Revisiting the KfW and Green Deal programmes: it's not all about finance!

Jean-Sébastien Broc
Broc Research & Consulting
34 quai de Versailles
FR-44000 Nantes
France
jsb@brnc.fr

Elodie Trauchessec
ADEME
500 route des Lucioles
FR-06560 Valbonne
France
elodie.trauchessec@ademe.fr

Christophe Milin
ADEME
27 rue Louis Vicat
FR-75737 Paris Cedex 15
France
christophe.milin@ademe.fr

Keywords

building refurbishment, national building renovation strategy, policy analysis

Abstract

Dealing with energy efficiency in existing buildings, the attention has increasingly been focused on financing issues in recent years. Two emblematic programmes have been frequently emphasised in this matter: the German KfW CO_2 Energy-Efficient Renovation programme and the UK Green Deal scheme.

The former has been established as one of the most successful worldwide, if not the most successful (e.g. by the IEA) programme in the field. The latter, after being expected as a true revolution, has faced strong criticism first in the UK, or for example at eceee 2013 Summer Study.

This paper looks beyond preconceived ideas, to examine the practical implementation details coming along the financing mechanisms, and how they have affected the outputs of both programmes. Their exposure has indeed led to many publications, providing the pieces of the puzzle making possible to understand what devils are hidden in the details.

The analyses point out that even if the financing mechanisms form the core and public face of these programmes, their implementation raises many other technical, organisational, etc. issues and/or assumes that certain contextual conditions are met (e.g., technical solutions well identified, qualification of professionals, quality of works, transaction costs induced). These conditions are examined for both programmes, questioning whether and how they affect their actual achievements.

The related experience feedback reminds that if financing is a necessary condition to any kind of economic activity, it is not sufficient by itself. Even more, the other conditions are often more critical for achieving a sustainable market transformation. These conclusions support the need to enrich the national strategies for building renovation, in order to integrate the energy dimension in the common renovation markets and not to create specific but separate (and much smaller …) energy renovation markets.

Introduction[1]

In recent years, an increasing attention has been devoted to financing issues in order to scale up the energy renovation of the building stock in European countries, as highlighted among others in the article 10 of the EPBD (2010) or in numerous reports (see e.g., BPIE, 2010 ; EIU, 2013 ; EFFIG, 2014). Several reviews have pointed case studies of policy measures addressing these financial issues (see e.g., Guertler et al., 2013a ; Murphy, 2014), with two cases getting a greater emphasis: the programmes run by the KfW public bank in Germany and the Green Deal scheme in the UK.

Their political backgrounds, main principles and results have already been analysed, especially as to the financial aspects (see e.g., Rosenow et al., 2013). The objective of this paper is to complement these analyses by examining the practical implementation details coming along the financing mechanisms, and how they have affected the outputs of both programmes. Their exposure has indeed led to many publications, providing the pieces of the puzzle making it possible to understand what devils are hidden in the details.

1. The sole responsibility for the content of this article lies with the authors. It does not necessarily reflect the opinion of the ADEME, which is not responsible for any use that may be made of the information contained therein.

The paper first recaps the main components of the two schemes, before describing the framework used to analyse their implementation. The 5 main steps identified in this framework are then scrutinised for both schemes. This comparison is finally put into concluding discussions, in a perspective of experience sharing to support the development of more comprehensive national renovation strategies.

Reminder about the two schemes

KFW PROGRAMME

The public bank KfW (Kreditanstalt für Wiederaufbau) has been commissioned by the German government to lead programmes for improving the energy efficiency of buildings since 1996. The key initial principle of this programme is the capacity of KfW to raise funding (with very low refinancing cost) on the international capital markets with excellent conditions (large amount, low rates)[2], see for ex. (Schröder et al., 2011) for more details about the KfW and its specific advantages.

The main component of the successive programmes has been to provide homeowners with financing support[3]: very low-interest loans (thanks to KfW's very low refinancing costs and complementary subsidies from the Federal budget) first alone, then with repayment bonus, and more recently direct grants (as an alternative to loans). The homeowners can apply for the KfW loan at any commercial bank or other credit institution, while the applications for grants are directly managed by KfW.

Three programmes have been successively implemented since 1996, keeping the main general principles (i.e., providing very low-interest loans) but with significant changes especially as to amount of funding, action eligibility and features of the incentives (see e.g., Schröder et al., 2011). The political process behind these changes (in particular for the amount of funding) has been analysed in details by Rosenow (2013). The main periods and changes from 2001 are summarised in Figure 1[4].

Over time, the improvements made to the programmes have gone beyond the financial aspects (e.g., definition of an energy efficiency label). The overall implementation process is described further on in the paper. Official details about the incentives proposed can be found on the KfW website[5], as well as evaluation reports[6] (mainly in German).

GREEN DEAL SCHEME

The Green Deal scheme was officially launched by the UK government in October 2012, with an effective start early 2013. The main initial component is a funding mechanism based on a loan whose repayments are made through the electricity bills and should not exceed the (conventional) energy savings assessed over the expected lifetime of the measure(s) (Golden Rule principle). The highlighted innovations are that the loan is attached to the property and not to the owner or occupant, and that the repayments are due by the occupant (addressing the split incentive dilemma[7]). The key political principle was that this scheme was supposed to be mostly driven by private actors.

When considering the implementation of the funding mechanism, numerous questions were raised, in particular in relation to ensuring the confidence of the different actors (e.g., households, loan providers) in the scheme. This has led to a comprehensive design, encompassing the whole implementation chain, from the initial energy advice to the repayment process. While addressing most of the key implementation barriers to energy renovation, this resulted in a complex scheme, opposed to the initial simplicity principle of the funding mechanism. Iterative improvements are on-going to streamline the scheme (for ex. through a Stakeholder Fora).

The Green Deal scheme was thought to partly substitute and complement the energy efficiency obligation schemes run since the 1990's (with many significant changes, like for the KfW programmes; see e.g., Rosenow, 2012): the Green Deal was meant for very cost-effective measures (e.g., cavity wall insulation), while the changed obligation scheme (ECO)[8] was directed to more difficult, hence expensive, measures or contexts (e.g., solid wall insulation, low income households).

The scheme has faced several problems during its preparation and launch, leading to a drastic revision of its objectives (Guertler et al., 2013b). The government had to intervene in different ways in order to mitigate the drop in investments compared to the previous years, in particular by providing funds to the main private consortium offering the Green Deal loans (the Green Deal Finance Company), by subsidising pilot projects of local authorities (Green Deal Low Carbon Cities and Pioneer Places) and by offering direct grants to households (cash-back scheme in 2013 and Green Deal Home Improvement Fund in 2014).

The overall implementation process is described in the next part of the paper. Official details about the scheme from the households' point of view can be found at the government website[9], as well as monitoring data[10] and research reports[11]. Details about the different categories of professionals involved can be found at the oversight body's website.[12]

Proposed framework to analyse both schemes

AVAILABLE COMPARISONS

Schröder et al. (2011) didn't perform a comparison per se between both schemes (at that time the Green Deal was in gestation), but made a detailed analysis of the KfW programmes in order to propose recommendations for the UK context. In

2. Moreover, this funding may not be accounted for in the national debt.

3. In this paper, we focus our analyses on energy renovations, but the KfW programmes also cover new constructions.

4. Sources: data compiled from (Schröder et al., 2011), (Rosenow, 2013) and KfW annual reports. In general, budgets are not planned annually but for multiyear periods. We averaged here these amounts over each period.

5. https://www.kfw.de/inlandsfoerderung/Privatpersonen/Bestandsimmobilie/

6. https://www.kfw.de/KfW-Konzern/Service/Download-Center/Konzernthemen-%28D%29/Research/Evaluationen/Evaluationen-Energieeffizient-Bauen-und-Sanieren/

7. Usually works are paid by the owners while the occupants profit from the energy savings.

8. Energy Company Obligation (ECO), substituting from January 2013 the previous Carbon Emissions Reduction Target and Community Energy Saving Programmes.

9. https://www.gov.uk/green-deal-energy-saving-measures

10. https://www.gov.uk/government/collections/green-deal-and-energy-company-obligation-eco-statistics

11. https://www.gov.uk/government/collections/green-deal-assessments-research

12. http://gdorb.decc.gov.uk/

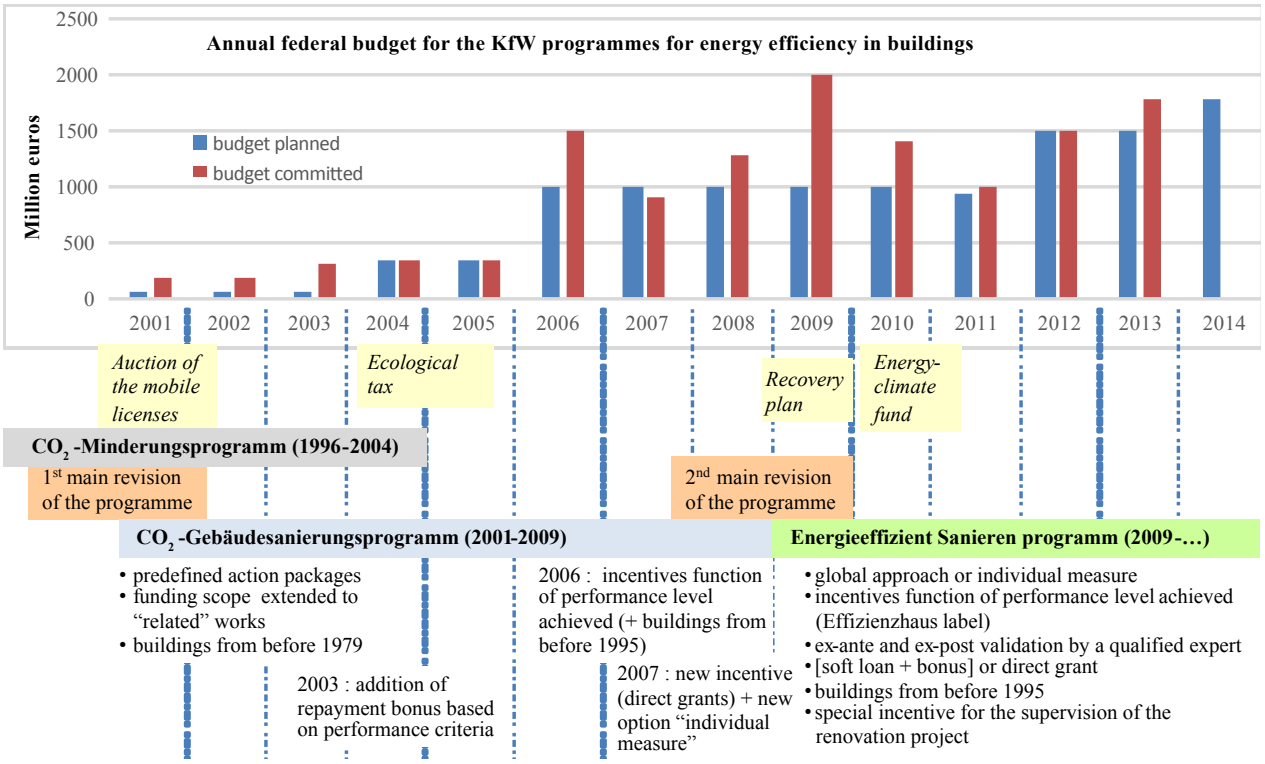

Figure 1. Main periods and changes for the KfW programmes (2001–2014).

particular, they looked at the main principles and changes in the implementation of the KfW programmes, from a policy maker's point of view. They pointed out significant differences of context: majority of owner-occupants in the UK vs. majority of private renters in Germany, higher initial performance of the building stock in Germany, energy efficiency mostly promoted so far through energy suppliers' obligations in the UK vs. mostly public-funded programmes in Germany, more focus on overall performance in Germany while more incentives for individual measures in the UK. Schröder et al. concluded on 7 lessons learnt:

1. Importance of integrating the three policy "pillars" (information, regulation and incentives).
2. Importance of the design of the incentives (attractive enough, financially, and performance-based).
3. Supporting the development of qualified professionals for the energy advice and the installation of measures.
4. Linking incentives for renewable energy technologies to minimum energy end-use efficiency requirements.
5. Favouring an overall performance approach (even if measures will be installed step by step).
6. Supporting innovation through pilot and demonstration projects.
7. Importance of the exemplary role of public buildings, especially at the local level.

Rosenow et al. (2013) have compared both schemes looking at the following aspects:

- Scope (action eligibility): similar minimum performance levels for the technical requirements of individual measures, KfW favouring measures with higher investment costs and comprehensive renovation approach vs. Green Deal focused on the most cost-effective measures (due to the Golden Rule) without condition for comprehensive approaches.
- Financial architecture: subsidised loans from federal budget through a public bank in Germany vs. private driven in the UK (although the government had to intervene, as mentioned above), larger loans in Germany (higher maximum vs. Golden Rule for the Green Deal) and higher interest rates in the UK, loans attached to the owner in Germany vs. to the dwelling in the UK, loans complemented by grants for the KfW programme vs. no direct grants for the Green Deal scheme initially.
- Interactions with other policy instruments: strong links for both schemes (with the building code and the information activities for the KfW programme, with ECO and feed-in tariffs for the Green Deal).

Other reviews of energy efficiency policies for dwelling renovations have included the KfW programmes and the Green Deal scheme, as well as other case studies. Murphy (2014) analysed the policies implemented in Germany, the UK, Denmark and Sweden, focusing on concepts related to policy instrument design and evaluation (instrument combinations, long term framework, incentivising/obligating balance, etc.). Guertler et al. (2013a) examined barriers to energy efficiency in buildings, and especially the ones related to financial issues, through 8 case studies of schemes addressing them. Their

analytical framework covered factors related to the scheme design, the contextual implementation factors, outputs and outcomes.

PERSPECTIVE USED IN THIS PAPER

The literature mentioned above provides valuable lessons and recommendations, analysing the schemes from a policy making perspective. We propose in this paper to complement these analyses by adopting the perspective of implementation, looking at the whole chain from the information of the building owner (or occupant) to the validation of the action implemented.

Based on a review of the implementation details available (from official documentations and papers about both programmes[13]), 5 main steps came out as relevant to describe the implementation process of a renovation project. This framework makes it possible to examine the owner (or other renovation customer) experience together with the practical components of the schemes. These 5 steps and the related questions covered in this paper are presented in Figure 2.

5 steps from information to post-implementation validation

STEP 0: GENERAL INFORMATION

This step can be analysed in considering first the general information background for energy renovation in the country, then the information components included in the activities of the schemes and finally the potential role of other actors (e.g., credit institutions, energy advisers) in informing project holders about the scheme.

Current KfW programme

The literature highlights the strong links between the so-called "three pillars" of the German energy efficiency policies for buildings (see e.g., Schröder et al., 2011): information, regulation and incentives. The KfW programme can indeed profit from a favourable information background, especially thanks to campaigns and other information activities led by the German agency DENA, such as *Zukunft Haus* (House of the Future) (Griechisch and Unger, 2014). DENA has also initiated a partnership (Allianz für Gebaüde-Energieeffizienz) gathering professional organisations, energy suppliers, renovation solution suppliers and research institutes. Local organisations (for ex., local authorities, consumer associations) also implement information activities. All these activities are not promoting directly the KfW programme but more generally energy efficiency in buildings or often more specifically energy advice services (see next step). However, it is very likely that these activities also include information about the KfW incentives.

The information activities included in the KfW programme are not emphasised in the official documentation nor in most of the related literature. It is noticeable that the official documentation does not include figures about the communication budget of the programme. The information activities mostly include dedicated pages on the KfW website, national campaigns led by the Federal Ministry for Economic Affairs and Energy Ministry of Housing, annual awards and training activities by KfW (sales department) for banks staff. There is no separate communication budget for the KfW energy efficiency programmes, but an overall communication budget for KfW programmes (KfW, 2015).

Energy advisers likely play an important role in informing the project holders about the incentives available. But this is not much discussed in the literature. Bankers also have a role: they may recommend KfW loans when their customers contact them about financing a "regular" renovation project (Schopp, 2014). The DENA efforts towards architects, engineers, building professionals and energy advisors have also been highlighted as a key to create a favourable climate, as these experts will be the direct contacts of project holders (Schröder et al., 2011).

The KfW programme does not correspond to a true brand. The three main periods since 1996 have seen three different names (see Figure 1). But since 2009, the scheme holds an energy efficiency label (*EffizienzHaus*) that acts as a strong brand.

So far, the entire federal budget available each year for KfW incentives has always been used (see Figure 1), suggesting that the level of communication is sufficient.

Green Deal

In the UK, the general information background is mainly linked to the energy efficiency obligation schemes operating since the 1990's and to the activities led by the Energy Saving Trust. The government also supports various initiatives or campaigns, like the "Big Energy Saving Week" in 2014. Local authorities and NGOs are also promoting energy efficiency in buildings in many different ways.

Initially, the government wanted to limit the public expenses for communication and information about the Green Deal, as the aim was for the scheme to be as much privately driven as possible. The communication principle relies on the public brand "Green Deal approved", assuming that the private actors would promote it. However before its launch, the scheme had been above all subject to strong criticism widely reported in the press (Guertler et al., 2013b). Private actors called for a public national campaign to support the promotion of the Green Deal. The government first refused. But when seeing the high risks of failure, a communication campaign was finally led with a budget of 3.6 million euros (so still limited compared to the initial ambition of the scheme). Another measure to support the Green Deal and the Energy Companies Obligation (ECO), has been the launch in April 2012 of a hotline managed by the Energy Saving Trust (*Energy Saving Advice Service*).

The Green Deal process requires the involvement of different categories of actors[14]: assessors (energy advisers), providers (who supervise the renovation projects, including its financing) and installers. They all need to be "Green Deal approved" so that the project holder can get a Green Deal loan. In theory, they thus have a direct interest in promoting the Green Deal, as it is supposed to bring them more turnover. But for many of these companies, the Green Deal has so far been a minor activity[15].

13. See references mentioned along the text.

14. See http://gdorb.decc.gov.uk/ for more details.

15. http://gdorb.decc.gov.uk/admin/documents/FinalGDORBAnnualReport2012 2013.pdf

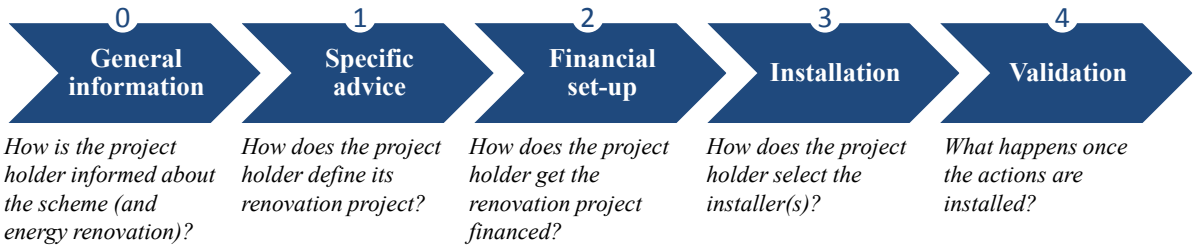

Figure 2. Analytical framework. Note: here the project holder can be the building owner, a housing association or similar body (for publicly-owned dwellings) or the building occupant (only for the Green Deal).

The UK government has commissioned regular surveys about the households' awareness and understanding of the Green Deal[16]. While the general awareness of initiatives promoting energy savings has been quite stable (55–60 %), the specific awareness of the Green Deal has progressed from 10 % in November 2012 to 19 % in March 2013, to reach 29 % in October 2014[17]. The main source of awareness reported was TV advertisement, ahead of advertisement in newspapers and posters. The recognition of the Green Deal Quality Mark and the understanding of the scheme have increased in similar ways. But the level of reassurance perceived in the Green Deal Quality Mark has remained stable (6/10, with 10 "completely reassured"). The awareness of the Green Deal comes closer to the one of the much older Energy Saving Trust, but the scheme still faces some scepticism.

Discussion

The Green Deal experience feedback shows that a public support is always needed when launching a new scheme, even if intended to be mostly privately driven. Moreover, it should be noted that the KfW process appears to be much simpler for the project holder than the Green Deal one, making it easier to communicate. Another difference is the political consensus observed in Germany (Rosenow, 2013) favouring a stronger support in the programmes, while the Green Deal has been a subject of oppositions in the UK, which may partly explain the scepticism of the private actors and households towards the scheme. Still, negative news about energy renovation have been reported in the media in both countries (Griechisch and Unger, 2014), showing that information is an on-going task. The label or brand of the schemes can therefore be an effective communication tool, if maintained over time and within a quality process (see e.g., the Green Deal Code of Practice).

STEP 1: SPECIFIC ADVICE

In both schemes, the application for a loan (and/or grant) first requires the project holder to get an assessment of the dwelling energy performance. This assessment aims at providing the project holder with recommendations about renovation actions, and/or at validating the renovation project. This step can be analysed by looking at who can deliver this assessment and at its content.

Current KfW programme

The assessors have to be registered by DENA, which also holds the online register[18] that the project holders can use to look for an assessor. The database has been jointly developed by different ministries, DENA and the KfW. The registration is based on qualification requirements and proofs of regular training, and is complemented by random controls. The assessors are mostly engineers or architects, and in a lesser extent building professionals[19]. About 4,000 assessors were registered in 2013, while there were more than 12,500 in early 2015[20].

The KfW programme includes energy performance requirements defined from the building code. First, there are minimum requirements for a renovation project to be eligible for a loan and/or a grant. Then the amount of grant (repayment bonus or direct grant) is a function of the approach and performance level achieved. The ex-ante assessment thus aims at validating the renovation project, i.e. verifying if the expected performance level meets the requirements of the incentive applied for. This has to be done through the official on-line assessment tool, using the calculation method of the building code (hence reinforcing the consistency between incentives and regulation).

The German context faces a paradox as regards energy assessment of dwellings. DENA estimated that only one third of the private dwellings had an Energy Performance Certificate in 2010 (Schröder et al., 2011 p. 60), while Griechisch and Unger (2014) pointed the diversity of energy advice offers, structured in three levels: 1) free online energy checks within the Climate Protection Initiative and a free energy hotline managed by DENA, 2) low-cost energy consultation by the advice centres of consumer organisations (costs mostly subsidised, with a price between €5–45 [Adisorn et al., 2012]) and 3) detailed and standardized on-site energy assessment (*BAfA-Vor-Ort-Beratung*). Levels 2 and 3 can meet the expectations of the KfW programme and include recommendations (level 3 also defines an action plan making possible a progressive renovation approach).

The *BAfA-Vor-Ort-Beratung* is another government scheme (led by BAfA office), offering in 2014 a 50 % subsidy (max. €500) for the assessment. The number of subsidised assessments increased up to 32,661 in 2009, before strongly decreas-

16. https://www.gov.uk/government/collections/green-deal-household-tracker-survey
17. https://www.gov.uk/government/collections/green-deal-assessments-research
18. http://www.dena.de/en/projects/building/database-of-experts-for-energy-efficient-building-and-refurbishment.html
19. http://www.buildup.eu/fr/news/41645
20. https://www.energie-effizienz-experten.de/sie-sindbauherrunternehmen/expertensuche

ing (16,247 in 2012), leading to a revision of this scheme for March 2015[21]. Even in 2009, the number of assessments was much lower than the number of files accepted for KfW incentives (close to 204,000 in 2009). So these assessments only cover a small share (about 16 %) of the applications validated by KfW. In parallel, the KfW programme includes a special incentive to subsidise up to 50 % (max. €4,000) of the renovation or construction supervision, that may include the ex-ante assessment (KfW, 2015). This supervision was initially required only for the highest performance level. Since June 2014, it is required for all *EffizienzHaus* levels (independent of construction or refurbishment) as well as for individual measures (KfW, 2015).

The *BAfA-Vor-Ort-Beratung* scheme has been evaluated in 2014[22], showing a very positive customer satisfaction rate. The advice services of consumer organisations have also been evaluated in some regions[23]. However, the assessment phase has not been covered by the official evaluations of the KfW programmes.

Green Deal

In the Green Deal, "assessor" is used for the company and "advisor" for the expert. The Green Deal certification is delivered for the assessors (company level)[24], by certification bodies authorised by the UK Accreditation Service and financed through certification fees. Advisors have to be registered for the Energy Performance Certificates (EPC) and get a complementary qualification specific to the Green Deal (see below). The whole process is supervised by the Green Deal Oversight & Registration Body (GDORB), which holds the online register of Green Deal assessors.

Being afraid of a possible lack of advisors for the launch of the scheme, the government promised in March 2012 more than 1 million euros for training about 1,000 advisors. This was also likely to mitigate a crisis of the EPC market. Only 40 advisors were registered in October 2012 (official launch) and 270 in January 2013 (actual launch), so it could have been a limiting factor in the Green Deal take off. Close to 3,000 advisors were registered by the end of 2013 and 4,135 by the end of 2014. So this seems not to be a critical issue anymore.

The Green Deal assessment includes a usual EPC complemented by an Occupancy Assessment (OA). While the EPC rates the standardised energy consumption, the OA examines the actual consumption based on energy bills and a standardised interview with the occupant. The assessment report includes detailed recommendations, with energy savings and costs per action, concluding with expected monthly energy savings vs. repayment (not including interest rates). The advisor shall explain the report and the Green Deal process to the occupant. A free public software (GDsap) makes it possible to simulate several scenarios of action package.

The complements to the EPC address the frequent differences between standardised and actual consumption. In addition, an "in-use factor" is applied to the energy savings of certain action types, to take into account possible performance gaps between theoretical and actual conditions of installation and use. These provisions are meant to protect the occupants from bias that could lead to lower-than-expected energy savings, hence not compensating the repayments. The interview between the advisor and the occupant is also an opportunity to promote energy saving behaviours. But in order to limit the cost of the assessment[25], the advisors may tend to shorten the interview. The double rating (EPC and OA) can also be a source of confusion or misunderstanding.

After a very slow start (74 in January 2013, 1,729 in February 2013), about 130,000 assessments were registered in 2013 and about 316,000 new ones in 2014. This assessment is required for ECO actions, some grant schemes of the government (e.g. Renewable Heat Incentives), and especially grants to boost the Green Deal scheme (cash-back and then Green Deal Home Improvement Fund). This may explain partly the number of assessments. An official evaluation[26] showed indeed that in 2013 more than 60 % of the assessments were paid by a third party (mainly energy suppliers or local authorities). As in Germany, the customer satisfaction rate is very positive.

Discussion

The Green Deal has put a greater emphasis on the assessment phase, as it is expected to be a key phase for taking up actions and implementing the Golden Rule. For KfW, the incentives are first targeted to increase the performance level of planned renovations. Therefore the assessment phase is not directly subject to evaluation. But the assessment results are checked as part of the quality management system, especially in the course of on-site project controls. The quality of the assessments relies on the registration of the assessors[27] and the requirement to provide project holders with a tailor-made concept for the refurbishment (KfW, 2015). The take-up effect of the assessment is not monitored within the programme. For the Green Deal, the number of assessments is much higher than the loans committed (see step 3), while it is the reverse for the KfW programme (for BAfA assessments). The assessment does not appear to be a critical factor for action taking. However it seems very useful for project holders to choose the most appropriate actions, possibly leading to higher performance level.

While the Green Deal assessment aims at informing the occupants about their own energy consumption and at identifying the actions meeting the Golden Rule, the KfW programme does not take actual energy consumption data into account (use of standardised calculations) (KfW, 2015). It is above all meant to provide a guarantee about the expected performance level (with a risk of performance gap, as analysed by Galvin 2014).

The interactions between the scheme-related assessment, the EPC and other public advice services are at least partly addressed in the UK context. This is not so clear for Germany. Griechisch and Unger (2014) points out the confusions ob-

21. http://www.bafa.de/bafa/de/energie/energiesparberatung/index.html

22. http://www.bafa.de/bafa/de/energie/energiesparberatung/publikationen/sonstiges/evaluation_vor_ort_beratung_2014.pdf

23. See for example https://www.ifeu.de/index.php?bereich=ene&seite=KEK.

24. http://gdorb.decc.gov.uk/assessors/assessor-specifications

25. A quotation survey has estimated the price range between €85–220: http://www.greendealinitiative.co.uk/2013/02/green-deal-provider-costs-of-assessments/.

26. https://www.gov.uk/government/publications/research-on-green-deal-assessment-further-analysis-and-new-findings

27. The assessors' record of project experience and/or further professional trainings is checked every two years.

served among households about BAfA-qualified assessors and EPC assessors. Moreover, the experience feedback from Green Deal and KfW schemes confirms that the content and quality of the assessment depends on its cost (indeed on its time length).

STEP 2: FINANCIAL SET-UP

The financial mechanisms of both schemes have already been analysed and compared in details in the literature (see e.g., Rosenow et al., 2013). So we focus here on how the project holder can get the financing, looking at the application/validation process, who is involved and whether the financing brought by the scheme is sufficient. Note: as mentioned in step 1, for both schemes the project holder has to first get an energy assessment validating the choice of the action package.

KfW programmes

To get a KfW loan, the project holder has to apply for it through a commercial bank or credit institution which will first apply its own creditworthiness criteria. A mandatory online-tool has been introduced in 2013 for the energy assessments. This tool automatically checks the compliance of the project with the performance criteria by testing plausibility for the data provided. This validation must be included in the application file for the bank to submit it online to the KfW. This makes an instant decision on the application by KfW possible (KfW, 2015).

Once the file is approved, the bank prepares the loan contract with the project holder, and requests the financing from KfW. The upfront costs for the project holder are thus limited to the energy assessment and the application fees possibly applied by the bank. In addition, the project holder may get a repayment bonus function of the project performance level.

The statistics available for 2008–2013[28] show that the loan commitments (per dwelling unit) have remained on average smaller (about €15–30,000) than the loan maximum (€75,000 for a global renovation, €50,000 for individual actions): the project holders would not need other financing sources in most of the cases.

To get a grant (without a loan), the project holder has to apply for it directly to KfW. In that case, the project holder has to cover upfront most of the investment costs.

For 2008–2013, as many dwellings have benefited from a loan as from a grant only (about 1.2 million each, close to an average of 400,000/year in total), showing that both mechanisms may be attractive for project holders. However strong discrepancies are observed among the years (with a pic of grants in 2009). The total amount of financing (loans + grants) provided by the KfW each year has varied, for the period 2008–2013, between €2.9 billion (in 2011) and €5.8 billion (in 2009).

Green Deal

One of the innovations in the Green Deal scheme is the new role of the Green Deal provider. The project holder can use the assessment report to ask for providers' offers. The selected provider is then assumed to be the single contact for the project holder. The provider manages the loan process, the contacts with the installers and the guarantee on the actions installed.

The provider's offer includes the technical and financial details of the Green Deal plan. The project holder has thus to agree first on the action package (based on options included in the assessment), then on the financing deal (interest rates, repayment amounts and period). The provider shall explain to the project holder the assumptions used to estimate the energy savings, repayment amounts, future energy prices, etc. which may be complex.

The Green Deal has to be signed by the owner and the occupant. Then the provider shall register it in the Green Deal Central Charge Database, where it is submitted to validation. Most of the verifications are automatized, by crossing different databases (of the plans, assessments and electricity consumer references). The remaining part of the validation is done by the electricity supplier of the occupant, as the repayment is made through the electricity bill. The verifications are administrative. The technical details are not verified at this stage, but may be controlled after the action installation (especially in case of customer complaints).

The Green Deal provider will cover the upfront costs of the actions[29], being then reimbursed by the project holder's electricity supplier from the repayment included in the electricity bills. The provider can use in-house funds or external financiers. In most of the cases, it will get the financing from the Green Deal Finance Company (GDFC). The GDFC is a non-for-profit consortium including among others energy suppliers, banks and investment funds. The government contributed for a large share to its initial capital (in particular through the Green Investment Bank).

As for the assessors, the number of authorised Green Deal providers may have been a limiting factor: only 8 in October 2012, 25 in January 2013, 101 in August 2013 and 176 by the end of 2014. The first Green Dean plans were registered in May 2013, with only 1,612 plans registered by the end of 2013, and 8,348 by the end of 2014. At the end of October 2014, the GDFC announced to have financed over 7,000 plans, committing about 32 million euros[30]. Many reasons have been pointed to explain the low take-off of the Green Deal financing: high interest rates (7 % or above) combined with long repayment period, other financing sources (in particular ECO), scheme complexity, etc. (for more discussions, see Rosenow and Eyre, 2014).

Discussion

Beyond the differences in the financing mechanisms, the related processes are also based on different principles and approaches. Over the years, the KfW programme has been changed to offer more flexibility to the project holders (choice between loans and grants, between individual actions and global renovation). In addition to much higher interest rates (about 7 % for the Green Deal vs. 1 % for KfW), the restrictive principles of the Green Deal Golden Rule (limiting in practice the loan amount) are likely to be a key reason why the project holders chose other financing sources.

28. https://www.kfw.de/KfW-Konzern/%C3%9Cber-die-KfW/Zahlen-und-Fakten/KfW-auf-einen-Blick/F%C3%B6rderreport/index.html

29. The project holder can also cover part of the upfront costs, or combine the Green Deal loan with other funding sources.

30. http://www.tgdfc.org/media/green-deal-finance-company-breaks-through-landmark-of-25-million-ongoing-plans/ ; this can be seen as close to an annual flow, as few plans were financed before October 2013.

Moreover, while the KfW offers training for increasing the involvement of commercial banks in its programme, the Green Deal theory relied on market mechanisms to attract Green Deal providers. This results in a kind of chicken-egg problem (low demand-low offer). The process for a provider to be Green Deal authorised is complex. With a very low take-off, few actors have an interest in taking the risk. In order to stimulate the market, the government had to propose direct aids to project holders through the cashback scheme and Green Deal Home Improvement Fund, see (Rosenow and Eyre, 2014) for more discussions about this.

Several authors (e.g., Guertler et al., 2013b ; Rosenow and Eyre, 2014) also highlighted the major problem resulting from the radical switch from the previous obligation schemes to the combination of Green Deal and ECO. The results observed over 2013 and 2014 confirm that a transition phase was needed, both to have time to get the Green Deal into shape, and to move from direct aids only to a system combining direct aids and market mechanisms (assumed to foster private investments).

STEP 3: INSTALLATION

We analyse here the installation phase, looking at the eligible installers and the type of actions installed. The energy savings results are not discussed here, as they would require detailed explanations about the calculation assumptions (see for ex. Rosenow and Galvin, 2013).

KfW programmes

Actions have to be installed by a professional, but the programme does not include specific qualification requirements, nor training activities. Such activities are led in parallel, in particular by DENA.

The eligible action types include insulation of building envelope, heating and ventilation systems (including optimisation devices). The minimum performance requirements are based on the current building code. For comprehensive renovations, a specific label has been created (EffizienzHaus, EH) with different levels according to the primary energy consumption level and the overall transmission coefficient of the building envelope. These levels are expressed in percentage compared to the building codes (EH70 then means a dwelling consuming 70 % of the building code level).

For 2008–2010, on average 120,000 dwellings/year (representing about 22,000 buildings/year) were renovated meeting an EH label. It has decreased to about 50,000 dwellings/year for 2011–2013. More than 95 % of these global renovations have been financed with loans. 78 % of the projects met a label between EH130 and EH85, while 22 % met EH70 to EH55. The average loan amount is about €150,000/building (with between 4 and 6 dwellings per building on average).

For individual actions, the pace is more stable with on average about 110.000 and 40.000 actions[31]/per year respectively for building envelopes (36 % grants/64 % loans) and heating systems (50 % grants/50 % loans). In addition, peaks of optimisation actions financed through direct grants have been observed in 2009 and 2010 (57,119 and 190,786 actions respectively). Actions on heating systems are mainly condensing boilers. Windows and roof insulation are the most frequent actions for building envelopes, then comes external wall insulation.

Green Deal

Like for the assessors, the installers (company and employees) have to be certified, according to PAS (Publicly Available Specification) 2030 defined in 2012 to answer the needs of the scheme. Specifications have been made per type of action. The certification includes an ex-ante verification of the quality processes (in particular documentation storage) and random ex-post controls of works done. 231 companies were certified in October 2012, 531 in January 2013, 2,353 by the end of 2013 and 2,514 by the end of 2014. This may not have been a limiting factor for the scheme. However, it should be noted that the number of certified companies per type of action may differ widely (for ex., an overrepresentation of photovoltaics can be seen in statistics of June 2013[32]).

The eligible action types include insulation, heating, lighting, glazing and microgeneration. So far, 45 action types can qualify for Green Deal financing[33]. The main criteria for an action type to be eligible are that it can meet the Golden Rule based on standard modelling. But some action types may also qualify even if they require in practice a complementary funding (for ex., from ECO).

1,738 actions were installed through Green Deal financing in 2013, 6,449 from January to November 2014. Meanwhile, ECO supported 532,611 actions in 2013 and 685,056 for January to November 2014. The Green Deal financing has still not succeeded in scaling up. The obligation scheme (meaning mostly direct aids) remains by far the most important financial support to renovation actions.

The three most frequent Green Deal actions are microgeneration (i.e. PV, 29 %), boilers (25 %) and solid wall insulation (17 %). Opposite to the initial expectations, low cost measures are much less represented (9 % for loft insulation, 3 % for cavity wall insulation). The same occurred for ECO which was supposed to be focused on more difficult actions, such as solid wall insulation (6 % of the ECO actions). While cavity wall and loft insulation represent respectively 38 % and 26 % of ECO actions (and 23 % for boilers). The first special incentive (cashback scheme) above all supported boilers (80 % of the cashback actions), with a possible high free-rider effect (see Rosenow and Eyre, 2014). Targeting of the Green Deal Home Improvement Fund has been improved, with 65 % of these actions being solid wall insulation.

Discussion

The main statistics available about the installation phase for both scheme highlight their respective approach.

The KfW programme's evaluations insist on the energy savings gain or the performance levels reached. An overall assessment gives figures about impacts on jobs and public budget. The market effects are not examined specifically, as the policy goals are CO_2 and energy savings (KfW, 2015). The 2014 German

31. Statistics about individual actions are available in number of actions, and not in number of dwellings covered.

32. http://gdorb.decc.gov.uk/admin/documents/FinalGDORBAnnualReport2012 2013.pdf

33. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/48406/5504-which-energy-efficiency-improvements-qualify-for-g.pdf

NEEAP (National Energy Efficiency Action Plan, p. 27) states that "the necessary sets of qualifications are widely established in the training and masters' examination schemes for the relevant occupations and that the relevant technologies and processes are well covered", assuming implicitly that the number of qualified building professionals would not be a problem in Germany.

The Green Deal monitoring provides many market indicators, and surveys among actors are done on a regular basis to analyse the customer experience and the development of the so-called supply chain. But likely due to the low number of actions, there is less communication about the energy savings results.

The more flexible approach of the KfW programme makes possible to support both, individual actions and global renovations. From 1996 to now, the priorities and conditions for action eligibility have changed several times (see Figure 1). The experience has shown that combining incentives for individual actions and global renovations is more effective, as the situations faced by project holders are diverse (in terms of initial state of the dwelling, financing capacities, time perspective, etc.).

The Green Deal scheme is still looking for a real take-off. Its implementation has required a very detailed design in order to address the possible risks for the project holder, and thus to provide guarantees and to build a strong Green Deal mark. But all these provisions bring a significant complexity to the actors, adding another important barrier to the ones of too high interest rates and restrictive Golden Rule. The intensive research efforts commissioned by the DECC (Department of Energy and Climate Change) support a continuous improvement process. Whereas some key aspects such as relying on private financing markets only and the Golden Rule principles would need to be revised (see Rosenow and Eyre, 2014), the supply chain approach could be promising. However, the scheme is likely endangered by the contradiction between the political will of short term results and the longer run always necessary for market transformation effects.

The drop between 2012 and 2013–2014 noted by Rosenow and Eyre (2014) in the number of actions (in particular for loft and cavity wall insulation) raises the issue of possible negative market impacts discussed in UK medias[34], at the opposite of the optimistic job creation effects claimed by the KfW programme. Both experiences show that interesting indicators to monitor market trends would be the business forecasts of manufacturers or suppliers of energy efficiency solutions (e.g., insulation materials, efficient windows, boilers).

STEP 4: VALIDATION

The validation phase is examined here through the quality or guarantee aspects, and the repayment process.

KfW programmes

The quality management system of the KfW programme relies in particular on the registration of the energy assessors and on-site controls performed by the assessors after the works are done (KfW, 2015).

The project holder has also to keep the project documentation for possible random controls. More than 400 projects per year are inspected (KfW, 2015). The first 50 inspections done in 2009 showed that 80 % of the actions installed differed in some way from what was initially planned. But the performance level defined in the application file was always met at the end (Adisorn et al., 2012).

Griechisch and Unger (2014) reported some negative experience feedback or false ideas communicated in German medias. But this seems general, with no explicit link with the KfW programmes. The public funds available each year for KfW incentives have always been totally used, and the EH label has been reported as a driver of increased asset value. This tends to show that the general opinion towards the programme would be very positive. However the official evaluations did not address these aspects.

As KfW loans are regular loans, the repayment process is classical. The money flow is the reverse of the upfront investment, coming from the project holder to the KfW through the commercial bank. The risk of default is hedged by the commercial bank (hence the initial creditworthiness test).

Green Deal

In order to address issues raised during the preparation phase of the Green Deal scheme, a particular attention has been paid to quality processes. This has resulted in particular in certification or authorisation requirements for each actor category of the supply chain (assessors, providers, installers). One cornerstone of this approach is the Green Deal Code of Practice that all actors have to sign. These efforts are promoted towards the project holders through the Green Deal quality mark.

A dedicated process has been set to facilitate possible complaints, with a Green Deal Ombudsman to examine conflicts that the Green Deal providers could not solve directly. Regular customer surveys are performed to monitor the satisfaction and possible problems encountered, among other indicators. This has been recently complemented by a mystery shopping research (focused on the assessments).

The Green Deal providers shall store the project documentation that can be controlled a posteriori (the same applies for the assessors with the assessment reports). They also have to contact the occupant or owner to get a confirmation that the actions have been correctly installed as planned. They enter this confirmation in the Green Deal database so that the repayment process starts.

In addition, the providers shall also ensure that the project holder get an updated EPC. This update does not require an on-site visit, but the registration of the actions' evidence and Green Deal plan in the EPC database.

The actual feasibility of the repayment process was delayed to after the official Green Deal launch. Rosenow and Eyre (2014) reports that the first supplier to offer project holders the facility to repay Green Deal loans through electricity bills was British Gas from mid-May 2013. This has added another limiting factor to the scheme.

In practice, the risk of default is hedged by the Green Deal providers. However it is assumed to be limited, as default rates for electricity bills are lower than for consumption credits. In fact, the creditworthiness is mostly checked by the GDFC, applying less strict criteria than for consumption credits. The GDFC estimated that about 80 % of British households could be eligible to Green Deal financing, while it is estimated that only 50 % is eligible to usual criteria applied for consumption credits.

34. See for ex., http://www.theguardian.com/environment/2013/jan/16/thousands-insulation-jobs-lost or http://www.businessgreen.com/bg/analysis/2375216/has-the-insulation-industry-reached-green-deal-crisis-point.

Discussion

The background is very different in both countries, for credits to consumers as well as for the qualification of building professionals and other actors involved in the scheme. This explains the differences observed about quality processes, in particular that the Green Deal scheme had to reinforce the related provisions. The German context seems to rely on an implicit confidence in the programme, while the UK context required detailed specifications to bring guarantees and to ensure consumer protection.

As for the other steps, the repayment process for the Green Deal is more complex to implement. However, it may have created conditions to solve part of the creditworthiness issue and of the tenant/owner dilemma.

General discussion and conclusion

Any programme for energy renovation, even if focused on financing mechanisms, will raise many non-financing issues, as soon as performance requirements are attached to the financing (which is a key success factor). These issues may be sources of limiting or success factors and should not be overlooked.

In 2014, the Member States had to report to the European Commission a national renovation strategy[35]. BPIE (2014) analysed 10 of these reports and highlighted that "none of the strategies looked at policy or market requirements in the medium to long-term. Rather, the focus was very much on near term actions"(p. 8). BPIE also pointed that "policy packages and support measures need to be developed in more detail to provide effective incentives to invest in deep renovation".

The analyses of the key steps examined in this paper are meant to provide useful sources for experience sharing in this perspective. These should go even further in the details (not possible here due to page limitations), especially looking at administration costs, quality processes, market transformation effects and empowerment of the actors (especially project holders). The two last points are particularly critical.

The official evaluations of the KfW programme were mostly focused on direct outputs (number and type of actions, energy savings, etc.), which is in line with its main policy objectives. However, seen the age and the very large amount of federal funding of the programme, it may be surprising that there is very few information about the market transformation effects (with the important exception of controversial macro assessments of the job impacts). This may be due to the initial approach of the programme that has been aiming at upgrading planned renovation projects towards a higher energy performance level. In parallel, the increasing political support from the 2000's has been driven by the objective of helping the building industry facing a strong crisis (Rosenow, 2013). Despite an acknowledged overall success, the programme has nevertheless not been sufficient to meet the high ambition of a 2 % energy renovation rate per year (the overall result has been close to 1 % per year, taking into account individual actions sometimes with limited impacts).

The apparent simplicity of the scheme has likely been a key success factor (together with the attractiveness of the incentives). The fact that the public budget committed has been totally used each year shows that there has been no particular limiting factor, and that the actors appropriated the programme. The KfW training for bank employees can for example explain a certain capacity building among commercial banks, as to handling the financing of an energy renovation project (Schopp, 2014).

The Green Deal may not be mature enough yet (especially due to low take off) to provide significant evidences of positive market transformation (the difficult transition between the previous obligation schemes and the Green Deal seems to have caused job losses, as mentioned earlier). The monitoring of the number of professionals or companies qualified per category and surveys about their activities (among the professionals and among the households) already provide interesting insights in this matter. The number of actions installed through Green Deal financing remains very low so far. The official communication has emphasised the number of assessments, pointing that the customer surveys showed that more than 80 % of the Green Deal assessments led to actions, even if not financed through the Green Deal. As discussed by Rosenow and Eyre (2014), the real take-up effect of the assessments is questionable. The detailed results of the surveys tend to support another assumption: the assessment is often used to specify or confirm an already planned project (when not performed because required to get a direct incentive).

Despite a simple general principle expressed through its Golden Rule, the scheme is very complex and difficult for actors to appropriate, especially for project holders. On the one hand, the detailed specifications of the scheme have raised most of the key issues for a comprehensive energy renovation policy. And the overall Green Deal branding can be an effective way to communicate about quality aspects. On the other hand, it may be too ambitious to expect from each project holder to understand complex issues such as the differences between standardised and actual consumption.

The Green Deal theory assumes implicitly that a project holder may undertake a renovation project because it saves money at the end. This may be true. But most of the project holders are likely to upgrade their dwelling for many other reasons. Indeed, the KfW approach aiming at "regular" renovation project to include an energy dimension appears to be more effective.

The UK NEEAP reported in 2014 (p. 9) that the Green Deal only represents 1.7 % of the energy savings expected to meet the target of the EED article 7, while the shares are respectively 25.9 % for the different energy suppliers obligations and 42.2 % for building regulations. In the German NEEAP (Annex II), the expected final energy savings for 2014–2020 of the regulation for existing buildings are 1.5 higher than these for the KfW programme (for renovations). Both estimates thus assume that regulations remain the policy instrument with the highest impact. This can be explained because regulations cover all the new buildings or all the renovation projects.

The KfW programme and Green Deal schemes both have links with the building regulations, but in different ways. The German regulation is used as the basis for the technical specifications of the KfW programme. While in the UK, the perspective of a minimum performance requirement for private-rented dwellings (announced for 2018) is expected to stimulate renovations of the least efficient dwellings.

35. http://ec.europa.eu/energy/en/topics/energy-efficiency/energy-efficiency-directive/buildings-under-eed

The German government recently announced new policy measures to foster investments in energy efficiency, among others tax credits and competitive tendering for energy-saving projects[36], acknowledging that the current action rate was not sufficient to meet goals set for 2020 and beyond. As to building renovations, these new measures may be seen as complementary to the KfW programme, especially to drive additional (not planned) renovation projects.

In the UK, the political debates have been over-focused on energy prices (overlooking energy costs), leading in particular to a review of the ECO scope and objectives. About the Green Deal, the complementary grants provided through the Green Deal Home Improvement Fund have proven to be very successful, with much more demands than possible to satisfy with the budget planned. While creating peaks of demands for the supply chain, many project holders that could not get the grant may then give up, generating off-peak periods hence critical difficulties for companies involved in this market, unless more visibility is given to actors about the existence and extent of this grant scheme. Rosenow and Eyre (2014) have analysed how to support a recovery of the UK renovation markets. However, the context will likely remain uncertain until general elections in May 2015.

References

Adisorn, T., Thomas, S., Klyar, D., 2012. KfW Energy Efficient Refurbishment and KfW Energy Efficient Construction (KfW). Case example 25 of the BigEE project. http://www.bigee.net/en/policy/guide/buildings/policy_examples/25/.

BPIE, 2014. Renovation strategies of selected EU countries – A status report on compliance with article 4 of the Energy Efficiency Directive. BPIE (Buildings Performance Institute Europe) report, November 2014. http://bpie.eu/benchmark_renovation_strategies.html#.VMP1zy4mKL0

BPIE, 2010. Financing energy efficiency in buildings. BPIE background paper, 16 November 2010. http://www.bpie.eu/documents/BPIE/BPIE%20background%20paper.pdf

EFFIG, 2014. Energy efficiency – the first fuel for the EU Economy. How to drive new finance for energy efficiency investments. Part 1: Buildings. Interim Report of the Energy Efficiency Financial Institutions Group. http://ec.europa.eu/energy/efficiency/studies/doc/2014_fig_how_drive_finance_for_economy.pdf

EIU, 2013. Investing in Energy Efficiency in Europe's Buildings, a view from the construction and real estate sectors. Report by the Economist Intelligence Unit for the Global Buildings Performance Network in collaboration with the Buildings Performance Institute Europe, 25 April 2013. http://www.gbpn.org/reports/investing-energy-efficiency-europe%E2%80%99s-buildings-view-construction-and-real-estate-sectors

EPBD, 2010. Directive 2010/31/EU of the European Parliament and of the Council of 19 May 2010 on the energy performance of buildings (recast).

Galvin, R., 2014. Why German homeowners are reluctant to retrofit. Building Research & Information, 42 (4), 398–408.

Griechisch, D., Unger, C., 2014. Spreading Myths Around Building Renovation: Information Failure Prevails in Germany. Proceedings of IEPPEC 2014, Berlin, 9–11 September 2014. http://www.iepec.org/conf-docs/papers/2014/Dora%20Griechisch.pdf

Guertler, P., Royston, S., Wade, J., 2013a. Financing energy efficiency in buildings: an international review of best practice and innovation. Report to ADEME and to the WEC (World Energy Council), June 2013. http://www.wec-policies.enerdata.eu/Documents/cases-studies/Financing_energy_efficiency_buildings.pdf

Guertler, P., Robson, D., Royston, S., 2013b. Somewhere between a 'Comedy of errors' and 'As you like it'? A brief history of Britain's 'Green Deal'so far. Proceedings of the eceee 2013 Summer Study, panel 1, 153–164.

KfW, 2015. Personal communication with Dirk Markfort.

Murphy, L., 2014. The policy instruments of European frontrunners: effective for saving energy in existing dwellings? *Energy Efficiency*, 7 (2), 285–301.

Rosenow, J., 2012. Energy savings obligations in the UK—A history of change. *Energy Policy*, 49, 373–382.

Rosenow, J., 2013. The politics of the German CO2-Building Rehabilitation Programme. *Energy Efficiency*, 6 (2), 219–238.

Rosenow, J., Galvin, R., 2013. Evaluating the evaluations: Evidence from energy efficiency programmes in Germany and the UK. Energy and Buildings, 62, 450–458.

Rosenow, J., Eyre, N., Bürger, V., Rohde, C., 2013. Overcoming the Upfront Investment Barrier-Comparing the German CO 2 Building Rehabilitation Programme and the British Green Deal. *Energy & Environment*, 24 (1), 83–104.

Rosenow, J., Eyre, N., 2014. Residential energy efficiency programmes in the UK: a roadmap for recovery. 10th BIEE Academic Conference. St John's College, Oxford. 17–18 September 2014.

Schopp, A., 2014. Incentives of commercial banks to finance energy efficiency. Proceedings of the 29th Annual Congress of the European Economic Association : EEA 2014, Toulouse, France, 25–29 August 2014. http://www.diw.de/documents/vortragsdokumente/220/diw_01.c.471701.de/v_2014_schopp_incentives_eea.pdf

Schröder, M., Ekins, P., Power, A., Zulauf, M., Lowe, R. J., 2011. The KFW experience in the reduction of energy use in and CO_2 emissions from buildings: operation, impacts and lessons for the UK. London: UCL Energy Institute, University College London and LSE Housing and Communities, London School of Economics. http://sticerd.lse.ac.uk/dps/case/cp/KfWFullReport.pdf

Acknowledgements

The authors would like to thank the reviewers and Dirk Markfort (KfW) for their very useful comments.

36. http://www.euractiv.com/sections/energy/german-government-approves-eu80-billion-climate-package-310571