

Transforming Northern Ireland's Heating Systems: A Plan to Retrofit Dwellings



An Introduction to the Morris Report

**Professor Christine Liddell
University of Ulster**

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The Morris Report

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The finishing touches were made to the Morris Report a few months ago. The Report was commissioned by Bryson Energy, and the University of Ulster has been given the privilege of writing an introduction to it. One of many notable discoveries that can be made when reading the Report is just how quickly the domestic energy landscape changes in Northern Ireland. Since the ink dried on the Report, several quite radical reforms have taken place, including the Gas to the West initiative and the launch of the region's new Fuel Poverty Strategy (aptly named Affordable Warmth). As each new initiative comes on-stream, the entire Rubik cube of energy provision in Northern Ireland is reformulated. The Morris Report puts a stake in some rapidly changing sand, but it is a timely and potentially transformative Report.

Estimates and projections in the Report are sometimes based on data from 2012 or earlier – whatever year has the latest complete data. Some will quibble about exact amounts, and how they might have been differently calculated. That would serve only to detract from the Report's central message: to make all housing in Northern Ireland fit for people to live in comfortably and affordably is going to cost a great deal of money. We should not waste any of it unthinkingly, because people in Northern Ireland rate the value of living in a warm home very highly indeed.

About the author

Dr. Chris Morris recently retired from a post as Principal Statistician with Northern Ireland's Department for Social Development NI, which is the department responsible for housing strategies in general, and fuel poverty strategies in particular. As a consequence of many years of service in this domain, he is unusually well suited to providing a set of road maps that are embedded in local conditions. As his report makes clear, the local perspective is essential given the unique conditions which drive fuel poverty and poor housing in Northern Ireland; even *within* the region itself, variations in micro-climate, energy sources, housing and many other factors create within-region variations of great significance for realistic retrofitting models. Great Britain, in this context, really is another country, and the rest of Europe almost another continent.

His report provides a nuanced assessment of what the alternatives to the status quo are, and does not stint on treating these alternatives critically and without bias. As is often said in science "nothing is perfect in the real world". Trade-offs and compromises are always intrinsic to best-case scenarios, and a local statistician long in residence with a housing department is well suited to bring that message home to us.

1. Objective of the Morris Report

This report has a single broad objective:

"To address issues of fuel poverty through retrofit interventions to improve the quality of housing stock in Northern Ireland".

In this context, it is important to note that it focuses primarily on only one of the 4 classic contributors to fuel poverty which are:

- household *income*
- the *price of domestic energy sources*
- the *energy demand* of the residents of a home, including the length of time energy is routinely used in the home, and the indoor temperatures required
- the *energy efficiency of the dwelling* itself – it is here that the Morris report is situated.

Morris aims to produce a fully costed set of plans related to the benefits and implications of a mass retrofit program, which targets (in particular) upgrades of insulation and the replacement of old oil-fired heating systems - two areas of retrofit which generate the greatest risk of fuel poverty, and where the greatest impacts on energy efficiency can be found.

2. Anticipated areas of impact

The report aims to inform:

- housing and related policies in Northern Ireland
- forward planning and the economic implications of retrofitting housing throughout the region
- how housing regeneration can be most cost-effectively implemented in a program of mass retrofit and rejuvenation of the existing housing stock
- the public understanding of how fuel poverty can be ameliorated through investments in the fabric of their home.

3. Local context

The report provides a detailed plan for a region-wide retrofit of homes in Northern Ireland, underpinned by a multi-faceted rationale that focuses in particular on households in fuel poverty. It is the first costed retrofit plan ever to be published for Northern Ireland, and one which is fully embedded in the region's :

- climate, particularly its cold, cloudy and temperate nature
- type and energy efficiency of the region's housing stock
- existing energy infrastructure and relative access to different energy sources

- energy prices
- common lifestyles and energy choices.

What is evident from the report is the limited extent to which data from elsewhere in the UK can be relied on to inform decisions made in Northern Ireland. Fortunately too, what is also evident is the fact that we have sufficient local understanding, local expertise, and local data to be in a position to draw up an energy retrofit plan for the region of at least as much robustness as models available for neighbouring regions.

In drawing up a retrofit plan, Dr. Morris makes clear that much depends on the decisions taken with regard to:

- the amount of public funds that can be allocated to reform – models for implementation can only work outwards from this
- number and type of measures that will be deployed
- the standard or SAP score which the retrofit will aim to achieve
- whether those most in need are the only targets for retrofit and reform
- who should be allocated the greater investment

Some of these decisions are economic, some technological, and others are both human and societal. This makes the flow of decision-making from *regional problem* to *regional solution* one which requires a compendium of information. A focus on collating the evidence-base before planning a strategy will help ensure sound decision-making.

Much will depend on the earliest decisions. For example, will the principal consideration be to reduce carbon emissions? Here it must be noted that Northern Ireland can contribute relatively little to the European Union's targets, given the region's size and population; we are not a global player in that context. On the other hand, the principal consideration could be saving energy; the region has little readily accessible indigenous supply of energy, prices are rising inexorably, and Northern Ireland has one of the highest rates of fuel poverty in the industrialised world. If saving carbon and/or energy were to be the principal driver for a retrofit program, then joint responsibility for retrofit plans belong most obviously to the Departments of the Environment (DoE NI) and Enterprise, Trade and Investment (DETI); furthermore, the homes targeted first and with greatest intensity would be high to middle income households, using oil-fired central heating and burning solid fuels as a "weekend and holiday supplement", living in large detached and older properties. These households generate twice as much carbon as do fuel poor households.

By contrast, if human and societal wellbeing become the principal drivers, then retrofit plans might remain the primary domain of the Department for Social Development. This could prioritise the needs of vulnerable households, targeting those most in need of help first. In line with this approach, the Morris Report declares an early interest in focusing retrofits on *people*, and more particularly on *people in fuel poverty* - with a view to reducing (though not eradicating) fuel poverty. This decision is based on the premise that targeting investment and resources to those who need it most will produce the greatest civic benefit. It also makes plain that any retrofit plan, no matter how comprehensive, remains a solution that can only ease the problem, since fuel poverty is only partially caused by energy inefficient housing stock. At the time this report is being published, it is rising energy prices which are contributing most to fuel poverty, disproportionately to all other drivers.

4. Wider context

We share some retrofit challenges with other parts of the UK. One of these is the burgeoning responsibility private landlords have for providing homes for local people. In nine years, the proportion of private landlords in Northern Ireland has doubled (to 16%), and there is presently limited (though growing) statutory protection for people who rent from them. This report indicates that the allocation of government subsidy for heating installations to the private rental sector (via the government's Warm Homes scheme) has remained static since 2006; during that time the allocation to owner occupiers has increased by almost a third (31%).

Morris offers some pointers to solution in this context, indicating that 10% of all privately rented properties are vacant at any one time. A system in which private-rented properties cannot be re-leased to a tenant before a minimum SAP has been achieved could provide a means by which a tenant moving out of a property triggered retrofit. Simple as this may sound, past and current legislation makes this rather difficult, since state-subsidised retrofits can only be applied for by a sitting tenant. There are very few quick fixes on offer to us.

The sheer demand for heat in Northern Ireland often goes unrecognised in Whitehall-led debates. The average Northern Ireland home requires more than 2,000 degree days of heating every year; furthermore, there is not a single month in the average year when indoor temperatures in Northern Ireland stay above minimum safe temperatures each day; in theory at least, every household in Northern Ireland should be running some form of heating system during every month of the year in order to maintain temperatures which the World Health Organisation endorse as safe for human health. The health risks associated with living with colder temperatures is illustrated by the fact that, while Northern Ireland averages almost 1,000 cold temperature-related deaths per year, almost 50% of these do not happen in winter. The region does not *become* cold in winter, it is almost always cold; cold enough for a lack of affordable warmth to present an enduring, year-round health risk.

Regional variation in temperatures across Northern Ireland are also notable. Some areas of NI have 11% more heating degree day demand than others, meaning that equitable solutions have to be sought at sub-regional levels.

Another consideration is that 35% of the population lives in rural areas, of concern because:

- colder temperatures prevail in exposed rural areas, so they have a greater degree day demand
- older houses are more common in rural areas
- there is a greater likelihood of under-occupancy for size of house
- standards of energy efficiency are poorer
- difficulties arise for providing cost-effective area-based retrofits in rural areas, since houses may be half a mile apart, and located 15 miles or more from the nearest town or city.

Furthermore, while about 80% of English and Welsh households rely on gas for their heating (the predominant element of most energy bills), in NI about 68% rely on oil, and are either unable or unwilling to access gas. The costs associated with heating the same house with oil when compared with gas vary as oil and gas prices change, but up until now at least, an oil-fired home has generally cost more to heat. Over and above cheaper tariffs, homes using gas can avail of valuable pay as you go alternatives and easily read meters, which have been found to help households with affordability, budgeting, and energy saving.

As Morris points out, evidence from other EU countries suggests that conversion to gas is unlikely to exceed about 70% of households on grid; with the new Gas to the West initiative, he estimates that 27,000 more homes will convert to gas in the foreseeable future; however, it still means that we should not expect more than half the region's households to be reliant on gas in the medium term. This leaves oil as a major component of the domestic energy sector, and also brings renewable sources of energy more sharply into the frame. Progress has been good in terms of establishing renewable sources of electricity (currently 19% of the region's electricity is from renewable sources, approximating the 2015 target of 20%). For heating, however, the shortfall is considerable: with a 2015 target of 4%, only 1.7% has been achieved so far.

5. Setting a target SAP level

As Morris makes clear, initial decisions need to be taken soon as to the depth and expanse of a retrofit program in Northern Ireland. As he explains, these early decisions will inform the scale of a region-wide retrofit plan, and what options will generate most return on investment.

Setting a minimum baseline SAP to be achieved through retrofit could be the most pivotal early decision. Northern Ireland's average SAP score is presently 60. Morris explores the costing and effectiveness of a retrofit program that could achieve a minimum SAP of 63 which is, he recognises, extremely conservative. If achieved it could make significant but probably temporary inroads on fuel poverty, by shifting those "just inside" fuel poverty into the "just outside" margin, though hovering near the cut and vulnerable to any energy price increase.

A more long-standing solution would be to aim for a SAP of 78, which is Morris's preferred option, since it best balances impacts against costs. Whilst other experts such as Brenda Boardman estimate that a SAP of 85 has the potential to "fuel-poverty-proof" most households in England, it will not achieve that status in Northern Ireland because of the more challenging local conditions. Hence, fuel-poverty-proofing might require something akin to SAP 90 in the region. As Morris points out, such deep retrofits (e.g. from SAP 59 to SAP 89) could cost more than £3,000 per SAP point gained, since there is a law of diminishing returns when aspiring to ever-higher scores. The economic conditions prevailing in the region may limit what can be reasonably expected. Here, Morris illustrates helpful tipping points: for example, a basic retrofit from SAP 59 to SAP 77, rather than SAP 89 would cost £1,000 per SAP point gained and provide three-quarters of the energy savings of the SAP 89 retrofit.

Hence, a SAP of 78 seems one which sets the challenge at a formidably high but nevertheless achievable target. Morris also reminds us that this would be a slightly variable target; in areas such as Belfast, local conditions mean that a SAP of 75 will be the equivalent of a SAP of 83 in Omagh. Taking account of local conditions will ensure that all areas of the region are treated equitably, and will prevent :

- over-investment in areas which do not require the regional NI average
- under-investment in areas which require a SAP level higher than the NI average

Equitable outcomes do not imply the same levels of retrofit throughout the region.

6. Estimating costs

Morris provides us with a grounded framework for estimating costs, based on six readily accessible

variables. These are:

- proportion of homes with gas boilers
- average inter-house distance
- baseline energy costs
- energy price
- poverty level
- local climate

Whilst many writers in this area construe the biggest single challenge to be hard-to-treat homes with solid walls, the Morris Report makes plain that the vast majority of retrofit work in NI is required in homes built since the 1960's; these are often still operating with their original boilers and radiators intact, and have, as Morris describes it, "drifted into obsolescence". The majority of these will be located in focal areas of the region, and will require very similar standards and types of retrofit; they are, therefore, especially well-suited to an area-based approach that could lead to substantial economies of scale.

Assuming that households in fuel poverty are the first target of reform, the Morris Report estimates that costs could range between:

£268M to replace 150,000 old oil boilers in NI

£454M to remove the majority of households from fuel poverty at 2012 prices – though not if prices increased by even 1%

£1.7B to raise the SAP of 87% of fuel poor households to a recommended SAP of 78

£1.7B to replace old oil boilers in NI with new boilers; with a mix of 80% conversion to gas where gas is available, to wood pellet for about 20% of homes where gas is not available, and the remaining off gas homes to new condensing oil boilers

£2.0B to raise the SAP of *all* fuel poor households to a recommended SAP of 78

£2.4B to raise the SAP of all households (regardless of fuel poverty level) to a recommended SAP of 78. At some of the higher costs recorded per SAP point gained, this estimate could easily be multiplied by a factor of ten or even thirty, making robust estimates at this global level especially difficult to attain.

Morris reminds us that due consideration needs to be given to new homes being built, and not merely to those requiring retrofit. Since the majority of these are detached homes in rural areas, often of considerable size given their occupancy levels, there are significant opportunities available through reforms to the Energy Efficiency Codes for new building. Fuel-poverty-proofing needs to apply equally across retrofits and new builds.

7. Rate of retrofit

As matters currently stand, the average amount required per property to achieve a SAP of 78 is around £5,000. It is important to note that the per property investment made by the Warm Homes scheme over the past decade has been less than one third of this amount, despite the maximum permissible spend per property being in excess of £5,000 as the scheme draws to a close. If present levels of investment in the homes of the fuel poor continue under the new strategy, there may be

considerable difficulty in making deep impacts on fuel poverty. Morris makes a similar point when referring to the current boiler replacement program in NI. At past rates of replacement, it would take 70 years to “get around” all of those presently in need of replacement. During which time, the first boiler installed would have required replacing again a further 5 times.

Examples such as these highlight one of the most important messages embedded in this report: a business-as-usual model could significantly worsen the landscape of fuel poverty in the foreseeable future. Radical reform is the only option.

8. Striking a balance

At a purely theoretical level, rural properties in hamlets and open countryside are those most in need of retrofit, and have the greatest potential for SAP gains. This comes about through a wide variety of risk factors, including lack of access to gas, older homes more often with solid walls, and colder local climates. But they will also cost the most to retrofit. Morris points out that householders in these areas are also (on average) reasonably wealthy (i.e. they have the lowest average poverty scores). This suggests that where need is greatest, capacity among householders to pay for much of the work required is highest, indicating the need for an approach which combines grants for those on low incomes in low SAP homes, while finding acceptable payment plans for households who are able to pay.

9. Human “obstacles”

One of the largest (and generally ignored) obstacles to achieving a mass rollout of housing reform is the household itself. In a recent pilot which aimed to assist those in the most extreme fuel poverty, almost half of those eligible for free heating and insulation refused the offer. If it is so often refused when free, how could we expect wealthier people to invest an average sum of £5,000 in the same measures?

The household is frequently blamed for failure to install measures, with little or no consideration being given to the logic that often lies behind their reasoning. Retrofitting is disruptive, noisy, dirty, and stressful, even when it is being done free. Any reform of house conditions in Northern Ireland will require a major “hearts and minds” campaign that focuses on what customers are most able to tolerate (both in terms of the installation, and the cost burden that many of them will be expected to take on).

The challenge of this has been ignored for too long, and should not be underestimated. Whilst early models of energy savings were optimistic about a “pay as you save” model (people could use their energy savings to finance their retrofits) these models are proving to be disappointingly over-optimistic. Achieved improvements are often much less cost-effective than modelled, as a result of many different factors often operating at the same time e.g. poor quality design and workmanship, inefficient use by the householders, and the rebound effect (through which householders heat their house to higher temperatures after retrofit, saving little on bills but feeling a lot more comfortable indoors). Morris estimates that savings can be as much as 80% on energy costs to the householder, but often with long or very long payback periods. In a period of sustained economic uncertainty few households are likely to be interested in long shots.

It will become increasingly difficult (under current retrofit options) to convince people that the investments required for housing reform will ever pay for themselves in 20 years or less, particularly

since housing improvements do not usually repay the cost of installation through a commensurate increase in resale price. Persuasion will probably need to focus on non-economic arguments. These can legitimately include improved thermal comfort, more modern and aspirational standards of living at home, better aesthetics, and the protection of family health and wellbeing. If these seem rather weak incentives, it is worth noting the results of a recent Northern Ireland survey published by QUB. This explored what residents thought were the most fundamental essentials for a decent life. The top two items nominated were :

- A damp-free home
- Heating to keep adequately warm

Both outranked “the ability to afford two meals a day”. People of all ages, both genders, and all incomes gave the same high priority to these top 2 nominations.

At a more societal level, any savings that are made on energy have the potential for households to invest elsewhere - on other products and services - potentially stimulating the local economy whilst at the same time improving the region’s energy security. These factors can all become formidable levers, if used in a sustained and sensitive manner. As Boardman (2012) has observed, this programme of reform would need a “perspective that starts with people, their priorities, and behaviour”. In doing so, we would need to tackle head-on the fact that Northern Ireland’s citizens show relatively little regard for carbon savings, have an unusually strong attachment to oil-fired heating systems, and have had little opportunity to see for themselves what low carbon and energy-efficient housing can offer them.

10. First steps

At this point in time, Morris recommends a small pilot retrofit scheme, applied to 5 different home conditions. He sees this as an important first step by which the assumptions of his report, and the costs associated with different scenarios, can be tested. He wisely envisages an iterative process in which translation from page to household comprises only the first of many iterations of plan, costing, and strategy, all of which will draw down on both past experience and new learning. At the same time, he recommends a paradigm shift in terms of what *all* utility companies (from oil, through gas, and electricity) make available in the public domain. Northern Ireland lags significantly behind all of the rest of Europe in the availability of energy consumption data, a matter in need of urgent remedy, perhaps through the region’s Regulating Authority. These data will be vital to provide us with baseline information, on which we will be able to first model, and then track, energy savings deriving from mass rollout of energy efficiency measures; without this information, no robust assessment of costs and benefits will be possible in the foresee-able future.

11. Conclusions

The energy efficiency of Northern Ireland’s housing stock either needs radical reform, or the region’s citizens will have to content themselves with an ever-diminishing capacity for attaining a commodity they view as essential for a decent life: affordable warmth. Within a decade, it is likely that a business as usual model will still see around half of the region’s households in fuel poverty.

We are slowly acknowledging that the solutions which have been implemented in the past decade have simply staunched what is becoming a relentless slide into housing that is less fit for purpose in

Northern Ireland. Radical reform seems the only game changing alternative. Though it is hard to imagine a problem more complex, we have a firmer grasp on what is required following the publication of this Report. It begins what could be a fruitful (but hopefully not protracted) conversation. In fact, the Report makes clear that we understand a great deal more than most of us thought, and we also have a moderate grasp of how affordable warmth for all *could* be achieved, as well as a sensible estimate of how much different options would cost.

Fortunately too, we have many examples of good practice in the region's social housing sector, which holds its own in terms of energy efficiency alongside many of the more progressive European Member States. We have exemplars on our doorstep, and this – especially - leaves us with few excuses.

The Morris Report draws almost exclusively on the *local* evidence base, which emerges as crucial given Northern Ireland's unusual circumstances vis-à-vis energy and fuel poverty. It provides a sound rationale for adopting SAP 78 as a fuel-poverty-proofing target, and offers us a variety of road maps for achieving that. Along the way, it leaves us in no doubt that radical energy efficiency reform will rejuvenate houses and neighbourhoods, generate significant energy savings, provide new jobs and training opportunities, and improve the wellbeing and health of tens of thousands of people. Reform could also ensure that those most in need are helped first, so that many more can live in houses that are fit for purpose – some for the first time in their lifetimes.

It leaves open only one question: when can we start?