Lessons for the UK Green Deal from the US BBNP

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\textbf{ABSTRACT}

How can programme design and strategy drive the decision actually to undertake retrofit upgrades? The US Better Buildings Neighborhood Program (BBNP) and the UK Green Deal both represent ambitious efforts to drive domestic retrofit markets. These programmes are compared and the differences in their conversion rates explored in the context of marketing, outreach and workforce engagement strategies. The impact of financial incentives is also explored. This paper supports the consensus that the US BBNP was successful against most of its stated objectives. The UK Green Deal, while slow to start, was gaining momentum before it was effectively ended. Semi-structured interviews with programme organizers give evidence that the Green Deal would have benefited from a more active approach to marketing and outreach, specifically emphasizing the distinction between the two. Marketing generates interest, but local outreach through word of mouth and personal referrals is needed to drive upgrades. The Green Deal did not sufficiently engage the workforce through an ongoing communication strategy and should have better facilitated both technical and non-technical skills development. The interest rate of the Green Deal is shown to be but one factor influencing participation, and can be effectively balanced through programme design in other areas.

Introduction

Barriers to cost-effective domestic retrofits are well documented (IEA, 2007b; Sorrell, O’Malley, Schleich, & Scott, 2004). Decades of energy-efficiency policy efforts focused on overcoming barriers for individual products and services (Birner & Martinot, 2005; Eto, Prahl, & Schlegel, 1996), but a new generation of programmes is targeting the barriers to retrofits by focusing on markets rather than end users (Blumstein, Goldstone, & Lutzenhiser, 2000; York et al., 2013). To support successful market transformation, new knowledge is needed regarding the institutional arrangements, organizational networks and consumer–vendor interactions that govern the behaviour of actors in the market (Blumstein, Goldstone, & Lutzenhiser, 2000).

Boza-Kiss, Moles-Grueso, and Urge-Vorsatz (2013) note that while building sectors vary widely across countries, there are still lessons to be learned from one another. This work compares the Better Buildings Neighborhood Program (BBNP) in the United States with the Green Deal (GD) in the UK. Both policies have similarly stated objectives of fundamentally and permanently enhancing the market for domestic energy efficiency retrofits. The two are not only similar in scale and ambition but also target similar retrofit measures using a combination of grants and loan programmes, and are aimed at similar demographics of able-to-pay homeowners. And perhaps most critically, they represent two countries’ most recent interpretations of how to design and implement national-scale, market-based retrofit programmes.

Both regulatory (Galvin, 2011) and market-based approaches (Beerepoot, 2007) have the potential to deliver savings, and a balanced policy mix is often called for (IEA, 2007a; Jaffe, Newell, & Stavins, 2005). However, where governments elect to use market-based policies such as the BBNP and GD, programme designers must carefully consider the boundaries of public involvement in the market. This paper compares the US BBNP and the UK GD along two themes: marketing and outreach, and workforce engagement. Specifically, it considers the questions:

- How can programme design best drive the conversion of initial interests and assessments into the decision actually to undertake retrofit upgrades?
• What is the role of the programme in marketing, outreach and workforce engagement, and how do these factors compare with simple financial self-interest in motivating programme participation?

**Literature**

The two programmes that are the subject of this paper represent logical steps in the evolution or retrofit programme design. This section considers that evolution, and then describes the BBNP and GD themselves. There is a well-documented history of barriers to the adoption of cost-effective energy efficiency technologies in the built environment (Gillingham, Newell, & Palmer, 2009; Golove & Eto, 1996; Jaffe & Stavins, 1994; Levine, Koomey, McMahon, & Sanstad, 1995; McKinsey & Co., 2009; Meier, Wright, & Rosenfeld, 1983). Among these barriers, the low priority of energy issues, lack of information, upfront cost barriers and split incentives have been highlighted as limiting the potential for retrofits in existing dwellings (IEA, 2007b; Sorrell et al., 2004). Despite the many differences between the US and the UK, the two countries have adopted largely similar approaches to addressing these barriers. Both have national-scale building codes and regulations driving increasingly strong thermal performance for new builds, but their approaches to thermal retrofit largely depend on leveraging market forces rather than regulatory measures. As such, the literature given herein applies to both the US and the UK, with any distinctions being noted throughout.

There are decades of policy efforts towards limiting the impact of barriers to domestic retrofits. The gradual transition from the utility demand-side management programmes of the 1990s (York, 1999) towards market transformation represents a natural evolution in the theory and practice in the energy-efficiency movement (Blumstein et al., 2000; Sebold et al., 2001). Programmes increasingly target whole-house retrofits, focusing on the efficiency of the home as a system (York et al., 2013), rather than on the barriers to an individual product or service (Van de Grift & Schauer, 2012). There is also an emphasis on understanding customer behaviour and motivations, including a rapid rise in behaviour-based programmes in the residential sector (York et al., 2013). Consumer engagement has become a central fixture in modern retrofit programmes. Both theory and practice have demonstrated that the provision of information and financing are necessary but insufficient drivers to encourage widespread adoption of energy efficiency measures (Fuller et al., 2010). Implementation methods have the potential to be more important than the size of the incentive (Stern, Aronson, Darley, & Hill, 1985), and the non-energy benefits of efficiency (e.g., comfort) can create a much vaster market penetration than selling on energy benefits alone (McHugh et al., 2002). An increasingly common approach to driving demand is called community-based social marketing (CBSM) (McKenzie-Mohr, 2011). It targets barriers at the level of social group rather than the individual, using the principle of the trusted messenger and the identification of leaders and authority figures within the group and targeted messaging that caters more directly to a given audience (Vigen & Mazur-Stommen, 2012).

The need for a skilled workforce, as well as the critical role that the workforce plays in driving demand for retrofits, is also increasingly acknowledged in both the literature (Fuller et al., 2010) and policy development (Retrofit Report, 2009). Workforce intermediaries such as contractors can drive change from the middle (Janda & Parag, 2013) act as programme ambassadors (Fuller et al., 2010) and help achieve long-term market transformation towards energy-efficient buildings (Poynter & Gilbert, 2006). Donnelly (2013) argued that a well-developed contractor network is the most important factor for achieving higher upgrade pull-through rates (e.g., completed upgrades), and cost-effective programme operations. However, despite this frequent observation that contractors play a central role in programme execution, there is a distinct lack of depth in the literature exploring the ways in which policies have engaged the workforce.

Before detailing the methodology with which these case studies are explored, this section describes the US BBNP and the UK GD in turn.

**BBNP**

The BBNP was created using stimulus funds in the American Recovery and Reinvestment Act (ARRA) to create programmes that could (DOE, 2009):

- fundamentally and permanently transform energy markets in a way that make energy efficiency and renewable energy the options of first choice; and
- sustain themselves beyond the grant monies and the grant period by designing a viable strategy for programme sustainability into the overall programme plan

The BBNP allocated 41 competitive grants to state and local programmes, which operated from 1 July 2010 to 30 September 2013. Each programme maintained the goals described above and followed similar fundamental structures, but varied significantly in a
number of demographic and operational factors including the climate served, the sector and building types served, the existing policy environment, the qualifications of the contractors, and the type of outreach and financial incentives they employed (RIA, 2012).

A large-scale third-party evaluation (RIA, 2015) of the BBNP found that a total of 99 071 residential and commercial upgrades were carried out (objective > 100 000). There was a verified savings of 15.1% per household on residential upgrades (objective 15–30%). A total of 10 191 net jobs were created (objective > 10 000). While not every objective was realized, the BBNP had an estimated net benefit-to-cost ratio of 3.0, and the programme is considered, by a number of different of measures, to be a successful example of domestic retrofit programme design and implementation (RIA, 2015).

**GD**

The political justification for the GD is similar to that of the BBNP in that there is tremendous potential for savings in the existing domestic stock (DECC, 2011). The UK has the added impetus of meeting a binding emissions target of an 80% reduction in greenhouse gases compared with a 1990 baseline by 2050 (DECC, 2008). According to the UK Department of Energy and Climate Change (DECC), as of January 2012, 60% of homes had sufficient loft insulation, 59% of cavity-wall homes were insulated, and 2% of solid-wall homes were insulated (DECC, 2012). Retrofitting existing dwellings therefore represents a policy priority in meeting emissions reductions targets.

The GD was launched 28 January 2013 in England and Wales (25 February in Scotland). It was similar in structure and ambition to the US BBNP in that it intended to reduce key barriers to the uptake of domestic energy efficiency retrofits through market-based interventions. The stated objectives of the GD were to improve the energy efficiency of the existing building stock in the UK by removing the barrier of high upfront costs through new financing mechanisms, and to provide a framework through which people and businesses can access accredited energy-efficiency assessments and the installation of measures (DECC, 2011). This very closely follows the BBNP responses to the Retrofit Report’s (2009) call for improved access to financing and access to a skilled workforce. Additionally, the GD impact assessment’s statement that ‘market led action to improve energy efficiency in the built environment will reduce the need for subsidized measures’ (DECC, 2011, p. 34) describes the essence of market transformation: creating a market change that does not require ongoing public support.

The intent for the GD is for installed measures to follow the ‘Golden Rule’ in which repayments do not exceed the monthly savings in energy costs; however, this is not strictly required. The UK also introduced the Energy Company Obligation (ECO) on 1 January 2013 to replace two predecessor programmes (DECC, 2014b). The ECO is a ratepayer-funded scheme that obliges large energy suppliers to deliver domestic energy-efficiency measures. It is intended to support low-income and vulnerable consumers and largely targets hard-to-treat properties and more costly measures such as solid-wall insulation. The GD and ECO are separate programmes, but closely connected as a GD assessment is a prerequisite for accessing ECO funding. In some cases, homes that elect to use GD financing may use ECO funding to reduce the overall cost of the measures and ensure compliance with the Golden Rule. ECO funding is comparable with the US Weatherisation Assistance Program, and multi-housing initiatives that focus on a different set of barriers than retrofitting single-family homes. While many BBNP programmes have included multi-family homes, these were not directly considered in this study. Similarly, ECO will not be directly treated as part of this GD study.

While the GD was initially intended as a cost-neutral financing framework, the UK government has since introduced grants and rebates including GD Cashback, the Home Improvement Fund and, most recently, the GD Communities scheme. Since its announcement, the GD has been the subject of considerable academic focus and many critiques regarding its design. For example, one study argued that the scale of activity set out in the details of the GD and ECO proposals is not sufficient to meet ambitious carbon targets, and in fact would likely result in only 19% of the carbon savings achieved by the policies they were replacing (Rosenow & Eyre, 2012, 2013). The same study echoes Killip’s (2012) concerns about the GD’s overemphasis on upfront cost while neglecting other barriers, stating that other issues are potentially more important such as the hassle and disruption of building work, low priority of energy issues, reliability of the advice given and poor integration of the supply chain. If and how GD changes the marketing of energy efficiency to homeowners and the supply chain is crucial and, inevitably uncertain (Eyre, Rosenow, Wade, Wilson, & Lowe, 2012; Rosenow & Eyre, 2013).

On 23 July 2015, the UK government announced that it would no longer be funding the GD Finance Company (GDFC), effectively ending the GD funding programme. The stated reasons were low take-up and concerns about industry standards (DECC, 2015). This paper will consider the merits of these reasons.
Methods

Evaluation approach

Both the BBNP and the GD had the stated goal of driving a domestic retrofit market in a way that is self-sustaining (DOE, 2009, 2011) (DECC, 2011). Defining evaluation priorities for complex programmes is challenging. Blumstein et al. (2000) noted the importance of measuring programme effectiveness beyond energy-saving benefits. In addition to estimated savings, the evaluation requires parameters to describe changes to the market and the effects of these changes (Neij, 2001). This paper presents a cross-section of a broader theory-based programme evaluation of the BBNP (Gillich, 2015). Both this broader evaluation and past work (e.g. Fuller et al., 2010) have noted the critical roles for marketing, outreach and workforce engagement in driving the development of retrofit markets.

Both the BBNP and the GD have the following fundamental structure:

• **Step 1 – Assessment**
  An assessor will come to the home, talk to the owner/occupier about their energy use and see if they can benefit from making energy-efficiency improvements to their property.

• **Step 2 – Recommendations**
  The assessor will recommend improvements that are appropriate for the property.

• **Step 3 – Quotes**
  The assessor will typically discuss with the owner/occupier available rebates and financing and quote for the recommended improvements. A number of quotes can be obtained.

• **Step 4 – Signing a Plan**
  The customer chooses to proceed with a given provider and package of measures.

• **Step 5 – Installation**
  Once a plan has been agreed, the provider will arrange for the improvements to be made by an installer (who may or may not be the same party as the assessor).

The objectives and broad operating structures of the BBNP and GD policies are therefore sufficiently aligned that any comparison is a potentially meaningful contribution to programme design. Furthermore, the two programmes share a high-profile nature as national-scale, flagship programmes intended to offer market-based solutions to longstanding barriers to domestic energy efficiency that have been insufficiently addressed by previous policy efforts. One significant difference between them is the homogeneity of the programme nationwide. From the outset, the BBNP encouraged grantees to design programme approaches best suited to their target areas, whereas the GD encouraged a consistent brand. However, the core on-bill financing mechanism of the GD remained consistent. In order to offer a meaningful comparison, this study covers BBNP grantees that offered loan programmes. Given that both programmes were designed to address the same barriers and have similarly stated objectives, the fact that BBNP loan programmes were allowed more flexibility than the GD offers a measure of the extent to which such flexibility is useful for a loan programme. This work will define the percentage of assessments (Step 1) that lead to retrofit upgrades (Step 5) as the ‘conversion rate’. The conversion rate is influenced by a wide range of programme factors; however, it is a useful quantitative indicator for the programme approaches to marketing, outreach and workforce engagement since it represents the degree to which the programme converts initial interest into the decision actually to install retrofit measures. This quantitative indicator is also problematic as the definition of terms and reporting of data is rarely consistent across programmes. Furthermore, quantitative indicators alone are unlikely sufficiently to represent the success factors driving effective retrofit programme implementation (Gillich, 2015). The quantitative result should be investigated and supported by qualitative evidence.

The evaluation approach of this paper is to compare the BBNP and the GD marketing, outreach and workforce engagement strategies. The methodology first compares the conversion rates as a quantitative measure, and then investigates the qualitative programme factors behind the quantitative results. Semi-structured interviews with programme organizers are used to gain direct insight into the programme operation in order to explore the extent to which the conversion rate can be explained by programme design and management decisions related to the marketing, outreach and workforce engagement strategies.

Marketing and outreach are explored in the context of CBSM approaches and the ability of the programme to create local networks and leverage trusted messengers. Research Into Action (RIA, 2012) has noted that marketing and outreach are distinct issues requiring distinct programme strategies. This paper will test this premise with regard to the BBNP and the GD.

Workforce engagement is considered in two ways. First, the programmes are compared in terms of their
approach to communication and the development of contractor networks. Second, this evaluation compares the programme approaches with the development of workforce skills. Finally, the evaluation tests how financial incentives may influence the conversion rate by comparing how the two programmes changed over time.

Data

Each of the 41 BBNP grantees collected detailed quarterly dashboards which were submitted to the US Department of Energy (DOE) and made publicly available (DOE, 2014). The calculations presented in this work combine the performance data for the 41 individual grantees and consider the BBNP programme performance as a whole. The data are given in Appendix A in the supplemental data online. Each programme also submitted final technical reports that offered qualitative context for the statistics reported in the quarterly dashboards. In addition, the researchers conducted semi-structured interviews with 16 programme organizers in order to gain insights into the operational factors behind the statistical releases. Those directly cited in this work are listed in Appendix A.

DECC issued statistical releases documenting the GD’s performance (DECC, 2015). Those referenced in this paper are summarized in Appendix A. In addition, DECC appointed market research firm GfK NOP and collaborated on a market segmentation analysis to poll participant motivation and experience with the GD. Their results are summarized in its January 2014 report Green Deal Assessments Research (DECC, 2014a). Finally, one semi-structured interview was conducted with a former DECC official who worked closely with the GD. All interviews for this research were used to clarify and augment the documentary evidence, but no argument in this paper is made exclusively based on testimony.

Analysis

This section begins by analysing the differences in the quantitative conversion rates of the BBNP and GD programmes. The sources of uncertainty are considered. A qualitative analysis then considers the programme implementation factors behind the statistical results, and finally considers how each programme changed over the three years they were each active.

Comparing programme conversion rates

The programmes both defined assessments in a similar way and the comparison between the two is suitable. However, the definition of the upgrade was more variable, as it includes anything from the installation of a single upgrade measure to a whole-house retrofit. It also includes wide ranges of different grant and rebate levels that changed throughout the programme and which are not easily controlled for. It is thus problematic to compare directly the number of upgrades achieved by each programme and the fact that Table 1 shows that the BBNP has a conversion rate roughly five times that of the GD for grant-supported projects is not necessarily reflective of wider programme design issues.

Factors such as the level of the grant/rebate can be somewhat controlled for by considering only the number of loan signups for each programme. The BBNP and GD loan programmes were largely similar in structure and thus form a better basis for comparison. The most notable difference between the BBNP and GD loan programmes is the interest rate, which will be specifically explored below. The number of assessments, loan-financed upgrade projects and the conversion rate for each programme are given in Table 2.

Note that residential multi-family units were not included for either the BBNP or the GD, thus not counting much of the ECO-funded efforts. The detailed figures used to calculate the summaries of Tables 1 and 2 are given in Appendix A in the supplemental data online.

The conversion rate is a relative measure controls for many variables such as programme size, but naturally there are a number of cultural and demographic differences between the US BBNP and the UK GD that complicate the comparison. However given that the programmes have a largely similar number of total upgrades, the threefold difference in the conversion rates deserves scrutiny. The next sections will evaluate the extent to which the difference in the conversion rates is likely to be a result of the programme design, or whether it simply represents an artefact of the data
due to a combination of the uncertainties described above.

Comparing approaches to marketing and outreach

Both the BBNP and the GD conducted considerable market research prior to the design of their programmes. The DOE/BBNP determined that an active push and pull method was required simultaneously to stimulate supply and demand. The GD, by contrast, focused primarily on the upfront cost barrier, believing that a well-designed financing package could be a catalyst for creating an innovative market where demand for energy efficiency measures will bring forth supply along the entire value chain (DECC, 2011). Or, as was described by the interviewed DECC official, ‘we assumed that the private sector would take the profit motive and run with it’ (Interview #5). Due to the assumption that homeowners would seek out the GD through financial self-interest, there are considerable differences between the marketing and outreach strategies of the GD and the BBNP.

The BBNP demonstrated that mass media marketing was useful for generating awareness of the programme brand, but that the most effective means of generating participation was through personal outreach and CBSM principles leveraging trusted messengers (RIA, 2012). The specific strategies varied by BBNP grantee; however, the following was representative of the general approach to programme design:

We already know it’s not enough just to provide rebates and incentives. There are a lot of details on the implementation side that determine how effective the program is. Common sense says that CBSM will provide better results, but the extent to which results are improved depends on many things such as the audience, the messenger, the relationship between the audience and messenger, specific CBSM techniques, and the rest of the program design.

(Interview #1)

Assessments are typically information only and are thus low cost and low disruption to the homeowner. The relevant barriers are more active for the upgrade. The assessment and the upgrade therefore represent different programme steps and require different programme strategies. Assessments are about awareness and are essentially a marketing issue, while upgrades are about the decision to purchase measures and are essentially a sales issue (RIA, 2012).

The most common means through which participants entered the BBNP was word of mouth, however for the GD word of mouth ranks fourth, behind direct sales, leaflets and utilities, as given in Figure 1.

Most of the changes between the ‘waves’ in Figure 1 represent a small number of households given the sample size ($N_1 = 507$, $N_2 = 499$, $N_3 = 500$). However, cold calling and door-to-door sales nearly doubled in wave 3. The DECC programme report (DECC, 2014a) refers to this as personal engagement, but this is not the same as using CBSM and trusted messengers. Efficiency Maine was among other BBNP grantees that found door-to-door campaigners were perceived as outsiders and instead found more success by leveraging the participation of pre-existing community groups (Fischer, 2013). BBNP Michigan also found mixed results when using door-to-door canvassing, with participation more likely if the homeowner had a favourable impression of the canvasser (BBFM, 2013). The emphasis is as much on the messenger as it is on the message. It is possible that the GD is accomplishing outreach through other means; however, that was not convincingly evidenced in the data.

The BBNP repeatedly demonstrated that mass media and cold-calling are sufficient to drive awareness of the programme and possibly assessments, but that a deeper connection through a CBSM approach using trusted messengers is more effective at creating multiple touch points and closing the sale (Donnelly, 2013).

The survey results of Figure 2 give insights in why customers did not choose to carry on from the assessment to the upgrade stage of the GD. Most respondents commented on a lack of communication and feedback. Very few customers indicated cost-related reservations, which challenges the GD’s fundamental assumption that creating a financing mechanism was sufficient to address the barriers present.

Finally, note that in both Figures 1 and 2 there is no significant change in the results observed across the three data-collection periods, suggesting that the programme did not modify its structure or incentives in response to interim feedback.

Comparing approaches to workforce engagement

The BBNP emphasized workforce engagement in three critical ways: (1) ongoing communication with contractor networks, (2) technical skills development and (3) non-technical skills development. For example, the Vermont NeighborWorks programme placed particular emphasis on building a relationship with the workforce and cultivating that trust over time by responding to workforce feedback on how to deliver the programme more effectively.

We met with the contractors one on one every few weeks, as a group once every two months. That’s
important; you have to have that open door with the contractors. What they liked about us was that we listened to their concerns. They said they didn’t have money to buy the equipment they needed for this work, so we helped establish an equipment loan for them. They said they needed more guys, but didn’t have time to hire them, and also didn’t want to have to lay them off during the summer, so we created a temporary labour pool.

(Interview #2)

Similarly in Michigan, coordination with the local workforce was crucial to calibrating the programme efforts to a particular community.

Each one of our local partners like the city of Grand Rapids or the local non-profits, they’re the ones that engaged with the contractors on a regular basis. It became a team that was committed to doing this work, so the contractors were part of every launch; they were part of the meetings with the outreach team. They were very, very involved in the whole process.

(Interview #4)

The BBNP found the following to be useful even when a strong contractor base exists in a region: sales training, technical training and training on the programme processes (McRae & Folks, 2015). Most grantees required participating contractors to be certified by the Building Performance Institute (BPI), and BPI membership increased significantly in the participant states (Gillich, 2015). External evaluations of the BBNP found that ‘offering of any form of contractor training was the best way to mitigate lacklustre performance, regardless of other programme elements or exogenous factors’ (McRae & Folks, 2015, p. 4).

The GD did not prioritize the development of the workforce to nearly the same degree as the BBNP. The GD did encourage some types of training with small subsidies for apprenticeships (Interview #5), and have gathered data on some aspects of contractor performance, (DECC, 2014a) but the broader approach was that the workforce would seek out the necessary skills to deliver the GD through financial self-interest.

The nature of the training that was supported by the GD also differed from that of the BBNP. While BPI certification emphasizes the skills needed to carry out the work, GD assessor training requires a previous energy performance certificate (EPC) assessor credential to be obtained, and thus assumes that the contractor already holds required technical skills. GD assessor, installer, and provider training are primarily directed towards the mechanics and procedures of the GD process itself. The bureaucratic requirements of the GD are potentially a barrier to participation for smaller contracting firms (Killip, Fawcett, Janda, Nosperger, & Beillan, 2013).

DECC has received feedback that the GD assessor certification was too easy to achieve (Interview #5). Additionally, an investigation by Which? found that they received reports from different GD advisors showing large differences in the recommended measures, when they should have been comparable. The DECC also stated that 11% of GD assessors and 14% of GD

Figure 1. How households heard about Green Deal assessments (W1 = 26 April–2 May 2013, W2 = 26 July–26 August 2013, W3 = 29 October–1 December 2013, arrows indicate changes between waves). Source: DECC (2014a)
installers have been suspended or withdrawn due to non-compliance with GD scheme requirements (DECC 2015c). This suggests that improved quality of technical skills training would be beneficial to the GD programme.

For the BBNP, the ongoing communication with the workforce also enabled grantees to calibrate the type of training they supported to the specific needs of the workforce. Many grantees found the provision of non-technical training such as sales and business training was beneficial. Regarding the Illinois programme, a senior planner expressed his opinion that:

In the beginning there just wasn’t demand for the work yet, so the workforce training didn’t make much sense. They needed to get new customers in, so one of the things that came from these round tables was the need for more sales and customer services training. We found that a lot of people didn’t have specific customer services training and that the company would really benefit from that kind of education. So that’s what we worked on was cultivating those skills.

(Interview #3)

The US Efficiency Maine Home Energy Savings Program (HESP) used sales training to increase their conversion rates from 10% to 60% over the course of six months (Efficiency Maine, 2012c). Similarly, Connecticut introduced marketing and behavioural science training alongside a series of other small changes to their outreach strategy and their conversion rate doubled within two months (Livingston, Donnelly, & O’Neill, 2012).

GD assessors were frequently called upon to sell the GD financing mechanism. Among GD customers who paid for the measures themselves, the most common reason for not using GD financing was that the product was not properly sold to them (DECC, 2014a). Given the need to sell a financial product as part of the GD application, assessors could receive additional training in business and finance. The UK deliberately does not provide sales training to contractors as part of the GD programme because of consumer protection issues and the desire to avoid the impression that DECC was advocating something that could not be sold on its own merits (Interview #5).

Contractors are unlikely to undertake changes to their business models without clear long-term benefits. This observation has been made with regard to the UK workforce (BIS, 2010; DBERR, 2008; Killip, 2012). While contractors’ business models will naturally adapt to changing markets over a long enough time period, it is the responsibility of the programme to encourage this to happen over the programme timescales. Taken together, this suggests that while the GD was originally created as a cost-neutral financing framework, the facilitation of improved technical and non-technical training for the workforce would have been beneficial towards accomplishing their stated objectives.

Financial incentives and changes over time

This section explores how the programmes have changed over time and how other programmatic differences, most notably the interest rate on the loan, may influence sign-ups. The degree to which the success of a loan programme is driven by an interest rate is complex. Given the relatively low availability of energy-efficiency loan products, (Hayes et al., 2011) most financing for energy-efficiency retrofits is available at approximately 7–8% APR in both the US BBNP (Van Clock et al., 2015) and the UK GD (Bayley...
and Allison, 2015). And as both of these sources point out, 7–8% is high compared with a home equity loan, but is a competitive rate for an unsecured personal loan. These types of loan programmes are therefore necessarily targeted at a subsection of the market that could not secure financing at a lower cost through other means.

The interest rates available for loans in the US varied significantly among BBNP grantees, and many were lower than the 7–8% APR loan offered by the GD. There are obvious advantages in selling a loan with a lower interest rate compared with a higher one. Where BBNP grantees offered low interest loans this was typically done by using BBNP grant funds as credit enhancements such as interest rate buy-downs or loan loss reserves. The value of using public funds to lower an interest rate must be measured against the effectiveness of using those same funds elsewhere in the programme. The BBNP grantee in Michigan found that, unsurprisingly, a lower interest rate was more likely to drive upgrades (BBFM, 2013). However, they also found that when offered the choice between a low-interest loan and a rebate, the rebates were more popular. The same report also found only a modest difference in signups between interest rates whether the interest rate was 3.99% or 7%.

The BBNP was acknowledged to have a low rate of loan signups overall. Of the grantees offering loan programmes, only 18% of residential retrofit projects received loans (Van Clock, et al., 2015). Several programmes, e.g. Illinois (EI2, 2014), transitioned away from loans towards rebates in order to get grant funds into the marketplace more rapidly. The 12 605 loans reported in Table 2 do not represent the result of an exclusive effort towards generating loan signups in the same way as the GD.

By the end of the BBNP grant period the Clean Energy Works Oregon Program was able to eliminate credit enhancements altogether (CEWO, 2013). They note that this was only possible because lenders were increasingly comfortable lending for energy efficiency projects, a process which took years to do develop.

Early uptake of the GD financing mechanism is not dissimilar to the uptake of the US Efficiency Maine PACE programme (Gillich, 2013), as well as Michigan Saves (BBFM, 2013), both of which evolved in to successful loan programmes over several years. Indeed, Figure 3 shows an increase in GD finance plans in late 2014 and early 2015.

The most straightforward reason for this is likely the increased number of GD Cashback and GD Home Improvement Fund (GDHIF) rebates that were distributed over the same period. The interest rate on the GD Finance plan remained constant throughout this period of increased activity. This suggests that as with the BBNP, the decision of whether to devote programme resources towards lowering an interest rate or towards leveraging participation in the loan programme using a rebate is a subtle question that must be addressed on a case-by-case basis as demonstrated by Michigan Saves (BBFM, 2013).

Clearly, the interest rate is but one factor influencing the uptake of the GD loan programme. Another factor is the considerable decrease in the number of ECO installations over the same period. A lack of communication and follow-up on GD assessments was noted above as the top reason for homeowners not continuing with a GD financed upgrade. The fact that fewer contractors were carrying out ECO installations in late 2014 and early 2015 meant that there was far more capacity for the workforce to follow through with GD projects (Bayley & Allison, 2015).

| Table 3. Changes to GD upgrades post-Q3 2014. |
|---------------------------------------------|
| BBNP Q4 2010-Q3 2013 | GD Q1 2013-Q2 2014 | Q3 2014-Q2 2015 |
|----------------------|----------------------|------------------|
| Total assessments    | 138 323              | 263 072          | 312 864          |
| Total upgrades       | 12 605               | 3852             | 12 465           |
| Conversion rate      | 9.1%                 | 1.5%             | 4.0%             |

Figure 3. Number of project signups for Energy Company Obligation (ECO), Green Deal (GD) Cashback + GDHIF, and GD finance plans.
This idea can be considered in the context of the conversion rate. The BBNP performance remained relatively steady throughout its three-year run. However, Table 3 shows that the GD conversion rate more than doubled in the period post-Q3 2014.

This is consistent with the qualitative above findings: that the workforce are critical actors in driving demand for a retrofit programme and can be effective messengers in communicating the benefits of energy efficiency and selling upgrades to interested homeowners.

**Conclusions**

This study compared the performance of the US Better Buildings Neighborhood Program with the Green Deal in the UK. The BBNP and GD programme objectives are sufficiently similar that meaningful comparisons can be made. The analysis suggests that for the programme steps in which the GD did not have an active strategy, this did not simply indicate that the GD was a different type of programme, but rather that it was missing a programme step which would be beneficial in meeting the GD’s stated objectives.

The GD assumed that homeowners would take up retrofits if it was financially logical and that an active approach to driving demand was not required. The BBNP, on the other hand, used an active approach with both homeowners and the workforce simultaneously to stimulate supply and demand for thermal retrofits. While both programmes are successfully engaging high numbers of assessments, the BBNP is more successful at converting these assessments to actual retrofits. This is in large part driven by the different ways in which the BBNP reaches out to homeowners using multiple touch points and trusted messengers to engage both homeowners and the workforce.

The BBNP implemented an advanced data collection strategy and represents one of the largest ever contributions to the library of information with which to study domestic retrofit programmes. The GD plans to measure success in terms of the long-term changes in EPC ratings and other data from the England Housing Survey from now until 2020 (Interview #5). This represents a very long view of market transformation and a more granular approach to data collection would allow the documentation of the overall energy savings as well as spillover and wider market effects. The GD polling data suggest that approximately 80% of those who have received GD assessments would like to carry on with measures (DECC, 2014a); however, it is unknown how many translate this intent into action. At the very least, measuring such effects would help the GD document the extent of the savings resulting from their actions. Though, as correctly noted by Rose-now and Eyre (2015), households have many reasons for installing retrofit measures and a causal link to the GD assessment is far from clear.

Modern retrofit programme theory largely agrees that active engagement with both the homeowner and the workforce is beneficial to the programme, and that economic self-interest is insufficient to drive widespread participation. Based on the indicators described in this paper, the US BBNP and the UK GD represent two recent examples that concur with this theory.

It must also be noted that the UK government’s stated reason for discontinuing the GD, namely lack of participation, is not supported by the present study. Not only was GD participation in line with the BBNP example but also it was improving, particularly in the past year, as show in Figure 3. Where the GD could improve was in the conversion rates and workforce engagement as discussed. A key finding from the BBNP was that successful loan markets are established over many years and require clear and steady political support to avoid a boom and bust cycle that forces the market to chase subsidies rather than build a retrofit market in the long-term. This long-term stability is critically lacking in the UK.

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