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The Effectiveness of Greenhouse Gas Emission Policies in Scottish Local Development Plans

Executive Summary

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Scottish Government commissioned ClimateXChange to assess the effectiveness of greenhouse gas emission reduction policies in Local Development Plans (LDPs) in promoting the uptake of Low and Zero-Carbon Generating Technologies (LZCGT).

Context

The Climate Change (Scotland) Act 2009[i] sets a target to reduce Scotland's greenhouse gas (GHG) emissions by 80 per cent by 2050[ii]. In addition, the Scottish Government has set a target for 100% of Scotland's demand for electricity to be met from renewable sources by 2020[iii].

More than 40% of Scotland's GHG emissions are a result of the heating, lighting and ventilation of buildings. A key tool in reducing this demand is the use of more efficient technology in all new buildings. Legislation now requires that all developments "… be designed to avoid a specified and rising proportion of the projected greenhouse gas emissions from their use, through the installation and operation of low and zero-carbon generating technologies" (Section 3F of the Town and Country Planning (Scotland) Act 1997, amended through the Climate Change (Scotland) Act 2009).

To date 14 Local Authorities have adopted specific Section 3F policies in their Local Development Plans since 2012. This study examined five of these authorities whose early implementation allows a sufficient set of applications for analysis. Examples of relevant technologies include hydro, wind, photovoltaics, solar thermal, biomass, all heat pumps and combined heat and power (CHP).

Key Findings

- The evidence shows **a modest increase in the uptake of LZCGT** since the policies were adopted, although the extent varies across the authorities studied. Whether this trend is a direct result of Section 3F policies or due to a number of external factors such as improvements in Building Standards legislation, the regional context, market influences and consumer preferences was impossible to determine in this study.
- The evidence suggests that from a local planning authority (LPA) perspective, Section 3F policies can be used to facilitate a more integrated approach to specific regional and local energy contexts, delivering larger CO_2 emissions reduction.
- All buildings included in the study met the CO_2 emissions reduction standard set out in building regulations. Compliance with the Section 3F policy requirement for new builds ranged from 35 - 98% across the five authorities studied. **The vast majority that did not comply were multi-**

domestic developments (i.e. planning applications for more than one house), suggesting potential for improved compliance.

- The data suggests that **regional differences have a significant impact on the type and extent of LZCGT provision**, with remote areas and those without a gas connection demonstrating a relatively greater uptake than urban and grid-connected areas (i.e. gas grid).
- **All of the domestic buildings included in the sample complied with the 2010 energy standards emissions reduction target** in the Scottish Government's building regulations Technical Handbooks at the time of the study. However, only a limited proportion of the total sample (ranged across the authorities from 35% - 98%) complied with Section 3F policy and achieved this reduction through the installation and operation of LZCGT. Although far fewer in number, all the non-domestic buildings in the sample complied with the Section 3F policy.
- For dwellings, there is a significant correlation between both heat and electrical demand and dwelling size. Space heating dominates in terms of energy consumption and CO_2 emissions in all but the smallest and most energy efficient dwellings.
- By concentrating solely on the specification of LZCGT, current Section 3F policies might, arguably, be detrimental to design-led responses to CO_2 emissions reduction (e.g. demand reduction through energy conservation and passive design principles). The evidence suggests that scaled solutions such as district heating are not being supported. However, the potential should not be underestimated of Section 3F policies to promote awareness, support uptake of more sustainable buildings, and encourage the adoption of more innovative and efficient energy infrastructures.
- None of the policies studied implemented a reduction in CO_2 emissions beyond that already required under the Scottish building standards (Bronze Sustainability Level). Nor do they incentivise applicants to voluntarily meet higher emissions reduction targets.

The **evidence indicates that the Scottish building standards are driving the current reduction in CO_2 emissions, not Section 3F policies**. Although Section 3F policies are effective at raising awareness about the benefits of LZCGTs, there is potential for much more effective promotion of uptake in new buildings and, in particular in integrated solutions with specific local and regional drivers.

Current Practice and Factors Contributing to Effectiveness

Policy approach in specifying LZCGTs

There is general consensus among building design professionals that the most cost effective and long term approach to reducing CO_2 emissions is to reduce overall energy consumption through improved fabric efficiency and site specific passive design[iv] before considering the specification of LZCGT. We found that three of the five LDPs studied encourage this approach by linking the Section 3F policy requirement for LZCGT with other energy efficiency measures and passive design principles. A fourth authority goes further and exempts Passivhaus (http://www.passivhaus.org.uk/) from having to comply with the LZCGT policy due to its inherently very low energy consumption.

Incorporating LZCGT policy at the planning stage

Discussing energy efficiency and CO_2 emissions early in the design process has benefits: it promotes awareness of the requirement to design more sustainable buildings, and encourages the adoption of a more innovative and efficient energy infrastructure, including district heating and combined heat and power (CHP). The evidence suggests that the request for detailed technical data can be counterproductive at this early stage of the design process and is challenging for planners when judging the design and technological solutions offered.

Policy design

There is **significant variation in the compliance methodology, type and complexity of evidence requested** in the LZCGT policies studied. Simple, clearly defined, evidencing procedures appear to achieve higher

levels of compliance. One Local Authority achieved 97% compliance at the planning stage with a simple tick box form.

Any policy is only as effective as the rigour with which it is implemented in practice. This study found that **only two of the five Local Authorities studied have procedures in place for non-compliance with policy** and impose suspensive planning conditions where no LZCGT is specified in the planning application. This study did not however investigate if the suspensive conditions were in themselves effective at securing LZCGT.

Delivering renewable energy

Regional influences have a significant impact on the type and extent of LZCGT provision, with remote and off-grid areas demonstrating a greater uptake of renewable technology than urban and grid-connected areas. The Scottish building standards recognise several technologies as LZCGTs. These include: hydro, wind, photovoltaics, solar thermal, biomass boilers/stoves, biogas, heat pumps, fuel cells and combined heat and power (CHP) fired by low emission sources. Most local authorities appear willing to expand this definition to include heat recovery devices and other innovative technologies. Efficient gas boilers and efficient appliances have a role to play in reducing GHG emissions, although they do not shift space and water heating away from non-renewable sources of energy, so inclusion of these as acceptable LZCGT undermines the ethos of the Section 3F policy.

All the policies studied actively encourage the use of scaled LZCGT (CHP and District Heating) but there was little evidence for this being strategically supported in practice.

The **issue of energy storage was absent in all Section 3F policies** with the exception of the inclusion of Fuel Cells as a LZCGT. There was little verification of energy storage provision in practice with the exception of hot water storage cylinders. Mechanical Ventilation Heat Recovery (MVHR) is considered fundamental to the Passivhaus concept, but is currently not sufficiently incentivised.

Delivering CO_2 emissions reduction

Of the five authorities studied, none currently impose requirement for CO_2 emissions reductions additional to that already legislated for in the Scottish building standards. There appears to be little desire in the building industry to meet higher aspirational CO_2 emissions targets, with 70% of domestic buildings simply aiming to comply with the 30% reduction target set in the Scottish building standards at the time of the study. Only 2 of the 482 dwellings (0.4%) returning building warrant data were carbon negative. It is clear that it is these Scottish building standards that are driving the current reduction in CO_2 emissions; not Section 3F policies. We recognise, however, that there are at least two further authorities who have incorporated policies into their plans, but which it was not possible to study as part of this research.

Methodology

The findings are based on a desk-based study taking a sample of planning applications with a heat and electrical demand that were submitted since the period that the specific Section 3F policies were adopted. Quantifiable data for heat demand, electrical demand, energy consumption, CO_2 emissions, and the distribution and contribution of specific LZCGTs was generated from data contained in SAP and SBEM reports. Overall effectiveness was judged in terms of the design of the policy, the application of the policy and the outcome in terms of uptake of LZCGT and achieved GHG reductions. Improvements made to the building standards regulations in 2015 were beyond the scope of this study and have not been considered.

[i] http://www.legislation.gov.uk/asp/2009/12/contents
[ii] http://www.gov.scot/Resource/Doc/276273/0082934.pdf
[iii] http://www.gov.scot/About/Performance/scotPerforms/indicator/renewable
[iv] David MacKay, Sustainable Energy without the Hot Air, UIT Cambridge Ltd, 2009.