

EU PUBLIC-SECTOR EXPERIENCES WITH BUILDING EFFICIENCY: EXPLORING BARRIERS TO PERFORMANCE CONTRACTING AND DEEP ENERGY RETROFITS



Issue Brief

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EXECUTIVE SUMMARY

Building efficiency is widely acknowledged as a high-potential and cost-effective means to increase Europe's energy security, reduce carbon emissions, and create jobs. Europe's public sector is being called upon to help realize this potential by playing a leading role in transforming the building stock towards better energy performance. One mechanism that has been put forward to support public-sector leadership on building efficiency – even in an era of tight fiscal policy and budget contraction – is energy performance contracting (EPC).¹ To better understand the applicability of the EPC as a mechanism to accelerate building efficiency improvements in the EU public sector, the Institute for Building Efficiency (IBE) conducted a series of interviews and surveys in winter of 2011 with public officials in the UK, France and Germany.

¹ For more information on this type of energy service provision please refer to the IBE page on existing building retrofits <http://www.institutebe.com/Existing-Building-Retrofits.aspx>, which includes numerous tools and resources including an introduction to EPC in the European Union <http://www.institutebe.com/InstituteBE/media/Library/Resources/Existing%20Building%20Retrofits/Issue-Brief---Energy-Performance-Contracting-in-the-EU.pdf>.

Our research found that public-sector managers continue to look at annual budget resources as their primary financing tool for energy efficiency improvements. This approach limits the scale of investment in energy efficiency, especially in the current economic context. Organizational capacity concerns, notably around staffing, appear to be significant in some markets and may continue to hamper efficiency investments, especially given budget cuts. The survey overall revealed positive experiences with EPC, and a number of respondents report no barriers to procuring EPCs in their organizations. Yet unfamiliarity and uncertainty about this model may be undermining market development. In addition, some level of technical support and regulatory changes may be required to help EPC markets scale.

The results of this research add to an existing body of work by European institutions showing that, while there have been positive experiences and potential exists, myriad barriers and market failures continue to undermine efforts to scale building efficiency improvements in Europe's public sector. This discussion is particularly relevant in the context of a new EU Energy Efficiency Action Plan, which proposes a binding annual renovation target of 3 percent for public buildings.

INTRODUCTION

Between November 2010 and March 2011, the IBE conducted research on European public-sector experiences with energy efficiency in buildings. A key objective was to identify the financial, organizational, legal and informational barriers to procuring public-sector building efficiency services, notably through EPC.

The research featured an online, multilingual survey developed by the IBE as a means to gather data from public authorities in the UK, France and Germany. The survey was completed by 90 public-sector representatives from the three countries with nearly equal representation from each country. More than 50 percent of respondents were representatives of municipal governments responsible for facility oversight, energy management, or both; the rest were representatives from regional governments, public universities and hospitals. A majority of responses were entered into the survey by IBE researchers during telephone

conversations with respondents. This allowed researchers to gather impressions and experiences not necessarily captured in the survey questionnaire.

Beyond the survey, the IBE engaged in conversations with European Union (EU) policymakers, nongovernment organizations (NGOs), industry representatives and other selected national officials with expertise in public-sector building efficiency. In total, well over 100 individuals were consulted. In addition, the effort was guided by existing research on public-sector building efficiency procurement, EPC, and the development of Europe's energy services markets.

While the survey sample is relatively small² and not necessarily representative of the entire public sector in the three countries, the conversations and overall research offer interesting snapshots and clues that could help European policymakers formulate implementation strategies for legislative measures relevant to building efficiency.

BACKGROUND AND CONTEXT

The EU's most recent Energy Efficiency Action Plan (EEAP)³ reiterates the importance of buildings in an overall effort to move away from a high-carbon economic model⁴ and calls on Europe's public sector to play a leading role in scaling building efficiency improvements across the EU. The EEAP proposes an obligation on EU Member States to double the annual renovation rate of their public buildings to 3 percent. Under the plan, renovations or refurbishments undertaken should bring a given building to within the top ten percent of comparable national buildings in terms of energy performance.⁵ The European Commission suggests that EPC and ESCOs should be promoted as part of efforts to reach the 3 percent annual refurbishment target.⁶

Placing the public sector at the center of the EU's retrofit agenda is strategic because payback periods for energy efficiency investments in publicly owned facilities are more negotiable than in the private sector. Where private-sector projects often require payback periods of less than three years, the public sector can extend the payback up to 20 years. This longer payback option creates potential for individual building energy savings of well over 50 percent, and average savings of at least 25 percent, through EPC. Limiting the payback period to less than three years generally means that efficiency projects are smaller and less comprehensive.

Reaching the 3 percent building retrofit target, assuming it is endorsed by EU member states and signed into law, will not be without complications. Existing research by the EU's Joint Research Centre as well as EU-funded projects like the Energy Efficiency Services Initiative (EESI) has already unearthed a number of persistent barriers to greater public-sector energy efficiency and EPC. Among the most commonly cited are:

- Lack of funding and economic incentives for public-sector energy efficiency upgrades
- Limitations or restrictions on non-budgetary spending for energy efficiency
- Unclear procurement rules and legal restrictions
- Limited staff capacity
- Lack of prioritization of energy efficiency by organizational leadership.

² Survey conduct and data collection more generally were limited by the availability and willingness of many public-sector officials to respond to queries by third parties. A number of officials indicated that they are asked to respond to too many surveys, and in some cases officials are not permitted to respond to surveys or interviews that do not come directly from their national ministries or other officially sanctioned sources.

³ The 2011 Energy Efficiency Action Plan and related documents are available at: http://ec.europa.eu/energy/efficiency/action_plan/action_plan_en.htm

⁴ European governments have committed to a range of CO₂ emissions reduction measures as part of their target to reduce greenhouse gas emissions by 20 percent by 2020. In addition, the EU has released in parallel to its Energy Efficiency Action Plan a 2050 Roadmap for achieving a low-carbon economy http://ec.europa.eu/clima/policies/roadmap/index_en.htm

⁵ The Commission intends to pursue this objective with a forthcoming legislative proposal. "This legal instrument, like the other binding measures in this plan, will be subject to a thorough impact assessment. It will include an in-depth analysis of the proposed annual renovation rate and a verification of the best method for its implementing as well as a monitoring mechanism," according to the EEAP, which notes that the current annual rate of refurbishment of public buildings with more than 1,000 square meters surface area is 1.5 percent across the EU.

⁶ A rough, back-of-the-envelope calculation would indicate that if EPC produces an average of 20 percent savings per building targeted, and if each year 3 percent of public buildings are refurbished using EPC, then at least 20 percent of public buildings will be 20 percent more efficient by 2020. Precise numbers on the size and emissions footprint of public buildings are still lacking, however. The EEAP only indicates that 12 percent of the EU's overall building stock is public. This complicates estimates of the contribution of public-sector building efficiency to overall EU energy/carbon use reduction targets.

⁷ A recent report by the World Bank notes that “the potential for efficiency gains in the public sector is substantial, but the implementation of energy savings programs is complicated by numerous factors, including a lack of commercial orientation on the part of public agencies, limited incentives to lower energy costs, complex and strict budgeting and procurement procedures, and limited access to budgetary or project financing. Many public agencies [...] face severe budget constraints and often focus on upfront costs as a matter of necessity. That leads to greater operating cost liabilities in out-years, causing further budgetary pressures and creating a vicious cycle.” (Singh, 2010)

⁸ The EU’s Joint Research Centre, for example, identified legal issues related to procurement as critical in its recent work on the role of EU energy service companies in supporting public-sector building efficiency (Bertoldi, 2010). The European Commission has also identified procurement as a key issue in the EEAP, with a proposal to make energy efficiency a binding criterion when public authorities procure building-related services. http://ec.europa.eu/environment/gpp/index_en.htm

In addition, Europe’s public sector is being called upon to lead on energy efficiency in the context of one of the worst recessions in the continent’s modern history. Banks and lenders have reduced financing flows due to the fallout of the financial crisis. Budget austerity is the norm rather than the exception in most European capitals and administrations. In such an environment, energy efficiency investments are often considered a luxury, despite growing evidence that investing in efficiency can significantly decrease immediate and long-term operating costs for facilities.⁷

MAIN SURVEY FINDINGS

The survey was designed to obtain information about issues in four main types of barriers commonly faced by public authorities: financial, organizational, informational and legal. Of these, respondents identified “**financial**” as the most prevalent type of barrier to energy efficiency. More than 20 percent chose “**organizational**” issues (Figure 1).

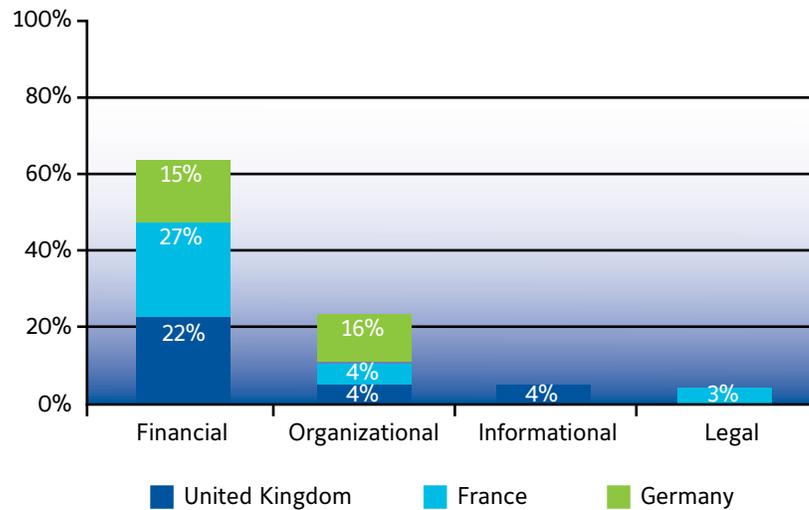


Figure 1: In general, what is the most important type of barrier to capturing energy savings in your organization?

While survey respondents did not identify legal and informational issues as their primary concerns, interview comments and supporting research identified important challenges in these areas.⁸ It is also conceivable that in the current climate of recession and austerity, financial concerns trump legal and informational concerns that, in more favorable economic times, would be perceived as more important.

Over-arching financial issues also need to be nuanced and must be examined alongside a number of other findings revealed by the research:

- **Insufficient budget** is the most common type of financial barrier to energy efficiency investments
- **Lack of staff capacity** is a critical organizational barrier, especially for smaller municipalities
- **Lack of trust and lack of familiarity** is a barrier to EPC, though the majority of respondents who have used an EPC would do so again

- **Legal issues** are critical for EPC and energy efficiency procurement generally
- A number of respondents reported **no barriers** to EPC.

The next sections discuss these findings in greater detail.

INSUFFICIENT BUDGET

The survey asked respondents to identify the top barrier they face when seeking to improve energy efficiency in their facilities. It did not specifically ask about EPC as a mechanism. It is important to emphasize that while a majority of respondents identified the financial category as the most important type of barrier, *financing* as such was not a concern for most respondents (Figure 2). Rather, insufficient budget was widely identified as the most critical barrier.

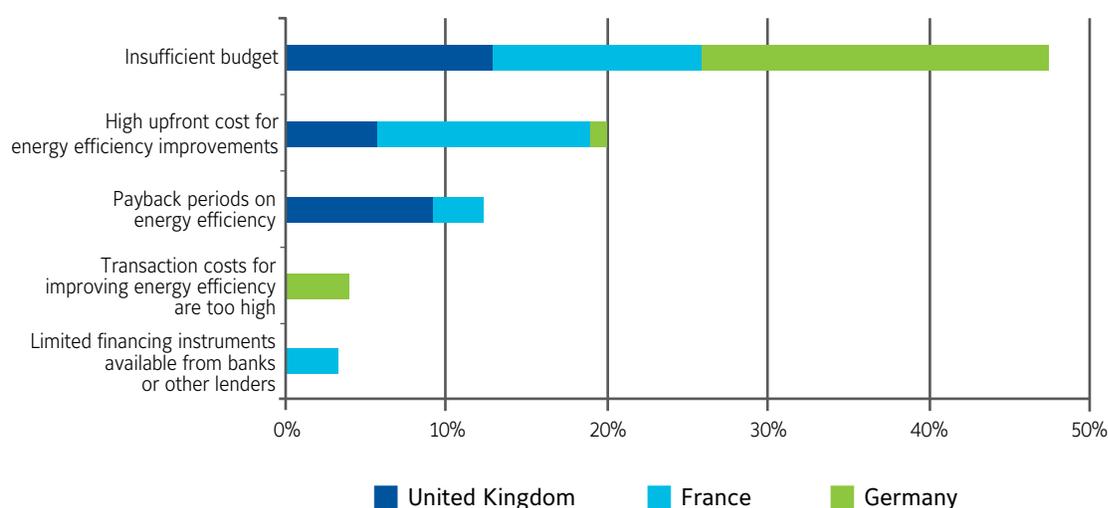


Figure 2: What is the top financial barrier you face when trying to improve the energy efficiency of your facilities?

In most publicly owned buildings, energy efficiency investments are typically paid using yearly capital or operational budgets. Different budget managers may coordinate and pool resources. In general, however, budget lines (such as for investments and operations) are kept separate, limiting the scale of investment possible, especially in periods of budget contraction.

As a result of the dependence on facility budgeting, one-off measures, such as insulation and lighting replacement, are frequently chosen as the only available efficiency options. While these measures do produce savings, the average per-building savings potential is limited in comparison with a more comprehensive building approach or deep retrofit, which is a cornerstone of EPC. Single or several combined measures have tended to yield an average of 5 to and 15 percent energy savings per building, compared with possible savings of 40 percent and beyond in deep-retrofit scenarios.⁹ In addition, pursuing single-technology efficiency projects one at a time acts as a disincentive for future deep retrofits, locking in sub-optimal savings.¹⁰

⁹ Results from the EU Green Building Programme, available at: <http://www.eu-greenbuilding.org/>

¹⁰ Most experts also agree that bundling measures leads to greater savings, whereas single energy-savings measures (such as rooftop insulation paid for by energy savings obligations on utilities) may not be cost-optimal in the long term, since they create a disincentive for further longer-payback investments at a later stage. See for example some of work done by the Central European University (CEU) on this issue (Vorsatz, 2010).

Many administrations also do not allow savings from energy efficiency projects to be recycled into the next year's annual budget. Instead, for example, lower spending in one annual operational budget due to greater building efficiency may result in a reduction of the operations budget for the subsequent year. This acts as a clear disincentive for efficiency investments.

Laws and rules related to public budgets and procurement can play an important role as well in defining the extent of money available for energy efficiency. In Germany, for example, EPCs and other efficiency measures may be blocked, even if they are cost-effective, due to legal restrictions. In addition, German municipal governments must operate within relatively complex governing structures bound by myriad rules that are not necessarily harmonized across geographies.¹¹

ORGANIZATIONAL ISSUES

The survey showed that organizational capacity and leadership are important factors in public institutions trying to invest in the energy efficiency of their facilities.

Despite a divergence of administrative approaches across geographies,¹² a majority – and a nearly equal share – of respondents from the UK, France and Germany agreed that limited staff capacity is the most important organizational barrier to carrying out or overseeing energy efficiency improvements (Figure 3).

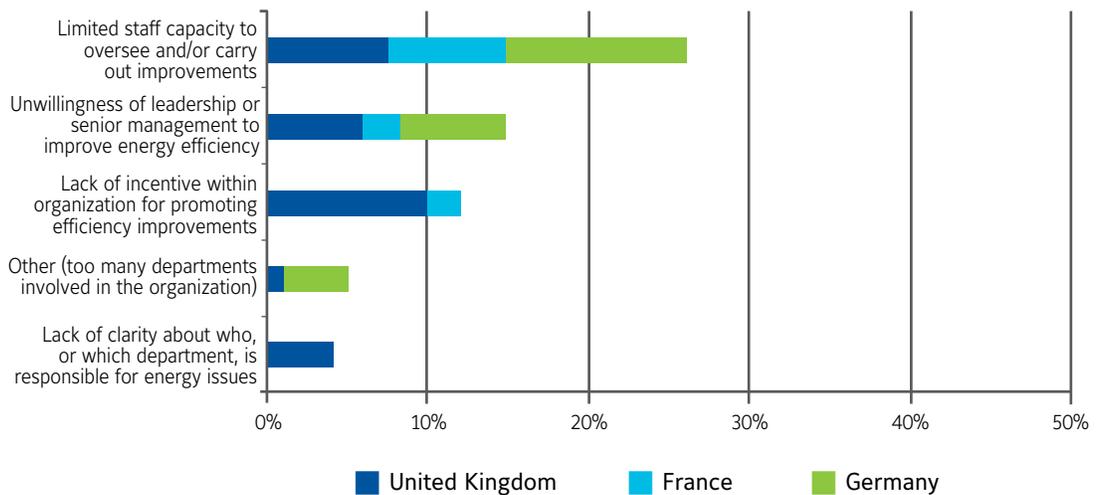


Figure 3: What is the top organizational barrier to capturing potential energy savings for your organization?

Limited staffing and limited capacity to undertake efficiency activities may be particularly acute in smaller cities. The findings appear to align with a comprehensive 2008 survey of mid-size German municipalities (under 100,000 inhabitants), which found that while large cities may have the in-house capacity and staff to oversee a range of building efficiency measures, smaller municipalities are often constrained by organizational limits and have difficulty contracting more complex service offerings like EPC.¹³

¹¹ "German municipalities are supervised by certain federal, state or local authorities. These institutions approve communal budgets and loans. Contracts for energy services with private companies are subject to prior approval of the authorities. For the approval of EPC projects, for example, certain requirements have to be fulfilled, including securing the competition of bidders before tendering, and a preliminary economic comparison with self-financing. An EPC project will only be approved if own implementation is more expensive. However, no consistent standards (or experience) in terms of economic comparisons exist." (EESI Germany Country Report, 2009, pgs 7-8).

¹² Regional and municipal approaches vary to a great extent both within and between countries, whether in relatively centralized and hierarchical administrative systems (France) or in more decentralized structures (Germany and the UK). Policy and market divergences are much more pronounced across the European Union compared with federal systems like the United States.

¹³ The survey found that 40 percent of respondents were disappointed by the outcome of EPC agreements (Meyer-Renschhausen, 2008).

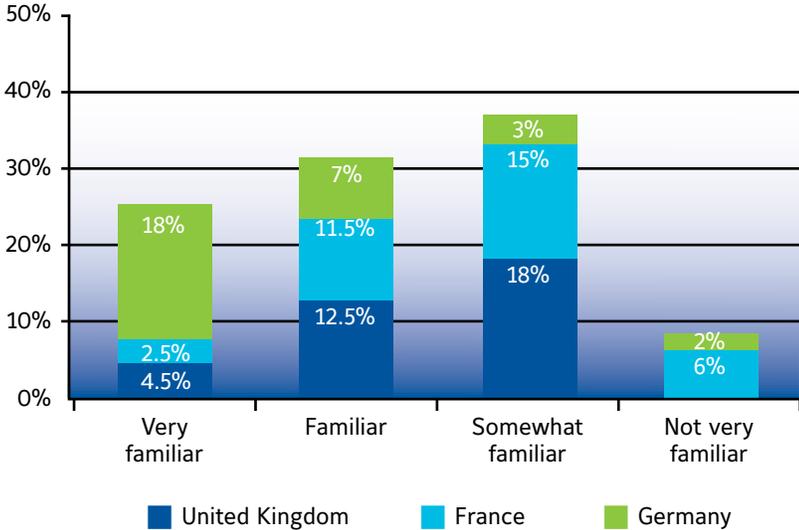
A number of UK respondents indicated that they may be facing a new set of challenges in this respect due to spending cuts underway in 2011. Organizations like regional development agencies and efficiency programs are being dismantled due to lack of funding, and that may foreshadow shifts in responses to these kinds of question over the next several years.

The second-most-cited organizational barrier, lack of leadership on efficiency within the organization, relates closely to the issue of how efficiency is typically paid for. Several respondents indicated that their leadership was not in principle opposed to efficiency investments. Indeed, when asked to describe how important energy management, energy efficiency or energy saving was for their organizations, 75 percent of respondents chose 'very important,' and nearly 25 percent chose 'important.'¹⁴ In addition, more than 65 percent of respondents expected the cost of energy required to run their facilities to rise within the next 12 months. The issue, rather, is that other types of spending were receiving priority given current limitations on annual public budgets.

UNCERTAINTIES ABOUT EPC

Business models like EPC should, in principle, allow cash-strapped public authorities to make deep retrofit investments without up-front payment, since the investment is paid for by the ESCO or a financing partner. The survey explored awareness and other issues associated with the introduction of the EPC model and how it has been received in the public sector.

The data indicates that awareness of EPC is generally high. Overall, 80 percent of respondents (nearly an equal share across the three countries) indicated they were familiar with the EPC model, although the level of awareness varied. Approximately 25 percent of respondents indicated they were very familiar with EPC, while nearly 40 percent indicated 'somewhat familiar' (Figure 4).



¹⁴ Only a handful of respondents (1.3 percent) chose 'somewhat important', while none of the respondents chose 'not important.'

Figure 4: Please describe your level of familiarity with energy performance contracting.

Despite these general awareness levels, actual uptake of the EPC model has been much more limited: fewer than 25 percent of respondents indicated that their organizations had ever signed an EPC. This signals that there have been limited incentives or opportunities to expand beyond financing efficiency through organizational budgeting.

In addition, a large majority of respondents who had never used an EPC – nearly 70 percent – said they were ‘not sure’ if their organizations would sign an EPC in the future, while 49 percent from the same pool said they were ‘not sure’ about the quality of the ESCOs operating in their markets. Lack of clarity on the type of offerings provided by ESCOs was a recurring theme in conversations, and some respondents suggested a need for better marketing and information on available efficiency services.

Among respondents who had implemented EPCs, the majority cited positive experiences. Of those whose organizations had signed an EPC in the past, 63 percent said they would do so again in the future (Figure 5).

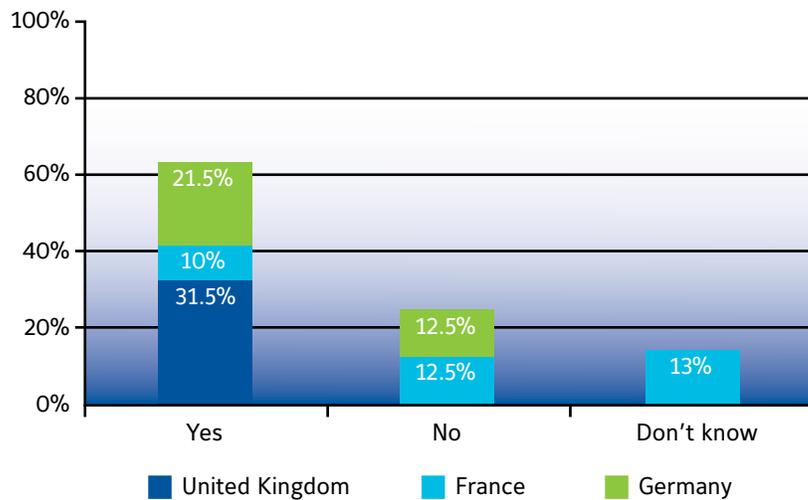


Figure 5: Would your organization sign an energy performance contract again?

These findings suggest that factors undermining EPC implementation relate not to shortcomings of the model itself but to uncertainties about the EPC model, uncertainties about ESCOs, and concerns about an organization’s capacity to procure an EPC. A handful of respondents even indicated that they had faced no barriers at all in the implementation of an EPC. International experience, particularly from the U.S., suggests that complications with EPC are often related to financing, regulatory and legal issues, rather than to the nature of the service offerings themselves, and that these issues tend to diminish as markets mature and scale.¹⁵

In its work on this issue, the EU’s Joint Research Centre confirms that “low awareness of the specifics of the ESCO model and skepticism towards its advantages among both clients and financiers remains one of the most commonly reported barriers to the deployment of ESCO projects.”¹⁶

Lack of organizational understanding or experience with EPC may extend beyond public-sector managers to financial institutions, as well. In some cases, banks may simply be unable to provide financing due to lack

¹⁵ In the US, for example, the EPC market was valued at \$5 billion in 2008 and is expected to grow to \$20 billion by 2020. See the Institute for Building Efficiency presentation on EPC in the US: <http://www.institutebe.com/InstituteBE/media/Library/Resources/Existing%20Building%20Retrofits/Performance-Contracting-Slides-IBE-Template.pdf>

¹⁶ (Bertoldi, 2010).

of liquidity, but conversations with experts also indicated that banks may be unwilling to provide financing in the absence of clarity about the likely returns on investment from investing in an EPC. Tellingly, financial concerns were cited as the main barrier to EPC by several UK and French respondents who had used such an agreement previously.

In contrast to lack of financial understanding or staffing issues, German respondents generally identified legal rather than financial issues as their most important barriers to EPC. That is not to say German public authorities do not face financing hurdles; the implication rather is that legal issues such as those governing budgeting and spending (as discussed in Section 1) are seen as more critical in terms of blocking potential EPCs. Findings of the EESI also confirmed that while Germany's EPC market is relatively developed, legal issues may hamper further development.¹⁷

OPTIONS FOR ADDRESSING BARRIERS TO EFFICIENCY INVESTMENTS AND ENERGY PERFORMANCE CONTRACTING

The barriers to energy efficiency and EPC identified in this and other studies are likely to have a critical impact on whether EU public authorities are able to reach the 3 percent annual refurbishment rate set out in the 2011 EEAP. Most experts also agree that addressing these types of barriers will be critical if overall EU energy savings objectives are to be achieved.

While the financial crisis and the recession have taken their toll on public authorities, there is a window of opportunity for adjusting legal and regulatory frameworks to support greater public investments in energy efficiency, notably through EPC. Then, as economies recover and financing becomes more available, legal issues will have been addressed, allowing for a more immediate and effective use of funds.

Pre-qualification of and quality-assurance certifications for ESCOs may be one option for addressing concerns about the quality of EPCs. A standardization of contract models and processes could help further, addressing trust and transaction costs issues simultaneously,¹⁸ since customized contracts may increase transaction costs and deter lenders while creating confusion among customers. The 2011 EEAP reflects these concerns and suggests that EU Member States draw up registries or lists of certified ESCOs while creating model EPC contracts.

Measurement and verification is a critical issue to build confidence in the EPC model, and international experiences suggest that a recognized, standardized protocol for measuring savings can minimize potential disputes, acting as a critical pillar for creating confidence in energy service offerings like EPC and beyond.¹⁹

All the countries examined in this study are taking actions to stimulate their own efficiency and EPC markets, though the picture is varied. In France, for example, the current environmental law reform agenda under the "Grenelle" process is revising existing rules governing public administrations specifically to facilitate EPC.²⁰ That process is being supported by a comprehensive report on EPC, commissioned by former French Environment Minister Jean Louis Borloo.²¹ In the UK, EPC has existed for decades in the form of "third-party financing," and advanced programs like the London Development Agency's (LDA) RE:FIT program are being rolled out.²² However, the levels of financial and legislative support from the current government are still under discussion, and it is unclear whether the government will back an aggressive regulatory push in support of EPC.

¹⁷ (EESI, Germany Country Report, 2009).

¹⁸ See also the Institute for Building Efficiency's publication on Energy Performance Contracting in the EU: Creating Common Model Definitions, Processes and Contracts. Available at: <http://www.institutebe.com/InstituteBE/media/Library/Resources/Existing%20Building%20Retrofits/Issue-Brief--Energy-Performance-Contracting-in-the-EU---Part-2.pdf>.

¹⁹ Refer to the Institute for Building Efficiency's page on this topic for an introduction to some of the main issues related to measurement and verification: <http://www.institutebe.com/energy-policy/monetizing-energy-efficiency-improvements.aspx>

²⁰ French public authorities have faced a number of hurdles in trying to procure EPCs, including restrictions on borrowing. The traditional separation of running and investment costs in public budgets has also restricted the ability of French authorities to reinvest the benefits of energy savings measures (EESI France Country Report, 2009).

²¹ Ortega, 2011.

²² RE:FIT features a pre-selected group of ESCOs who engage with public-sector clients via the LDA, which acts as an intermediary and provides some level of quality assurance <http://www.lda.gov.uk/projects/refit/>.

Meanwhile, energy agencies and new support functions have arisen, such as the EU's European Local Energy Assistance (ELENA) program, which in 2009 provided 15 million euros of technical support via the European Investment Bank to municipal and other public organizations seeking to procure comprehensive energy efficiency services.²³ These entities are designed to help public bodies address organizational capacity issues while mitigating energy efficiency transaction costs, such as by helping public bodies to prepare tenders, negotiate contracts and conduct energy audits. Anecdotal evidence suggests that these kinds of organizations and programs have been highly successful and have facilitated EPC market development.²⁴ Governments may need to consider carefully whether to scrap support for these kinds of organizations and programs.

Ultimately, no single measure by itself can address the mix of barriers faced by public-sector authorities. There are a number of options for addressing financing, while there may be limited options for addressing the lack of economic incentives for public-sector action on energy efficiency. For example, it may be effective to have top-down targets accompanied by a revision of procurement and budget rules to allow public authorities to reinvest savings obtained from efficiency measures into their organizations' overall investment budget, but efficiency markets may need to be supported simultaneously.

CONCLUSIONS AND RECOMMENDATIONS

Public-sector experiences with energy efficiency may differ significantly across the EU. In Germany, the use of EPC decreases in smaller municipalities, highlighting capacity concerns for understaffed cities trying to achieve ambitious energy savings. France has taken the issue of legal reform seriously, pushing through an ambitious environmental agenda featuring targeted support for building efficiency. Though financing is a worry across the board, the UK faces perhaps the most pressing concerns of the three countries.

Policymakers in each jurisdiction will need to make careful and balanced decisions about which measures to support in light of their unique barriers and circumstances on the ground. Fortunately, precedents from across Europe have emerged through initiatives like the Covenant of Mayors and Concerto, providing a growing body of good practice that can help municipalities to develop the kind of scalable and replicable public-sector building efficiency programs needed put the 3 percent annual refurbishment target in reach. In addition, the findings of this research provide some recommendations and conclusions that may apply regardless of geographic location:

- Deep retrofits are necessary to achieve energy savings and refurbishment targets, yet EPC is still only emerging as an approach to help scale efficiency activity.
- Financing issues in the cash-strapped public sector can be overcome in a number of ways, including EPSs in which energy savings cover the cost of deep energy efficiency retrofits. However, additional incentives may be required to help policymakers realize this potential.
- Some entities, especially smaller municipalities, need staffing support.
- Legal reform, may be necessary, especially in public budgeting and procurement.
- Some framework supports – such as standardization, ESCO accreditation, and information programs – are needed initially to help efficiency markets scale, so that transaction costs go down while savings increase.
- Further evaluation of local barriers may be required to help guide design of energy efficiency and EPC approaches.

²³ More information available at http://www.eib.org/products/technical_assistance/elena/index.htm

²⁴ In Germany, for example, the Berlin Energy Agency has been credited with laying the foundations for a vibrant EPC market. See: <http://berliner-e-agentur.de/en>

Creating effective energy efficiency regulatory frameworks can be a complex challenge and will have costs. But the unquestionable quality of efficiency is that most costs – capital and transaction-related – will be recovered through energy savings,²⁵ and that returns on investments will increase as markets scale and produce improved energy efficiency service offerings.

²⁵ The French Rhone-Alpes Energy Agency for example estimates that reaching France's target of 40% reduced building related CO2 emissions by 2020 will be largely paid for through energy savings.

Opportunity to Increase Survey Response Rates

The Institute for Building Efficiency (IBE) has limited access to public-sector authorities. Therefore, we would like to use this opportunity to invite interested public-sector authorities or other organizations with privileged access to the public sector to take ownership of the survey developed by the IBE and to distribute it among a large pool of potential respondents across the EU.

A larger sample could help EU and national authorities identify specific action areas and programs to help overcome persistent barriers to energy efficiency upgrades in public facilities, in light of the 3 percent refurbishment target.

The IBE has developed the survey in five languages (English, German, French, Italian and Spanish) and can make it available to interested parties. Furthermore, the IBE is available to assist in information and diffusion efforts related to any further work on this matter by governmental entities.

Please contact instituteforBE@jci.com for more information.

REFERENCES

Official Documents

EU Energy Efficiency Action Plan (EEAP), 2011. Available at: http://ec.europa.eu/energy/efficiency/action_plan/action_plan_en.htm

EU Energy Performance of Buildings Directive (EPBD) recast, 2010. Official Journal of the European Union, L 153, Volume 53, 18 June 2010. Available at: <http://eur-lex.europa.eu/JOHtml.do?uri=OJ:L:2010:153:SOM:EN:HTML>

Research Publications and Presentations

Building Services Research and Information Association (BSRIA), 2009. *Energy Services in the UK*. Market Report.

Guertler, Pedro, 2009. *Working paper: current financial and fiscal incentive programmes for sustainable energy in buildings from across Europe*. Report for EuroACE. Available at: http://www.euroace.org/PublicDocumentDownload.aspx?Command=Core_Download&EntryId=205

International Energy Agency, 2008. *Promoting Energy Efficiency Investments*. Available at: <http://www.iea.org/textbase/nppdf/free/2008/PromotingEE2008.pdf>

International Energy Agency, 2007. *Mind the Gap: Quantifying Principal-Agent Problems in Energy Efficiency*.

Available at: http://www.iea.org/textbase/nppdf/free/2007/mind_the_gap.pdf

Meyer-Renschhausen, M, Baedeker, H and Schroeder, K, 2008. *Kommunales Energiemanagement und Contracting in Deutschland*. Shaker Verlag, Aachen.

Ortega, Olivier, 2011. *Les Contrats de Performance Énergétique en France*. Lefèvre Pelletier & Associés. Available (only in French) at <http://www.lecpe.fr>

Singh, Jas, Dilip R Limaye, Brian Henderson and Xiaoyu Shi, 2010. *Public Procurement of Energy Efficiency Services: Lessons from International Experience*. World Bank Group. Available at: http://siteresources.worldbank.org/INTRUSSIANFEDERATION/Resources/305499-1280310219472/JSingh_Public_Procurement_of_EE_Services_ENG.pdf

Ürge-Vorsatz, Diana, 2010. *Energy efficiency in buildings: how far can they take us in mitigating climate change?* Keynote talk at the International Energy Program Evaluation Conference IEPEC in Paris, June 10, 2010. Available at: http://3csep.ceu.hu/sites/default/files/field_attachment/page/node-3234/iepec2010_keynote.pdf

World Business Council for Sustainable Development (WBCSD), 2010. *Energy Efficiency in Buildings: Transforming the Market*. Available at: <http://www.wbcd.org/includes/getTarget.asp?type=d&id=MzQyMDU>

European Union Commissioned Reports and Projects

EU Green Building Program. Available at: <http://www.eu-greenbuilding.org/>

European Energy Services Initiative (EESI) Project and Country Reports, 2009. Available at: <http://www.energy-service-initiative.net/>

EU ChangeBest Project, 2009. Available at: <http://www.changebest.eu/>

Sorrel, Steve et al, 2000. *Barriers to Energy Efficiency in Public and Private Organisations*. EU Project Report. Available at: <http://www.sussex.ac.uk/Units/spru/publications/reports/barriers/final.html>

Fraunhofer Institute for Systems and Innovation Research et al, 2009. *Study on the Energy Savings Potentials in EU Member States, Candidate Countries and EEA Countries Final Report*. For the European Commission Directorate-General for Energy, Brussels. Available at: http://ec.europa.eu/energy/efficiency/studies/doc/2009_03_15_esd_efficiency_potentials_final_report.pdf

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