda Boardman	Oxford University
Brian Canning	The Wise Group
Carol Gilbert	SPT/Sustainable Glasgow
Cathy Johnston	Glasgow City Council
Celia Moore	IBM UK
Chris Cunningham	Shettleston Housing Association
Christopher Holmes	Action for Children

Name	Organisation
Councillor Elaine McDougall	Glasgow City Council
Councillor George Redmond	Glasgow City Council
Councillor Gordon Matheson	Glasgow City Council
Councillor Martha Wardrop	Glasgow City Council
Councillor Ruth Simpson	Glasgow City Council
Councillor Stuart Clay	Glasgow City Council
David Cormack	Scottish Government
David Fletcher	Glasgow Housing Association
David Forbes	Sustainable Glasgow/SSE
David MacLeod	Dram Communications
David Ogilvie	Scottish Federation of Housing Associations
David Ross	Dram Communications
Debbie McColl	Glasgow City Council
Derek Casey	Commonwealth Games Bid, Director
Don MacMahon	Glasgow City Council
Douglas McGarrie	IBM UK
Duncan Booker	Glasgow City Council
Dusan Magula	IBM SPSS
Eddie Folan	Poverty Alliance
Edward Kelly	Sustainable Glasgow/Scottish Power
Evelina McCafferty	Glasgow Housing Association
Evelyn Milligan	The Wise Group
Fotini Stamou	IBM SPSS
Frances Muller	Scottish and Southern Energy
Gary Clark	West Dunbartonshire Council
Gary Kildare	IBM UK
Gavin Jones	IBM UK
Geoff Duke	Sustainable Glasgow
George Kirk	Scottish Power/Sustainable Glasgow
Gerry Gormal	Glasgow City Council
Gil Morgan	Glasgow City Council

Name	Organisation
Graeme McKay	IBM Canada
Graeme Mullin	G-HEAT
Grant Carson	Glasgow Centre for Inclusive Living
Gregor Whyte	Sustainable Glasgow/SPT
Gwynneth James	Citizens Advice Bureau
Iain Marley	City of Glasgow College/Sustainable Glasgow
Iain Stewart	IBM UK
Ian Abbott-Donnelly	IBM UK
Ian Murray	South Lanarkshire Council
Ian Pulford	BT/Sustainable Glasgow
James Forest	The Wise Group
Jamie Arnott	Glasgow City Council
Janet Robertson	The Wise Group
Jim McKay	IBM UK
Jim Whyte	Scottish Power
John Dickie	Child Poverty Action Group
John McConnel	The Wise Group
Kal Osmani	IBM UK
Katie McMillan	Scottish Enterprise
Kirsty Sinclair	Snook
Linda O'Donoghue	IBM UK
Lisa Burrett	East Renfrewshire Council
Mairi Claire Rafferty	The New Housing Association
Manju Marwaha	Glasgow City Council
Marie Ward	SSE/Sustainable Glasgow
Mariella Macleod	Dickory Dock
Mark McArthur	Energy Saving Trust
Mark Wakefield	IBM UK
Maureen Mulvey	Glasgow Housing Association
Michael Donnelly	Glasgow City Council
Michael Kay	iSLI

Name	Organisation
Mrs Bishop	Pollok Resident
Norman Kerr	Energy Saving Trust
Oliver Hastie	IBM SPSS
Pamela Rennie	Renfrewshire Council
Paola Pasino	Glasgow City Council
Patrick Flynn	Glasgow City Council
Paul Tincknell	IBM UK
Pauline Redmond	Glasgow City Council
Prof Graeme Burt	University of Strathclyde
Raymond Boyd	East Dunbartonshire Council
Richard Bellingham	University of Strathclyde/Sustainable Glasgow
Ronald Mould	Renfrewshire Council
Ronnie Melrose	IBM UK
Rose Chard	Edinburgh University
Russell Jones	Glasgow Centre for Population Health
Sandra McDermott	IBM UK
Sandy Gillon	Glasgow City Council
Sarah Lloyd-Williams	IBM UK
Sharon Moore	IBM UK
Sheena Glass	Glasgow Old Peoples Welfare Association
Sheila Brown	Glasgow City Council
Sonia Domingues	Glasgow City Council
Stephen Garland	Scottish Government
Stephen Leonard	IBM UK
Steve Hosey	Glasgow City Council
Susan Sanchez	IBM USA
Terry Hogg	Scottish Enterprise/Sustainable Glasgow
Tommy Gorman	McMillan Cancer Trust
Tommy McDonald	Glasgow City Council
Victoria Kelly	Glasgow City Council
William Marshall	Glasgow Housing Association

Appendix 8

Abbreviations/Definitions

CAB – Citizens Advice Bureau – helps people resolve their legal, money and other problems by providing free, independent and confidential advice.

CACI – a leading provider for Marketing and Information solutions in the United Kingdom.

CENSUS – a count of the population. Taken in UK every 10 years helping census users decide how best to plan and deliver everyday services such as housing, education, healthcare and transport.

CERT – the Carbon Emissions Reduction Target (April 2008 – March 2011) is the third three-year phase of an energy supplier obligation in the UK. It requires all domestic energy suppliers with a customer base in excess of 50,000 to make savings in the amount of CO_2 emitted by householders.

CESP – the Community Energy Saving Programme has been created as part of the Government's Home Energy Saving Programme. It requires gas and electricity suppliers and electricity generators to deliver energy-saving measures to domestic consumers in specific low income areas of Great Britain.

COSLA – the Convention of Scottish Local Authorities – is the representative association of Scottish local government and is the employers' association for all Scottish councils. It is the equivalent in Scotland of the Local Government Association in England & Wales.

EER – Energy Efficiency Rating – often called a SAP or Standard Assessment Procedure Rating. This rating will range from 1 – 100, with 100 being the most efficient. The property will be placed in a banding from A – G depending on its EIR ratings.

EIR – the Environmental Impact Rating – likely level of Carbon Dioxide emissions (derived from EER/SAP).

DRS – Development and Regeneration Services – an organisation with Glasgow City Council.

EPC – Energy Performance Certificate – a result of European Union Directive 2002/91/EC relating to the energy performance of buildings, as transposed into British law by the Housing Act 2004 and The Energy Performance of Buildings (Certificates and Inspections) (England and Wales) Regulations 2007. Affecting three+ bedroom homes from 10 September 2007. Rental properties, with a new tenancy commencing on or after 1 October 2008 require a certificate valid for 10 years.

ESSAC – Energy Savings Scotland Advice Centre – network funded by the Scottish Government and managed by the Energy Saving Trust, giving free, impartial advice on energy efficiency to householders, community groups, businesses and the public sector.

EST – the Energy Saving Trust – a non-profit organisation that provides free and impartial advice on how to save energy.

GCPH – Glasgow Centre for Population Health – established in 2004 as a resource to generate insights and evidence, to create new solutions and provide leadership for action to improve health and tackle inequality in Glasgow.

G-HEAT – Glasgow Home Energy Advice Team – provides advice and support on energy-related issues to the city's fuel impoverished households in their homes. Established by Glasgow City Council through the city's Fuel Poverty Partnership, the team provides householders with advice on all energy-related matters and is able to refer them on to partner agencies that can provide specialist advice on a wide range of financial issues. Key partners include the Wise Group, the Scottish Federation of Housing Associations and the West of Scotland Forum of Housing Associations, with funding coming from the Glasgow City Council, the Scottish Government and Scottish Power Energy People Trust.

HEED – Home Energy Efficiency Database

SAP – a Standard Assessment Procedure Rating – often called EER (Energy Efficiency Rating) will range from 1 – 100 with 100 being the most efficient. Properties will be placed in bands from A – G depending on their SAP and EIR ratings.

SG – Sustainable Glasgow – consisting of the following members: City Council, University of Strathclyde, Public Transport, Glasgow Housing Association, National Health Services, Central College Glasgow, Scottish Enterprise, Scottish Water, IBM, Scottish Power, Scottish-Southern Energy, British Telecom, Honeywell International.

SHCS – Scottish House Condition Survey

SIMD – Scottish Index of Multiple Deprivation

SSE – Scottish-Southern Energy

WISE – The Wise Group – a social enterprise (since 1983) aiming to devise and manage efficient, innovative and flexible ways back to work. Wise focuses on increasing job and training opportunities for people, contributes to the regeneration of communities, and helps to create a fairer and greener society.

Aberdeen
Montrose
Arbroath
Perth
Dundee
Carnoustie
Broughty Ferry
Newport
Cupar
INCHCAPE OR
BELL ROCK
St. Andrews
Auchterarder
Callander
Dunblane
Kinross
Stirling
Auchtermuchty
FIFE NESS
STIRLING
Helensburgh
Greenock
Dunoon
Dumbarton
Dunfermline
Alloa
Buckhaven
Kirkcaldy
Cowdenbeath
Falkirk
North Berwick
Haddington
GLASGOW
Paisley
Rothesay
Skipness
Largs
Millport
Bowmore
GIGHA
ISLAND
Port Ellen
East
Kilbride
Coatbridge
Bathgate
Edinburgh
Stewarton
Saltcoats
Motherwell
Hamilton
Irvine
Kilmarnock
Galston
Lanark
Brodick
KINTYRE
Campbeltown
RRAN
Prestwick
Troon
Ayr
Cumnock
Peebles
Firth of Clyde
SANDA ISLAND
AILSA CRAIG
Girvan
Maybole
RATHLIN
ISLAND
GIANT'S
CAUSEWAY
FAIR
HEAD
MULL OF
KINTYRE
Portrush
Portstewart
Ballycastle
Coleraine
Limavady
Londonderry
Ballymoney
LONDONDERRY
683
Strabane
Sawel Mtn.
Ballymena
MOUNTAINS OF ANTRIM
North Channel
MILLEUR POINT
Larne
Cookstown
Antrim
Newtownabbey
Stranraer
Carrickfergus
TYRONE
Dungannon
Belfast
Bangor
Donaghadee
Portadown
Armagh
Lurgan
Lisburn
Newtownards

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2 Scottish Fuel Poverty Statement http://scotland.gov.uk/Publications/2002/08/15258/9959

3 https://picasaweb.google.com/ianad123/SuggestionCards?authkey=Gv1sRgCLGIvMaV7ajnbA

4 http://www.turningpointprogram.org/toolkit/content/health.htm#ObesityandPhysicalInactivity

5 http://www.scotland.gov.uk/Publications/2010/11/23125350/4

6 http://www.understandingglasgow.com/indicators/poverty/comparisons

7 http://www.scotland.gov.uk/About/scotPerforms/purposes/solidarity

8 http://www.scotland.gov.uk/Topics/Statistics/Browse/Social-Welfare/TrendIncIneq; data source: Department for Work and Pension's Family Resources Survey

9 http://www.understandingglasgow.com/indicators/poverty/comparisons/within_glasgow

10 http://www.glasgow.gov.uk/NR/rdonlyres/AE58F4B8-C0F8-4CB8-B75F-78063612808D/0/FuelPoverty08.pdf

11 http://www.glasgow.gov.uk/NR/rdonlyres/9629CE57-3177-496A-8B36-E9248082C934/0/FuelPovertyDRSComReportJan08.pdf

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IBM Corporate Citizenship & Corporate Affairs
1 New Orchard Road
Armonk
NY 10504

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