



# Energy efficiency in public and residential buildings

## Final Report Work Package 8

*Ex post evaluation of Cohesion Policy programmes  
2007-2013, focusing on the European Regional Development  
Fund (ERDF) and the Cohesion Fund (CF)*

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European Regional Development Fund (ERDF)  
and the Cohesion Fund (CF)

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## Executive summary

This report examines investment in energy efficiency in public and residential buildings supported by the European Regional Development Fund (ERDF) and the Cohesion Fund (CF) during the 2007-2013 programming period. It forms one of the thematic work packages of the European Commission's ERDF/Cohesion Fund ex post evaluation 2007-2013 of 320 co-funded programmes.

Energy efficiency in public and residential buildings was a new area for ERDF/CF investment for many programmes; and the scope for allocating funds to this activity, particularly for the EU 15 Member States, was increased as a result of legislative changes during the programming period.

### *Methodology*

The information and assessments included in the report have been created over four phases of work:

- (i) A background review covering literature on the rationale for energy efficiency investments by the public sector, existing evaluations of energy efficiency expenditure under the ERDF and CF, an analysis of Member State funding for energy efficiency, and an initial assessment of the data available on relevant expenditure in operational programmes (OPs);
- (ii) A more detailed examination by country experts of 48 programmes, selected by the Commission on the basis of the level of funds they allocated to the designated priority theme "Energy efficiency, co-generation, energy management";
- (iii) More detailed case studies of 6 operational programmes with aspects of particular interest in relation to energy efficiency in public and residential buildings, in Poland, Hungary, Lithuania, Greece, the UK, and the cross-border Italy/Slovenia programme;
- (iv) The identification of good practices and those that should be improved, as well as policy implications, and the development of conclusions, which were then tested at a workshop with representatives of Managing Authorities and other organisations involved in the implementation of support to energy efficiency investments.

A challenge facing the project was the nature and comparability of data recorded by operational programmes; in addition to the problem of time delays in reporting outputs, results and impacts, the priority theme "Energy efficiency, co-generation, energy management" does not separately identify energy efficiency investments in public buildings and residential buildings, but also includes other types of energy investments. Seven of the 48 programmes identified as having relatively large allocations to the priority theme proved, on closer examination, not to have supported projects in public or residential buildings. The study therefore concentrated on assessing the remaining 41 programmes.

### *Support to energy efficiency 2007-2013*

Total ERDF/CF allocations to the "Energy efficiency, co-generation, energy management" priority theme for the 2007-2013 programming period amounted to EUR 6.1 billion – 2% of the total ERDF/CF allocated by operational programmes. (Commitments amounted to EUR 6.0 billion.) It is estimated (bearing in mind the caveats on the data mentioned above) that EUR 3.4 billion were allocated to support energy efficiency in public and residential buildings. The total allocations for the priority theme increased substantially over the course of the programming period, by 45% from initial intentions to spend EUR 4.2 billion. Expenditure on the priority theme

amounted to EUR 4.7 billion by the end of 2014. 90% of the funds committed to the priority theme were in the form of non-repayable grants, with loans making up 8%.

Other public funding in Member States for relevant energy efficiency projects was also examined, to clarify the context for ERDF/CF funding. In total 129 mechanisms supporting energy efficiency in public and residential buildings were identified to be in place in the EU27 between 2007 and 2013. Most of those 129 mechanisms (more than two thirds) involved grants, rather than loans or other financial engineering instruments. Roughly two thirds of the mechanisms supported investments in residential buildings. The mechanisms were subject to significant change in many countries over the period, partly in response to the development of EU and national policy and legislation on energy efficiency, and partly as a result of downward pressure on overall public expenditure. The total estimated cumulative funding in 9 Member States (Bulgaria, Czech Republic, Greece, Hungary, Lithuania, Poland, Romania, Slovenia and the UK) amounted to EUR 7.2 billion. The role of ERDF/CF investments in public and residential buildings in view of the available public funding identified in these 9 Member States showed a varied picture, in some cases providing significant levels of funding, in other cases playing a limited role in comparison with other policy instruments.

#### *The reasons for funding energy efficiency in public and residential buildings*

The analysis of the rationale for supporting energy efficiency investment was based on a comparison of the stated reasons included in operational programmes with the typology of rationales which emerged from the literature review. The literature review identified a broad range of primary and secondary objectives which are cited as the basis for public support for energy efficiency, covering economic, social and environmental outcomes. In general, public support should be aimed at addressing specific market failures in order to deliver wider public benefits. The broad range of objectives to which energy efficiency investment can contribute has been an important argument in favour of allocating public funding. However, the downside is that the range of objectives can make it more difficult for public authorities to set clear success criteria, and design transparent evaluation mechanisms.

Generally, the quality of the stated rationales underpinning support to energy efficiency investment in the operational programmes examined was poor. Key outcomes mentioned included climate change, energy security, and reduced costs; but there was little detailed analysis of specific market failures, and little explicit argumentation for the choice of mechanism (for example, grants as opposed to loans), or the choice of buildings targeted (with a majority of the programmes studied referring to general benefits of energy efficiency investment, rather than issues specific to public or residential buildings). These findings can be partly attributed to the novelty of the eligibility of these investments for ERDF/CF support, and to the context of the rapidly-developing EU legal framework and national strategies for energy efficiency.

#### *The types of intervention funded*

Of the 41 programmes from the sample which funded investments in public and residential buildings, nearly all (38) included some support for investments in public buildings. Support for residential buildings was included in half (21) of the programmes, and was more common in programmes from the EU15 Member States than in programmes from the EU12 Member States, where less than a third of operational programmes included such support. This finding is surprising in view of the well-documented need for thermal modernisation of residential buildings in the Member States which joined in 2004, particularly those with a legacy of communist-era multi-apartment building blocks, but may in some cases be explained by the

existence of national funding mechanisms targeted on such properties, rather than by a low public policy priority.

As noted above, the support provided generally took the form of non-repayable grants. Where grants were used, Managing Authorities seem to have found it difficult initially to judge the level of co-financing which should be made available; in some cases, very high co-financing rates were offered (up to 100%), particularly for public buildings. In other cases, co-financing rates were significantly increased following initially slow take-up, leading to over-subscription. In general, the process of decision-making on the type of funding available, and its generosity, showed to be weak, although there were some cases where more careful planning and assessment of likely behavioural responses was carried out (Lithuania, Greece).

While there are strong arguments in principle for the use of loans rather than grants for energy efficiency investments, particularly those with a clear perspective of an early payback of investment costs through reduced energy costs, Managing Authorities were in general reluctant to use them. A number of reasons were cited, including constraints on public authorities taking on loan commitments (in the case of public buildings); cultural reluctance to accept loan commitments (in the case of residential buildings); and administrative complexity for the managing authorities. Nevertheless, detailed analysis of loan mechanisms in the UK (London), Greek, and Lithuanian programmes which were the subject of case studies suggest that it is possible to overcome these difficulties and design interventions which can generate significant benefits at a lower final cost to the public sector.

#### *Governance of interventions*

The governance structures used by operational programmes varied; this variation was largely in line with the broader governance structures of the programmes concerned, rather than a reflection of different approaches to energy efficiency as a policy issue. However, there was some evidence of a pattern that Managing Authorities sought to overcome their own lack of familiarity with energy efficiency investments by making use of intermediate bodies, and implementing bodies (including bodies charged with administering loan funds).

Project selection criteria were often loosely defined; the most frequently-used criteria referred, unsurprisingly, to energy savings. Energy audits were used as a means of assessing energy savings in only 17 out of the 41 programmes studied in detail; and their use, and that of Energy Performance Certificates, was partly determined by the level of familiarity of public authorities and the construction industry with them. In some cases, the use of energy audits by ERDF/CF programmes has been beneficial in encouraging their use in the property market more generally.

Accompanying measures, including training for both programme authorities and beneficiaries, were included in most of the programmes studied; and some programmes (see section 4.4.2 on accompanying measures) have shown particular strengths in terms of addressing a wider information gap and behavioural challenges associated with energy efficiency policy, although detailed evidence of outcomes on this, as on many other aspects, remains scarce.

#### *Evidence of achievements*

The evidence on achievements in terms of indicators of energy efficiency in public and residential buildings in the 2007-2013 programming period provides an incomplete and mixed picture. The extent to which the output, result and impact indicators reported on by Managing Authorities were designed appropriately to capture evidence of achievements was variable and inconsistent. Not all programmes used indicators that were able to capture energy efficiency impacts specifically from public and



residential buildings; and many did not include indicators that were specific to buildings at all.

While the most commonly used indicators focused on energy savings, these used a range of methodologies. The targets set by programmes also showed a range of levels of ambition, suggesting that Managing Authorities found it difficult to judge, at the beginning of the programme period, an appropriate level of achievement to aim for. In many cases, although allocations to the “Energy efficiency, co-generation, energy management” priority theme were increased over the course of the programming period, targets were not adjusted. While comparability across programmes is challenging, even where data on achievements is available for them, there is little correlation between the level of funding they made available and their results in terms of the two most commonly used types of indicator: greenhouse gas emissions, and energy reductions.

#### *The strategic underpinning of energy efficiency investments*

In addition to a general weakness in defining an explicit rationale for energy efficiency investments in public and residential buildings, operational programmes also found it difficult to establish a clear strategy for their interventions in this area. In particular, there was generally little attempt to show how ERDF/CF investments were integrated into, and formed a relevant contribution to wider national strategies to meet EU and national energy efficiency targets. In some cases, this is partly explained by a low level of national strategic orientation on energy efficiency at the start of the programme period. While there were positive examples of programmes which stated a broader contribution to the development of a self-sustaining energy efficiency dynamic (for example, the development of a more capable energy efficiency services sector; or improvements in public understanding of energy efficiency; or the role of public buildings as exemplars), it was not always clear how these were followed through in the detailed design of interventions. This evaluation also draws attention to temporary, or implicit, rationales for energy efficiency investments, particularly the need during the financial crisis for ERDF/CF funds to contribute to economic activity in the short term, and a potential bias towards investment in public buildings in order to reduce future public expenditure, rather than making them on the basis of their relative cost-effectiveness and wider policy contribution.

#### *Policy implications*

The report points to a number of policy implications from its findings, in particular:

- There is a need for operational programmes to set a clear rationale for their interventions, and in doing so to take account of the wider context of energy efficiency policy, including the scale of ambitions, and the types of national and regional funding support mechanisms available.
- The choice of intervention mechanism should be carefully considered, and supported by a clear rationale. Very generous levels of grant financing for public authorities, beyond the level necessary to fund well-justified projects, should be avoided. However, grants may be particularly well-suited to deep energy efficiency interventions where beneficiaries may face uncertainty about the pace and scale of payback of the investment.
- Programme authorities should actively examine loans and other mechanisms (such as energy service contracts) as a more cost-efficient means of supporting energy efficiency. The development of “off-the-shelf” templates for such instruments can be of significant value to programme authorities.
- Careful attention should be paid to project selection criteria in order to maximise the effectiveness of funding in delivering policy objectives, and to avoid the risks of perverse incentives created by poorly designed criteria.

- Supporting measures (such as facilitation for homeowners, capacity-building, training, and information campaigns) can play an important role, particularly where the types of intervention made available are new to the Member State or region. Specific attention should be given to project development assistance, where its availability would increase the effectiveness of European investments and improve the capacity of beneficiaries, for example in structuring larger and more aggregated projects.
- The competencies of programme authorities in the area of energy efficiency investment should be reinforced; they should ensure (through recruitment, training, or the use of external expertise) that they can draw on the right level of understanding of energy efficiency investment in buildings and its context.
- The use of energy efficiency audits should be the norm for ERDF/CF investment in this area.
- Cultural specificities, potential behavioural responses, and the incentives created by intervention design are all important to the success and impact of interventions, and should be carefully considered in programme design.
- Good inter-agency communications are important, particularly between Managing Authorities and agencies responsible for energy policy, in order to ensure that the delivery of cohesion policy and energy efficiency policy objectives is mutually reinforcing. The agreed common indicators 2014-2020 for energy efficiency investments encourage more standardisation of the reporting of results and impacts. There is potential for more guidance to be offered to Managing Authorities by energy efficiency policy experts on appropriate approaches to reporting.

## Résumé

Le présent rapport examine les investissements supportés par le Fonds Européen de Développement Régional (FEDER) et du Fonds de Cohésion (FC) dans le domaine de l'efficacité énergétique des bâtiments publics et résidentiels au cours de la période de programmation 2007-2013. Le rapport constitue un des lots thématiques de l'évaluation ex-post de la Commission européenne portant sur 320 programmes cofinancés par le FEDER/FC durant la période 2007-2013.

L'efficacité énergétique dans les bâtiments publics et résidentiels a constitué un nouveau domaine d'investissement pour un grand nombre de ces programmes. Pendant la période de programmation, le champ d'intervention des fonds ERDF/CF dans ce domaine a été élargi, en particulier dans les pays de l'UE-15, suite à une modification législative.

### *Methodologie*

Les données et l'analyse présentées dans ce rapport ont été produites lors de quatre phases de travail :

- (i) Une analyse du contexte, basée sur la littérature concernant la justification des investissements publics dans l'efficacité énergétique, les évaluations disponibles des dépenses d'efficacité énergétique dans le cadre du FEDER et du FC, une revue du financement des Etats Membres en faveur de l'efficacité énergétique et une première analyse des données disponibles sur les dépenses des programmes opérationnels (PO) dans ce domaine ;
- (ii) Un examen plus détaillé, mené par des experts nationaux, de 48 programmes choisis par la Commission européenne sur la base des fonds alloués au thème prioritaire « Efficacité énergétique, cogénération, maîtrise de l'énergie » ;
- (iii) Des études de cas encore plus détaillées de six programmes opérationnels présentant des aspects particulièrement intéressants de l'efficacité énergétique dans les bâtiments publics et résidentiels en Pologne, Hongrie, Lituanie, Grèce, Royaume-Uni et dans le programme transfrontalier Italie/Slovénie ;
- (iv) L'identification de bonnes pratiques et de pratiques qui pourraient être améliorées, leurs conséquences en termes de politiques publiques, et le développement de conclusions qui ont été discutées dans le cadre d'un séminaire avec les représentants d'autorités de gestion et d'autres organisations impliquées dans la mise en œuvre de programmes de dépenses d'efficacité énergétique.

L'une des difficultés auxquelles ce projet a été confronté porte sur la nature et la comparabilité des données collectées par les programmes opérationnels. Au-delà du problème des retards dans la production de données de suivi sur les réalisations et les impacts, le thème prioritaire « Efficacité énergétique, cogénération, maîtrise de l'énergie » n'identifie pas séparément les investissements d'efficacité énergétique dans les bâtiments publics et résidentiels, mais comprend également d'autres types d'investissements en matière d'énergie. Sept des 48 programmes opérationnels affichant des dotations relativement importantes au thème prioritaire ont démontré, après un examen approfondi, qu'ils ne soutenaient pas de projets dans les bâtiments publics ou résidentiels. Par conséquent, l'évaluation se concentre sur l'analyse des 41 autres programmes.

### *Le soutien à l'efficacité énergétique 2007-2013*

L'enveloppe totale des dotations FEDER et FC au thème prioritaire « Efficacité énergétique, cogénération, maîtrise de l'énergie » lors de la période de programmation 2007-2013 s'élevait à 6,1 milliards d'euros, représentant 2% du

FEDER/FC alloué aux programmes opérationnels. (Les engagements s'élevaient à EUR 6,0 milliards.) Il est estimé (gardant à l'esprit les réserves mentionnées ci-dessus concernant les données) que 3,4 milliards d'euros ont été alloués au soutien à l'efficacité énergétique dans les bâtiments publics et résidentiels. L'enveloppe totale allouée au thème prioritaire a considérablement augmenté pendant la période de programmation, avec un accroissement de 45% par rapport aux affectations initiales de 4,2 milliards d'euros. Les dépenses pour le thème prioritaire se chiffraient quant à elles à 4,7 milliards d'euros fin 2014. La grande majorité de ces dépenses ont été opérées sous la forme de subventions non remboursables, les prêts constituant 8% des dépenses.

D'autres fonds publics disponibles pour le financement de projets d'efficacité énergétique dans les Etats membres ont été examinés afin d'éclairer le contexte des investissements FEDER/FC. Au total, 129 mécanismes de financement pour l'efficacité énergétique dans les bâtiments publics et résidentiels ont été identifiés dans l'UE-27 pour la période 2007-2013. La plupart (plus de deux tiers) des 129 mécanismes de financement identifiés incluait des subventions plutôt que des prêts ou d'autres instruments d'ingénierie financière. A peu près deux tiers des mécanismes soutenaient des investissements dans des bâtiments résidentiels. Ces mécanismes ont fait l'objet de changements significatifs dans beaucoup de pays, d'une part en réponse aux évolutions politiques et réglementaires au niveau européen et national dans le domaine de l'efficacité énergétique, d'autre part en raison de la pression à la baisse exercée de manière générale sur les dépenses publiques. Le financement global cumulé dans 9 Etats membres (Bulgarie, République Tchèque, Grèce, Hongrie, Lituanie, Pologne, Roumanie, Slovénie et Royaume-Uni) est estimé à 7,2 milliards d'euros. Le rôle des investissements FEDER/FC dans les bâtiments publics ou résidentiels compte tenu le financement public identifié dans ces 9 Etats membres est cependant contrasté : dans certains cas les investissements FEDER/CF ont représenté des niveaux considérables de financement, dans d'autres cas ils ont joué un rôle limité comparé aux autres instruments de financement.

#### *Les justifications du financement de l'efficacité énergétique dans les bâtiments publics et résidentiels*

L'analyse des justifications des investissements publics dans l'efficacité énergétique se base sur une comparaison entre les justifications explicites mentionnées dans les programmes opérationnels et la typologie des justifications identifiées dans la revue de littérature. L'examen de la littérature a permis d'identifier un large éventail d'objectifs primaires et secondaires qui sont considéré comme la base d'un soutien public à l'efficacité énergétique, couvrant des retombées de nature économique, sociale et environnementale. Le soutien public devrait en général être destiné à compenser des défaillances de marché spécifiques afin de contribuer à l'intérêt général. La large gamme d'objectifs auxquels l'efficacité énergétique peut contribuer a constitué un argument important en faveur de l'affectation des financements publics. Cependant, le point négatif est que cette large gamme d'objectifs peut aussi rendre plus difficile, pour les autorités publiques, la définition de critères de succès clairs et la mise en place de mécanismes d'évaluation transparents.

Dans le cadre des programmes opérationnels analysés, les arguments avancés pour justifier l'investissement public dans l'efficacité énergétique étaient généralement de qualité médiocre. Les principaux impacts attendus comprenaient le changement climatique, la sécurité énergétique et une réduction des dépenses énergétiques, mais dans l'ensemble les programmes opérationnels ne proposaient que peu d'analyse détaillée des défaillances de marché spécifiques, et peu d'argumentation explicite sur le choix des mécanismes de financement (p.ex. l'utilisation de subventions au lieu de prêts). Ces observations peuvent en partie être attribuées au fait qu'il s'agissait d'un champ de dépenses éligibles nouveau pour le FEDER/FC dans un contexte de

développement rapide du cadre juridique européen et des stratégies nationales en faveur de l'efficacité énergétique.

#### *Les types d'intervention financés*

Sur les 41 programmes de l'échantillon ayant financé des investissements énergétiques dans les bâtiments publics et résidentiels, presque tous (38) ont fourni un soutien aux investissements dans les bâtiments publics. La moitié de ces programmes (21) ont fourni un soutien aux investissements dans les bâtiments résidentiels, et ce plus fréquemment dans l'UE-15 que dans l'UE-12, où moins d'un tiers des programmes opérationnels ont soutenu ces investissements. Cette observation peut paraître étonnante dans la mesure où les besoins de modernisation thermique des bâtiments résidentiels dans l'UE-12 sont bien documentés, surtout dans les Etats membres possédant un patrimoine de grands ensembles résidentiels hérités de l'ère communiste. Elle peut cependant s'expliquer par l'existence de mécanismes financiers nationaux ciblant de tels biens, plutôt que par une faible priorité donnée à l'action publique dans ce domaine.

Comme exposé ci-dessus, le financement a en général été fourni sous la forme de subventions non remboursables. Là où des subventions étaient utilisées, les autorités de gestion ont d'abord eu des difficultés à établir le taux de cofinancement adéquat. Dans certains cas, des taux très élevés ont été offerts (jusqu'à 100%), notamment pour les bâtiments publics. Dans d'autres cas, les taux de cofinancement ont été augmentés considérablement en réponse à une souscription initialement lente, menant finalement à une sursouscription. Dans l'ensemble, le processus décisionnel concernant le type et niveau de financement a affiché des faiblesses, bien que dans certains cas une planification plus minutieuse et une analyse préalable des réponses comportementales aux mesures envisagées ont été effectuées (Lituanie, Grèce).

Bien qu'il y ait des arguments solides en faveur de l'utilisation de prêts au lieu de subventions pour soutenir les investissements d'efficacité énergétique, surtout dans les cas où un remboursement rapide par une réduction des coûts énergétiques est attendu, les autorités de gestion ont généralement hésité à utiliser des prêts. Un certain nombre de justifications ont été apportées, en ce compris les contraintes pesant sur les autorités publiques qui souhaitent contracter des emprunts (dans le cas de bâtiments publics), les réticences culturelles à contracter des emprunts (dans le cas de bâtiments résidentiels), et la complexité administrative pour les autorités de gestion. Cependant, une analyse détaillée, dans le cadre d'études de cas, des mécanismes de prêts utilisés dans des programmes au Royaume Uni (Londres), en Grèce et en Lituanie indique qu'il est possible de surmonter ces difficultés et de créer des interventions qui génèrent des gains importants à un coût final réduit pour le secteur public.

#### *La gouvernance des interventions*

Les programmes opérationnels ont mis en place des modes de gouvernance diverses. Les variations observées reflètent largement la diversité des modes de gouvernance générale mis en place par les programmes plutôt qu'elles ne représentent différentes approches sur l'efficacité énergétique en tant que domaine d'action publique. Cependant, les informations collectées font apparaître une tendance au sein des autorités de gestion qui ont cherché à compenser leur manque de connaissance dans le domaine de l'efficacité énergétique des bâtiments en faisant appel à des organismes intermédiaires et de mise en œuvre (y compris des organisations chargées de la gestion des fonds de prêts).

Les critères de sélection des projets ont souvent été définis de manière vague. Les critères les plus souvent utilisés se réfèrent aux économies d'énergie. Des audits énergétiques visant à évaluer les économies d'énergie ont été utilisés dans

seulement 17 des 41 programmes examinés en détail. L'utilisation de ces audits et des certificats de performance énergétique était en partie déterminée par le degré de familiarité des autorités publiques et du secteur de la construction avec ces outils. Dans certains cas, l'utilisation des audits énergétiques par les programmes FEDER/FC ont eu des effets positifs incitant à l'utilisation de ces audits sur le marché immobilier en général.

Des mesures d'accompagnement, y compris la formation des autorités de programme et des bénéficiaires, ont été incluses dans la plupart des programmes analysés. Certains programmes ont montré leur capacité à apporter une réponse au déficit général d'information et aux enjeux comportementaux associés à la politique d'efficacité énergétique, bien que des indications détaillées sur les retombées de ceux-ci demeurent rares, comme pour beaucoup d'autres aspects.

#### *Le résultat des interventions*

Les informations obtenues sur les résultats de la période de programmation 2007-2013, en termes d'indicateurs d'efficacité énergétique dans les bâtiments publics et résidentiels, fournissent une image incomplète et contrastée. Les indicateurs de réalisation, de résultat et d'impact communiqués par les autorités de gestion reflètent de manière inégale et incohérente les accomplissements des programmes. Certains programmes n'ont pas utilisé d'indicateurs mesurant de manière spécifique l'impact des interventions d'efficacité énergétique des bâtiments publics et résidentiels, et de nombreux programmes ne comprenaient aucun indicateur spécifique aux bâtiments.

Alors que les indicateurs les plus utilisés ont porté sur les économies d'énergie, ils ont fait l'objet de méthodologies variées. Aussi, les objectifs cibles ont également reflété des niveaux d'ambition très variables, indiquant que les autorités de gestion ont rencontré des difficultés à définir en début de programmation un niveau adéquat d'accomplissements à atteindre. Dans beaucoup de cas, ces objectifs n'ont pas été ajustés au cours de la période de programmation, et ce malgré une augmentation sensible des allocations au thème prioritaire « Efficacité énergétique, cogénération, maîtrise de l'énergie ». Une comparaison entre les programmes reste difficile, même quand des données sur les accomplissements sont disponibles, il n'y a que peu de corrélation entre les niveaux de financement mis à disposition et les résultats obtenus pour les deux types d'indicateur les plus utilisés : réductions des émissions de gaz à effet de serre et réduction de la consommation énergétique.

#### *Le renforcement stratégique des investissements d'efficacité énergétique*

En plus d'une insuffisance générale dans la justification explicite des investissements d'efficacité énergétique dans les bâtiments publics et résidentiels, les programmes opérationnels ont rencontré des difficultés à définir une stratégie claire pour ces investissements. En particulier, il n'y eu que peu d'effort consenti à démontrer comment les investissements FEDER/FC ont été intégrés et ont contribué de manière pertinente aux stratégies nationales plus globales, afin d'atteindre les objectifs européens et nationaux en termes d'efficacité énergétique. Ceci s'explique dans certains cas par un faible niveau d'orientation stratégique nationale sur la question de l'efficacité énergétique au début de la période de programmation. Alors que certains programmes apportent des exemples positifs de contribution au développement d'une dynamique autonome dans l'efficacité énergétique (p.ex. le développement d'un secteur professionnel des services d'efficacité énergétique, l'amélioration de la compréhension du public sur la question de l'efficacité énergétique ou encore le rôle exemplaire des bâtiments publics), il n'est pas toujours apparu de manière très claire comment ces développements ont été poursuivis dans la conception détaillée des interventions. La présente évaluation rappelle aussi qu'il y avait des justifications temporaires ou implicites aux investissements d'efficacité énergétique, notamment le besoin de contribuer, par le FEDER/FC, à l'activité économique à court terme durant la

crise financière. Elle rappelle également qu'il existe un biais potentiel en faveur des investissements énergétiques dans les bâtiments publics afin de réduire les dépenses publiques futures, au lieu de tenir compte du rapport coût-efficacité relatif et des implications plus générales de ces investissements en termes de politique publique.

### *Implications en matière de politiques publiques*

Sur base de ces observations, le rapport identifie un certain nombre d'implications en termes de politiques publiques, notamment :

- Il est nécessaire que les programmes opérationnels définissent une logique claire pour leurs interventions et, ce faisant, tiennent compte du contexte plus général de la politique d'efficacité énergétique, y compris le niveau d'ambition et le type de financements et soutiens disponibles au niveau national et régional.
- Le choix du mécanisme d'intervention devrait être soigneusement considéré et étayé par des justifications claires. Des niveaux de subvention très généreux pour les autorités publiques, au-delà du niveau nécessaire pour financer des projets par ailleurs légitimes, devraient être évités. Cependant, des subventions peuvent être particulièrement adaptées dans le cas de rénovations énergétiques profondes où les bénéficiaires peuvent être face à une incertitude concernant la vitesse et l'ampleur du retour sur investissement.
- Les autorités de programme devraient considérer activement les prêts et les autres mécanismes (comme les contrats de services énergétiques) comme un moyen de soutenir l'efficacité énergétique de façon plus rentable. Le développement de modèles standards pour ces instruments pourrait être d'une grande utilité pour les autorités de programme.
- Les critères de sélection des projets méritent une attention particulière afin de maximiser la contribution des financements aux objectifs stratégiques et d'éviter le risque d'effet pervers généré par des critères mal conçus.
- Les mesures de soutien (comme la facilitation pour les propriétaires, le renforcement des capacités la formation ou des campagnes d'information) peuvent jouer un rôle important, notamment quand les types d'intervention disponibles sont nouveaux pour un Etat ou une région. Une attention toute particulière devrait être portée à l'assistance au développement de projet, dont la disponibilité accrue renforcerait l'efficacité des investissements européens et améliorerait la capacité des bénéficiaires, comme par exemple dans la conception et la mise en œuvre de projets plus larges et plus intégrés.
- Les compétences des autorités de programme dans le domaine de l'efficacité énergétique devraient être renforcées. Les autorités devraient veiller (à travers le recrutement, la formation et l'utilisation d'expertise externe) à ce qu'elles disposent d'un niveau de compréhension adéquat des investissements d'efficacité énergétique et de leur contexte.
- L'utilisation d'audits d'efficacité énergétique devrait être la norme pour les investissements FEDER/FC dans ce domaine.
- Les particularités culturelles, les réponses comportementales potentielles et les incitants créés par la conception des interventions contribuent de manière importante au succès et à l'impact de ces interventions et devraient être soigneusement considérés pendant l'élaboration des programmes.
- Une bonne communication « inter-agences » est importante, notamment entre les autorités de gestion et les agences responsables de la politique de l'énergie, et ce afin de s'assurer que la mise en œuvre de la politique de cohésion et les objectifs de la politique d'efficacité énergétique se renforcent mutuellement.
- Les indicateurs communs pour l'efficacité énergétique introduits dans le cadre de la période de programmation 2014-2020 encouragent à plus de standardisation dans la manière de rendre compte des résultats et des impacts. Il pourrait être utile d'accroître le soutien apporté par les experts de l'efficacité énergétique aux autorités de gestion sur les méthodes de suivi et de reporting appropriées.

## Kurzfassung

Dieser Bericht untersucht die vom Europäischen Fonds für regionale Entwicklung (EFRE) und vom Kohäsionsfonds (KF) geförderten Maßnahmen zur Steigerung der Energieeffizienz in öffentlichen und Wohngebäuden während der Förderperiode 2007 bis 2013. Dieser Bericht gehört zu einem der thematischen Arbeitspakete der Ex-Post-Evaluierung 2007-2013 durch die Europäische Kommission von europaweit 320 Operationellen Programmen des EFRE und KF.

Energieeffizienz in öffentlichen und Wohngebäuden war für viele der EFRE und KF OPs ein gänzlich neuer Investitionsbereich. Im Laufe der Förderperiode wurden durch eine Gesetzesänderung die Möglichkeiten der Förderung ausgeweitet, was vor allem in den EU-15 Mitgliedsstaaten zu einer erheblichen Aufstockung der vorgesehenen Fördermittel führte.

### *Methodik*

Die Informationen und Analysen, die in diesem Bericht präsentiert werden, wurden über vier Arbeitsphasen zusammengetragen:

- (i) Eine Untersuchung des förderpolitischen Kontextes, in dem sich die Investitionen in Energieeffizienz in öffentlichen und Wohngebäuden in Europa bewegt. Dies wurde sowohl anhand einer umfassenden Literaturrecherche über die theoretischen und praxisorientierten Beweggründe für Investitionen in Energieeffizienz durch den öffentlichen Sektor und der bereits existierenden Evaluierungen von Investitionen in die Energieeffizienz von Gebäuden, als auch anhand einer Analyse der Förderung von Energieeffizienz in den Mitgliedstaaten, sowie einer ersten Bewertung der verfügbaren Daten über Zuweisungen und Ausgaben für Energieeffizienzinvestitionen in öffentlichen und Wohngebäuden im Rahmen des EFRE und KF untersucht;
- (ii) Eine detailliertere Untersuchung durch Länderexperten von 48 EFRE und KF Förderprogrammen, die durch die Kommission aufgrund der Höhe der Finanzmittel, die für das Schwerpunktthema „Energieeffizienz, Kraft-Wärme-Kopplung und Energiemanagement“ bereitstanden, ausgewählt wurden;
- (iii) Ausführlichere Fallstudien von 6 Operationellen Programmen in Polen, Ungarn, Litauen, Griechenland, dem Vereinigten Königreich und dem grenzübergreifenden Programm Italien/Slowenien, die Aspekte von besonderem Interesse für Energieeffizienz in öffentlichen und Wohngebäuden aufzeigen,;
- (iv) Die Identifikation von bewährten Verfahren und solchen, die noch verbesserungswürdig sind, und die Zusammenstellung von Schlussfolgerungen, die bei einem Seminar mit Vertretern der Mitgliedstaaten und anderer Organisationen, die an der Umsetzung von Investitionen in Energieeffizienz im Rahmen des EFRE und des KF beteiligt sind, erprobt wurden.

Eine Herausforderung für das Projekt war die Beschaffenheit und Vergleichbarkeit der Daten, die durch die Operationellen Programme verzeichnet wurden. Ein grundsätzliches Problem sind die zeitlichen Verzögerungen und unterschiedlichen Messverfahren bei der Berichterstattung über Outputs und Wirkungen der Energieeffizienzinvestitionen, wodurch Daten aus unterschiedlichen Programmen oftmals nur mit Einschränkungen miteinander verglichen werden konnten. Des Weiteren umfasst das Schwerpunktthema „Energieeffizienz, Kraft-Wärme-Kopplung und Energiemanagement“, unter dem die Zuwendungen und Ausgaben für Energieeffizienz in öffentlichen und Wohngebäuden aufgeführt wurden, auch Investitionen in andere Bereiche wie Kraft-Wärme-Kopplung und Energiemanagement. Zu guter Letzt zeigte sich bei näherer Untersuchung, dass in sieben der 48



Programme, für die eine verhältnismäßig hohe Zuweisung zum Schwerpunktthema verzeichnet wurde, keine Projekte in öffentlichen oder Wohngebäuden unterstützt worden sind. Daher konzentriert sich die vorliegende Studie auf die Analyse der übrigen 41 Operationellen Programme.

### *Förderung von Energieeffizienz 2007-2013*

Während der Förderperiode 2007-2013 belief sich die Gesamtzuweisung der Operationellen Programme des EFRE und des KF für das Schwerpunktthema „Energieeffizienz, Kraft-Wärme-Kopplung, Energiemanagement“ auf EUR 6,1 Milliarden. Dies entspricht ca. 2% der Summe, die durch die Operationellen Programme insgesamt in dem Zeitraum bereitgestellt wurde. Bis Ende des Jahres 2013 hatten die Operationellen Programme bereits EUR 6,0 Milliarden für dieses Schwerpunktthema verpflichtet. Es wird davon ausgegangen (unter den oben genannten Vorbehalten bezüglich der Daten), dass aus den EUR 6,1 Milliarden für das Schwerpunktthema ca. EUR 3,4 Milliarden für die Förderung von Energieeffizienz in öffentlichen und Wohngebäuden bereitgestellt wurden. Die ursprüngliche Gesamtzuweisung von EUR 4,2 Milliarden für das Schwerpunktthema wurde im Laufe der Förderperiode mit einem Zuwachs von 45% deutlich erhöht. Ausgaben unter dem Schwerpunktthema betrugen Ende des Jahres 2014 EUR 4,7 Milliarden. 90% der zugesagten Mittel wurden in Form von nicht-rückzahlbaren Zuschüssen gewährt. Darlehen hingegen machten nur 8% aus.

Andere öffentliche Förderungen von Energieeffizienzprojekten in den Mitgliedstaaten wurden ebenfalls analysiert, um den Hintergrund, vor dem die EFRE und KF Förderungen bestehen, besser nachvollziehen zu können. Zwischen 2007 und 2013 wurden EU weit insgesamt 129 Förderprogramme identifiziert, die finanzielle Mittel für Investitionen in die Energieeffizienz von öffentlichen und Wohngebäuden zur Verfügung gestellt haben. Der Großteil der 129 Förderprogramme (mehr als zwei Drittel) vergab Zuschüsse anstelle von Darlehen oder anderen Finanzierungsinstrumenten. Etwa zwei Drittel der Förderprogramme haben Investitionen in Wohngebäude gefördert. Die Förderprogramme waren in diesem Zeitraum erheblichen Änderungen unterlegen, die zum Teil eine Antwort auf die Entwicklungen von nationaler und EU Politik und Gesetzgebung, zum Teil aber auch ein Ergebnis von Druck, die öffentlichen Ausgaben zu reduzieren, waren.

Die geschätzte Gesamtförderung in 9 Mitgliedstaaten (Bulgarien, die Tschechische Republik, Griechenland, Ungarn, Litauen, Polen, Rumänien, Slowenien und das Vereinigte Königreich) belief sich auf EUR 7,2 Milliarden. Im Vergleich zu den öffentlichen Förderprogrammen in diesen 9 Mitgliedstaaten, zeichnen die EFRE/KF Investitionen in öffentliche und Wohngebäude ein gemischtes Bild: in einigen Fällen wird ein erheblicher Teil der öffentlichen Förderung von Energieeffizienzinvestitionen durch die Operationellen Programme des EFRE und KF bereitgestellt, in anderen wiederum spielen EFRE und KF nur eine begrenzte Rolle in der jeweiligen nationalen Förderlandschaft.

### *Gründe für die Finanzierung von Energieeffizienz in öffentlichen und Wohngebäuden*

Die Analyse der Beweggründe für die Unterstützung von Investitionen in die Energieeffizienz von Gebäuden basiert auf einem Vergleich der in den Operationellen Programmen angegebenen Gründe mit einer Typologie von Begründungen, die aus einer Aufarbeitung der Fachliteratur hervorging. Durch die Literaturrecherche wurde ein breites Spektrum an primären und sekundären Zielvorgaben identifiziert, die als Grundlage für die öffentliche Finanzierung von Energieeffizienz genannt werden und sowohl wirtschaftliche, soziale, als auch umweltrelevante Auswirkungen miteinbeziehen. Im Allgemeinen wird in der Literatur angemerkt, dass sich die öffentliche Förderung mit der Behebung eines spezifischen Marktversagens befassen sollte, um einem gemeinnützigen Zweck zu dienen. Das weite Spektrum an

Zielvorgaben, zu denen Investitionen in Energieeffizienz beitragen können, wird als ein wichtiges Argument für die Zuweisung von öffentlichen Mitteln identifiziert. Die Kehrseite ist jedoch, dass das Spektrum an Zielvorgaben und möglichen positiven Auswirkungen es für Behörden schwieriger machen kann, klare Erfolgskriterien zu setzen und einen transparenten Evaluierungsmechanismus zu entwickeln.

Im Allgemeinen war die Qualität der angegebenen Gründe für die Unterstützung von Investitionen im Bereich der Energieeffizienz in den Operationellen Programmen mangelhaft. Wichtige Ergebnisse die genannt wurden, bezogen sich auf den Klimawandel, Energiesicherheit und eine Reduzierung der Kosten für Energie. Es gab jedoch kaum detaillierte Analysen von spezifischem Marktversagen und wenig explizite Argumente für die Wahl des Finanzierungsinstruments (zum Beispiel die Verwendung von Zuschüssen anstelle von Darlehen) oder die Wahl der zu finanzierenden Gebäude (ein Großteil der untersuchten Programme bezog sich auf den generellen Nutzen von Investitionen in Energieeffizienz, anstelle von Aspekten, die mit öffentlichen oder Wohngebäuden zusammenhängen). Diese Ergebnisse können zum Teil der Tatsache zugeschrieben werden, dass es sich um eine relativ neue Fördermaßnahme handelte, über die nur wenige Erfahrungen und Kenntnisse bei den Verwaltungsbehörden verfügbar waren. Auch die sich schnell wandelnden europäischen gesetzlichen Rahmenbedingungen und nationalen Strategien für Energieeffizienz sind eine Ursache für den Mangel an ausformulierten Strategien für die Verwendung von EFRE/KF Förderungen für Energieeffizienz.

#### *Art der geförderten Maßnahmen*

Von den 41 ausgewählten Operationellen Programmen, die Energieeffizienzinvestitionen in öffentlichen und Wohngebäuden gefördert haben, haben beinahe alle (38) Unterstützung für Investitionen in öffentliche Gebäude bereitgestellt. Die Förderung von Wohngebäuden war in der Hälfte der Programme (21) vorgesehen und war unter den EU-15 Mitgliedstaaten weiter verbreitet als unter den EU-12, bei denen weniger als ein Drittel der Operationellen Programme solche Unterstützung beinhaltete. Dieses Ergebnis ist überraschend im Hinblick auf den gut dokumentierten Bedarf an thermischer Modernisierung von Wohngebäuden in den Mitgliedstaaten, die der EU seit 2004 beigetreten sind, insbesondere in Ländern mit einer Altlast an Wohnblocks aus der kommunistischen Ära. Dies kann jedoch teilweise durch die Existenz von nationalen Fördermitteln, die sich an solche Wohngebäude richten, erklärt werden und ist nicht darauf zurückzuführen, dass dies keine politische Priorität wäre.

Wie bereits erwähnt, wurde die Förderung vor allem in Form von nicht-rückzahlbaren Zuschüssen bereitgestellt. Dort wo Zuschüsse verwendet wurden, zeigte sich, dass die Verwaltungsbehörden anfangs Schwierigkeiten hatten, die richtige Höhe der Ko-finanzierung zu finden. In einigen Fällen wurde eine sehr hohe Ko-finanzierung angeboten (bis zu 100%), insbesondere für öffentliche Gebäude. In anderen Fällen wurde die Höhe der Ko-finanzierung nach einer anfangs sehr langsamen Aufnahme der Zuschüsse wesentlich erhöht, was letztendlich zu einer Überzeichnung führte. Im Allgemeinen war der Prozess der Entscheidungsfindung bezüglich der Art der Förderung und deren Höhe mangelhaft, obwohl in einigen Fällen sorgfältige Planungen und Analysen des möglichen Verhaltens der Fördermittelempfänger vorangegangen waren (Litauen, Griechenland).

Obwohl es prinzipiell starke Argumente für die Verwendung von Darlehen und anderen Finanzinstrumenten für die Förderung von Energieeffizienzinvestitionen gibt, insbesondere in Fällen, in denen die Investitionskosten durch reduzierte Energiekosten schnell wieder eingespielt werden, machten die Verwaltungsbehörden nur zögerlich von diesen Gebrauch. Verschiedene Gründe wurden hierfür angeführt, darunter Einschränkungen für Behörden Darlehenszusagen auf sich zu nehmen (im Falle von

öffentlichen Gebäuden), kulturell begründetes Zögern Darlehenszusagen zu machen (im Falle von Wohngebäuden) und die verwaltungstechnische Komplexität der Finanzinstrumente für die Verwaltungsbehörden. Dennoch zeigen detaillierte Analysen von Darlehen, die in Programmen aus dem Vereinigten Königreich (London), Griechenland und Litauen bereitgestellt und im Rahmen der Fallstudien untersucht wurden, dass es möglich ist, diese Schwierigkeiten zu überwinden und Maßnahmen zu entwickeln, die unter geringeren tatsächlichen Kosten beachtlichen Nutzen für den öffentlichen Sektor generieren.

#### *Organisationsstruktur der Maßnahmendurchführung*

Die Organisationsstruktur der Operationellen Programme hinsichtlich der Planung, Auswahl und Förderung von Energieeffizienz-Projekten war sehr verschieden. Diese Unterschiede stimmen weitestgehend mit den generellen Strukturen der betroffenen Programme überein und sind keine Konsequenz aus den unterschiedlichen Herangehensweisen für Energieeffizienz als einer politischen Frage. Dennoch gibt es Anzeichen, dass Verwaltungsbehörden versucht haben, ihren Mangel an Kenntnis über Investitionen in Energieeffizienz zu überwinden, indem sie auf die Hilfe von zwischengeschalteten Stellen und Durchführungsstellen mit finanzwirtschaftlicher Erfahrung (darunter externe Stellen, die die Verwaltung der Darlehensfonds übernehmen) zurückgriffen.

Die Auswahlkriterien für Projekte waren häufig weit gefasst. Das am häufigsten verwendete Kriterium bezog sich auf Energieeinsparungen. Energieaudits wurden jedoch nur bei 17 von 41 analysierten Programmen als Mittel verwendet um Energieeinsparungen zu messen. Die Anwendung von Energieaudits, sowie die Verwendung von Energieausweisen, waren teilweise abhängig von der Vertrautheit der Behörden und der Bauwirtschaft mit diesen Mitteln. In einigen Fällen war die Verwendung von Energieaudits durch die EFRE/KF Programme dadurch von Nutzen, dass die Anwendung von Energieaudits und Energieausweisen im Immobilienmarkt angeregt wurde.

Die meisten der untersuchten Programme beinhalteten begleitende Maßnahmen, darunter Fortbildungen für die Programmbehörden und die Förderempfänger. Einige dieser Programme (siehe Abschnitt 4.4.2 zu begleitenden Maßnahmen) haben eine besondere Stärke hinsichtlich der Herangehensweise an Wissenslücken im Bereich Energieeffizienz und Herausforderungen in Verhaltensweisen von Empfängern der Förderung, gezeigt. Dennoch sind Hinweise über die Wirkungen dieser Maßnahmen selten.

#### *Hinweise auf Erreichtes*

Die von den Operationellen Programmen verwendeten Indikatoren zur Messung der Outputs, Ergebnisse und Wirkungen der Förderung von Energieeffizienzinvestitionen liefern ein unvollständiges und gemischtes Bild von dem Erreichten. Nicht alle Verwaltungsbehörden verwendeten relevante Indikatoren und diejenigen, die Indikatoren verwendeten machten dies auf sehr unterschiedliche Art und Weise, wodurch die Vergleichbarkeit in vielen Fällen nicht gegeben ist. Beispielsweise verwendeten einige OPs Indikatoren die die Energieeinsparungen in öffentlichen Gebäuden messen, während andere Indikatoren verwendeten die die Gesamtheit aller Energieeinsparungen durch das OP messen. Nicht alle Programme verwendeten Indikatoren, die die energieeffizienzspezifische Wirkung von öffentlichen und Wohngebäuden hätten erfassen können. Viele verwendeten überhaupt keine Indikatoren, die sich spezifisch auf Gebäude bezogen.

Obwohl die am meisten verwendeten Indikatoren sich auf Energieeinsparungen bezogen, wurde ein Spektrum an Messmethoden verwendet. Die durch die Programme gesetzten Ziele weisen darüber hinaus ein sehr unterschiedliches Niveau an

Ambitionen auf, was darauf hinweist, dass die Verwaltungsbehörden während des Programmplanungszeitraums Schwierigkeiten hatten, angemessene Ziele zu setzen. In vielen Fällen wurden die gesetzten Ziele im Laufe der Förderperiode nicht angepasst, obwohl die Zuweisungen für das Schwerpunktthema „Energieeffizienz, Kraft-Wärme-Kopplung und Energiemanagement“ im Verlauf der Förderperiode erhöht wurden. Ein Vergleich zwischen den Programmen ist schwierig, aber dort, wo Daten zu den erzielten Ergebnissen verfügbar sind, gibt es nur einen geringen Zusammenhang zwischen der Höhe der Finanzierung, die zur Verfügung stand und den Ergebnissen bezüglich der zwei am meisten verwendeten Indikatoren: der Reduzierung von Treibhausgasemissionen und des Energieverbrauchs.

#### *Strategische Untermauerung von Investitionen in Energieeffizienz*

Zusätzlich zum allgemein feststellbaren Mangel an Klarheit in der Zielsetzung, weisen die Operationellen Programme auch Schwächen auf bei der Definition einer klaren Strategie wie die gesetzten Ziele durch die Fördermaßnahmen erreicht werden können. Insbesondere gab es nur wenige Versuche zu zeigen, wie EFRE/KF Investitionen in breitere nationale Strategien und zur Erreichung von EU und nationalen Energieeffizienzzielen integriert wurden. In einigen Fällen kann dies teilweise auf eine schwache nationale strategische Ausrichtung auf Energieeffizienz während des Programmplanungszeitraums zurückgeführt werden. Obwohl es positive Beispiele von Programmen gibt, die einen Beitrag zur Entwicklung einer selbsterhaltenden Dynamik des Energieeffizienzsektors gemacht haben (zum Beispiel durch die Entwicklung eines leistungsfähigeren Sektors für Energieeffizienz, die Verbesserung des öffentlichen Verständnisses für Energieeffizienz oder die Nutzung von öffentlichen Gebäuden als Vorbilder), war es nicht immer eindeutig, wie diese Ziele durch die praktische Umsetzung der Fördermaßnahmen erreicht werden sollten. Diese Evaluierung weist auch auf temporäre oder implizite Gründe für Investitionen in Energieeffizienz hin, insbesondere die Notwendigkeit während der Finanz- und Wirtschaftskrise durch zusätzliche EFRE/KF Zuweisungen kurzfristig zur wirtschaftlichen Aktivität beizutragen. Es existiert außerdem eine potenziell einseitige Ausrichtung von Investitionen in öffentliche Gebäude auf die Reduktion von zukünftigen öffentlichen Ausgaben, während das relative Preis-Leistungsverhältnis von Investitionen in öffentliche Gebäude und deren Vorbildfunktion nicht ausreichen in Betracht gezogen wird.

#### *Strategische Schlussfolgerungen*

Der Bericht weist auf eine Anzahl an Schlussfolgerungen für politische Entscheidungen hin:

- Es ist notwendig, dass Operationelle Programme klare Grundüberlegungen für ihre Maßnahmen machen und dabei den weiteren Zusammenhang der Energieeffizienzpolitik, sowie die vorhandenen Arten nationaler und regionaler Finanzierungsmechanismen in Betracht ziehen.
- Die Wahl der Maßnahmen sollte mit Bedacht getroffen werden und durch klare Grundüberlegungen unterstützt werden. Großzügige Zuschüsse für Behörden, die über die nötige Finanzierung für gut begründete Projekte hinausgehen, sollten vermieden werden. Zuschüsse können jedoch für tiefgreifendere Energieeffizienzinvestitionen besonders geeignet sein, wenn Begünstigte mit Unsicherheit über den Zeitraum und den Umfang der zukünftigen Kostenersparnisse konfrontiert sind.
- Die für die Programme zuständigen Behörden sollten aktiv die Verwendung von Darlehen und anderen Maßnahmen (wie Energieserviceverträge) als kostengünstigere Mittel für die Unterstützung von Energieeffizienz, in Betracht ziehen. Die Entwicklung von Standardvorlagen für die Verwendung von solchen Instrumenten kann von erheblichem Wert für die zuständigen Behörden sein.

- Auswahlkriterien für Projekte sollten sorgfältig bedacht werden, um die Wirksamkeit der Finanzierung bei der Verwirklichung von strategischen Zielen zu maximieren und das Risiko für falsche Anreize, die durch schlecht konzipierte Kriterien entstehen, zu vermeiden.
- Begleitende Maßnahmen (wie die Unterstützung von Hauseigentümern, Kapazitätsaufbau, Fortbildungen und Informationskampagnen) können eine wichtige Rolle spielen, insbesondere, wenn die zur Verfügung stehenden Maßnahmen neu für einen Mitgliedstaat oder eine Region sind. Besondere Aufmerksamkeit sollte der Assistenz in der Projektentwicklung dort verliehen werden, wo sie, zum Beispiel durch größere, gebündelte Projekte, die Wirksamkeit europäischer Investitionen erhöhen und die Kapazitäten der Begünstigten verbessern könnte.
- Die Kompetenzen der Behörden, die für die Umsetzung der Energieeffizienzmaßnahmen im Rahmen eines Operationellen Programms zuständig sind sollten verbessert werden. Es sollte (durch gezielte Einstellungen, Fortbildungen oder die Verwendung von externer Expertise) sichergestellt werden, dass die Behörden Zugang zum nötigen Wissen über Investitionen in Energieeffizienz von Gebäuden und deren Kontext haben.
- Die Verwendung von Energieeffizienzaudits sollte die Norm für EFRE/KF Investitionen in diesem Bereich sein.
- Kulturelle Eigenheiten, mögliche Verhaltensweisen der Förderbegünstigten und die Anreize, die durch die Ausgestaltung der Fördermaßnahmen entstehen sind wichtig für den Erfolg und die Wirkung der Maßnahmen und sollten bei der Programmentwicklung miteinbezogen werden.
- Gute Kommunikation zwischen den Behörden, insbesondere zwischen den Verwaltungsbehörden und den für Energiepolitik zuständigen Behörden im Programmgebiet, ist wichtig, um sicherzustellen, dass die Umsetzung der Ziele der Kohäsionspolitik und der Energieeffizienzpolitik sich gegenseitig ergänzen. Die für 2014-2020 festgelegten gemeinsamen Indikatoren für Investitionen in Energieeffizienz ermutigen eine weitere Standardisierung der Berichterstattung über Ergebnisse und Wirkung. Es existiert ein Potential für mehr Orientierungshilfe für Verwaltungsbehörden durch Experten für Energieeffizienz, um die passende Herangehensweise für die Berichterstattung zu finden.

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## 1. Introduction

### 1.1 Purpose and scope of the evaluation

The objective of this evaluation is to support the European Commission in its ex-post evaluation of cohesion policy spending over the 2007-2013 programming period, in particular in relation to energy efficiency.

More specifically, the objectives of the present study are to assess the rationale for supporting investments in energy efficiency in public and residential buildings, to identify what types of interventions were made, and to find out whether there is early evidence of effectiveness of these investments.

The scope of the evaluation is limited to energy efficiency interventions in public and residential buildings. Interventions in energy efficiency in other contexts (for example in SMEs) as well as investments in renewable energy in public and residential buildings are excluded from the scope of this study.

The evaluation covers the ERDF/CF programming period from 2007 to 2013. All 27<sup>1</sup> Member States which used ERDF or CF support during that programming period have been included in the scope of the evaluation but 48 Operational Programmes (hereafter OPs) have been looked into in greater detail, out of which six were assessed in case studies.

The evaluation responds to the following key questions.

Table 1: Key evaluation questions

#### Key evaluation questions

1. What are the main justifications for public (and EU) investment in energy efficiency in public and residential buildings?
2. What were the arrangements for support to energy efficiency in public and residential buildings in the 2007-2013 operational programmes?
3. Is there evidence of achievements in energy efficiency in public and residential buildings?
4. Were investments based on good strategies? What were the strengths of such strategies?
5. What are the main lessons which can be learnt for future policy development?

### 1.2 Method

#### 1.2.1 Research framework

In order to understand the investments in energy efficiency in public and residential buildings made under the ERDF and CF the research framework for this evaluation was designed around three main components: (i) the rationales for interventions, (ii) the types of interventions and (iii) their achievements. This is highlighted in the logic model below (Figure 1).

<sup>1</sup> The EU28 excluding Croatia, which acceded in 2013

Figure 1: Generic logic model



In relation to this generic model, the following definitions were used:

- **Rationales:** Justification for public intervention, in terms of a stated need, problem or goal to be addressed or achieved. The analysis of the rationales may identify barriers and/or market failures that are meant to be addressed in the programmes. In their most advanced form, rationales may also indicate the channels through which a certain intervention is expected to affect energy efficiency and generate other types of impacts. In that sense, rationales are related to intervention logics.
- **Interventions:** Any action or operation carried out by public authorities regardless of its nature (policy, programme, measure or project). In this report, ‘intervention’ is used as an equivalent to public interventions and includes financial input and all forms of operations by public authorities. The term intervention is also systematically used to designate the object of evaluation, which in this particular case are ERDF/CF funded projects or groups of projects in support of energy efficiency.
- **Achievements:** Any products or effects resulting from public interventions, whether they are outputs, results or impacts. In this respect, a comparison was made of what was achieved with what was originally planned, i.e. it compares actual with expected or estimated outputs, results, and impacts.<sup>2</sup>

Additionally, the following definitions were used:

- Residential buildings are characterised as multifamily apartment houses or individual houses which are primarily used for housing. They can be owner-occupied, from the private rented sector or social housing.
- Public buildings are defined based on their use by public services and include schools, hospitals and administrative offices<sup>3</sup>.

### 1.2.2 Structure of the work and selected sample

The work of the evaluation has been spread over four phases. The first phase generated contextual information and hypotheses on the rationale for, types of interventions and possible achievements of investments in energy efficiency in buildings. It involved a review of the literature, an analysis of national financing mechanisms for energy efficiency in public and residential buildings in the 27 Member States, and a report on the data available on these investments from OPs and Annual Implementation Reports (AIR) of all 215 Operational Programmes financed by the ERDF and CF.

The second phase analysed a set of OPs selected for their high financial allocations to the priority theme “Energy efficiency, co-generation, energy management”.

<sup>2</sup> European Commission, “The New Programming Period 2007-2013, Indicative guidelines on evaluation methods: monitoring and evaluation indicators”, Working Document No. 2

<sup>3</sup> The research identified two Operational Programmes that treated NGO accommodations as public buildings. This understanding was taken up by the evaluation.

Initially 48 OPs were identified which each allocated more than EUR 20 million in 2012 to the priority theme. European Territorial Cooperation OPs were included when they allocated more than EUR 7.5 million. Out of these, the 41 OPs which actually supported energy efficiency investments in public and/or residential buildings were analysed through a systematic review of programme documentation and interviews with Managing Authorities and intermediate bodies.

The sample of 41 OPs covered in this evaluation includes 7 Member States that joined the EU on or after May 1<sup>st</sup> 2004 (hereafter EU12) and 6 Member States that have been in the EU before 2004 (hereafter EU15), as well as 4 cross-border or transnational programmes. They cover the 3 objectives Convergence, Regional Competitiveness and Employment (Competitiveness), and the European Territorial Cooperation (hereafter ETC). Member States included are Bulgaria, Czech Republic, France, Germany, Greece, Hungary, Italy, Lithuania, Romania, Slovenia, Spain, Poland, and the United Kingdom. The European Territorial Cooperation programmes reviewed are France-England, Italy-Slovenia, the North Sea Region and Central Europe. The sample includes 12 programmes from EU12 and 25 programmes from EU15. They represent 72% of the total allocations to this theme.

Table 2 below presents an overview of the sample, highlighting the number of Member States and objectives covered. Total funding allocated to the priority theme “Energy efficiency, co-generation and energy management” is shown in the last column.<sup>4</sup>

Table 2: Sample of Operational Programmes included in the analysis

Types	Total number of OPs	EU 15	EU 12	Competitiveness	Convergence	European Territorial Cooperation	Financial allocation to priority theme in million EUR
	<i>(share of total in row)</i>						<i>(Share of all OPs)</i>
Selected OPs supporting energy efficiency in public or residential buildings and included in the analysis	41 (100%)	28 (68%)	13 (32%)	14 (34%)	23 (56%)	4 (10%)	4,395.1 (72%)
Original sample of OPs	48 (100%)	31 (65%)	17 (35%)	16 (33%)	27 (56%)	5 (10%)	4,991.6 (82%)
All OPs	215 (100%)	169 (79%)	46 (21%)	96 (45%)	70 (33%)	46 (22%)	6,066.8 (100%)

The third phase analysed 6 Operational Programmes in depth through case studies, selected for their relatively high allocations to this theme, high project selection rates (i.e. allocation of funds to specific projects) and other particular interests identified in the previous phases. The selected cases are: the Polish Infrastructure and

<sup>4</sup> Among the European Territorial Cooperation programmes Interreg France-England, Interreg Italy-Slovenia and Interreg North Sea Region were counted as EU15. The Interreg programme for Central Europe was counted as EU12.

Environment programme, the UK London programme, the Greek Competitiveness and Entrepreneurship programme, the Hungarian Environment and Energy programme, the Lithuanian Promotion of Cohesion programme, and the Slovenia/Italy cross-border programme. Sources of information included monitoring data, literature and programme documentation, and interviews with various stakeholders.

The final phase of the evaluation included a stakeholder seminar with representatives from OPs, experts in energy efficiency policy and investments, and members of the Commission. The seminar was held in Brussels on 26 June 2015 and included discussions on rationale, interventions and achievements, as well as on the relationship of ERDF/CF funding to other initiatives at European and national level. The seminar allowed testing and refining findings from the previous phases.

### 1.2.3 Limitations

The major difficulty encountered in the evaluation was to provide precise data on allocations and expenditures to energy efficiency interventions in public and residential buildings. The priority theme under which these interventions were funded and which was used by OPs for reporting, also covers investments in energy efficiency other than in public or residential buildings (e.g. in SMEs or in transport), as well as investments in co-generation and energy management. Consequently, detailed information on funds allocated to energy efficiency interventions in public and/or residential buildings could only be obtained for two thirds of the 48 selected programmes reviewed. For the remaining programmes only crude estimates were obtained. In a small number of cases not even this information was available.

At the same time, some OPs supported energy efficiency in public and residential buildings under other priority themes. This was for example the case where projects combined energy efficiency measures with investments in renewable energy and projects were marked under a priority theme for renewable energy. Other OPs generally encouraged energy efficiency investments wherever renovations took place. Urban renewal projects or renovations of specific types of buildings were then not marked under the priority theme for energy efficiency (e.g. Greek Competitiveness and Entrepreneurship OP). It has not been possible to identify all of these interventions and therefore no complete financial data is available.

To contextualise ERDF/CF interventions, information on national financing schemes for energy efficiency investments in public and residential buildings was collected. Information on the amount of funding allocated was not available for all mechanisms, and in some Member States there was significant change in financing mechanisms over the course of the period. While it was therefore not possible to estimate the total amount of national public funding available in the EU27 between 2007 and 2013 for energy efficiency investment in public and residential buildings, this exercise provided estimates for a subset of Member States.

Concerning the analysis of the rationale for investments in energy efficiency in buildings, the review of 48 selected programmes was conducted before the conclusion of the general literature review. Hence, the OP review adopted an inductive approach, starting from the information available in the programme documentation to identify justifications for support to energy efficiency in public and residential buildings. At a later stage the various types of rationales were introduced to allow a systematic analysis of the data collected. While completeness therefore cannot be guaranteed, an overview is provided of the explicit rationales found in the programme documentation.

The case studies complement this exercise by identifying a range of additional implicit rationales.

Detailed data concerning interventions was not always available in OPs and Annual Implementation Reports (hereafter AIRs). Therefore, research depended strongly on the input from Managing Authorities. As the evaluation took place in a new programming period, it was not always possible to find interviewees who had sufficient knowledge of the 2007-2013 period; and in some cases Managing Authorities found it difficult to devote time and attention to assisting with the evaluation. There was therefore limited data availability for some of the 48 OPs subject to in-depth review. This problem also occurred in the case studies, in particular for the Hungarian Environment and Energy OP and the Interreg Programme for Italy and Slovenia.

Another difficulty concerned the evaluation of achievements. Operational Programmes have not systematically used indicators to measure the outputs, results and impacts of investments and where these have been used they are very diverse. Furthermore, monitoring data on the indicators were not always available and methods to measure indicators that in principle could have allowed comparison across OPs differed strongly. Therefore, robust evidence of achievements is scarce, and where available it does not provide sufficient ground for systematic comparisons across OPs, regions and Member States.

Finally, the initial intention to analyse investments in public buildings and residential buildings separately proved to be difficult. Operational Programmes that supported both types of buildings did not always provide information on the rationale and the achievements separately for residential and public buildings. Also data on financial allocation did not differ between the two types of interventions.

### 1.3 Presentation of the EU Cohesion policy, funds and programmes

Regional Policy is the EU's main investment policy for growth and jobs. Its overall goal is to reduce the gap in the different regions' levels of development, in order to strengthen economic and social cohesion across the EU. The policy's budget (equivalent to one third of the EU's overall budget) is divided between three funds of which two were used to support energy efficiency in buildings: the European Regional Development Fund (hereafter ERDF) and the Cohesion Fund (hereafter CF). These two funds had a combined budget for the 2007-2013 period of EUR 269.6 billion.

Member States set out in detailed plans (Operational Programmes) for specific regions or the entire country how money from the EU funds would be spent during the seven-year programming period. There is also the possibility to define programmes aimed at improving territorial cooperation, which can include cross-border or transnational programmes.

In the programming period 2007-2013, each OP contributed to one of three objectives. Under the "Convergence" objective, the support was focussed on stimulating growth and employment in the least developed regions<sup>5</sup>. The "Regional Competitiveness and Employment" objective covered all areas of the European Union not eligible for the convergence objective. It focussed on reinforcing the regions' competitiveness and attractiveness as well as employment. Finally, assistance under the "European Territorial Cooperation" objective aimed to reinforce cooperation at cross-border, transnational and interregional level.

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<sup>5</sup> Those regions with a per capita gross domestic product (GDP) of less than 75 % of the Community average

The Operational Programmes of all three objectives could be used as a tool to respond to the EU's energy and climate policy.

According to Regulation (EC) No 1080/2006 ERDF, funding for Energy Efficiency and Renewable Energy investments in residential buildings was initially limited to EU12, partly because the housing stock in many of these Member States, especially apartment blocks constructed during the Soviet era, was in great need of renovation. The eligibility criteria further limited funding to multi-family housing and buildings owned by public authorities or non-profit operators and designated for social housing. Finally, these investments were capped to not exceed 2% of the total ERDF allocation in each OP. Energy efficiency investments in public buildings were eligible to ERDF/CF support in all Member States.

In 2009, the eligibility criteria for energy efficiency and renewable energy investments in housing through the ERDF were changed.<sup>6</sup> The amendment to the Regulation (EC) No 1080/2006 expanded the funding eligibility for residential buildings to all EU Member States—including EU15 and granted Member States the freedom to define what categories of housing were to be eligible. Member States could now spend up to an upper limit of 4% of their total ERDF allocation in this field. The consequences of this alteration in the eligibility criteria have been assessed in the evaluation.

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<sup>6</sup> Regulation (EC) No 397/2009 of the European Parliament and the Council of 6 May 2009 amending Regulation (EC) No 1080/2006 on the European Regional Development Fund as regards the eligibility of energy efficiency and renewable energy investments in housing

## 2. Overview of support to energy efficiency in buildings in 2007-2013

Buildings account for around 40% of the European Union's final energy consumption and are indirectly or directly responsible for approximately 36% of the EU's CO<sub>2</sub> emissions. Improvements to the energy efficiency of buildings therefore play a key role in the EU's climate and energy policy framework; the EU has set a target of reducing the EU's energy consumption by 20% by 2020 compared to a reference scenario.

During the 2007-2013 period support for energy efficiency investments in buildings was provided by national, sub-national and EU sources in the Member States of the EU, with the addition of some supra-national institutions.

As part of the first phase of this study the financial information on EDRF/CF funding for energy efficiency in the programming period 2007-2013 was analysed, focusing in particular on the priority theme "Energy efficiency, co-generation and energy management". It should be noted that expenditure recorded under this theme includes not just the energy efficiency investments in public and residential buildings which are the subject of this report, but other energy-related expenditure as well<sup>7</sup>. Furthermore, an inventory of the types of national public funding mechanisms Member States made available for energy efficiency investments in public and residential buildings between 2007 and 2013 was developed, in order to provide contextual understanding of the interventions in OPs.

### 2.1 Summary of findings

The total allocations of ERDF/CF investment in EU27<sup>8</sup> and European Territorial Cooperation (ETC) areas amounted to EUR 269.6 billion. of the total allocations to the priority theme "energy efficiency, co-generation and energy management" amounted to EUR 6.1 billion. The intensity of funding for this priority theme was thus 2% at EU level.

The total commitments for project investments under the priority theme "energy efficiency, co-generation and energy management" amounted to EUR 6 billion. The average rate of project selection for this priority theme<sup>9</sup>, based on the total of all OPs was thus close to 100%. However, the rate of project selections at the level of the specific Member States and OPs shows a varied picture; at the level of MS the minimum rate of project selection was 12% (Sweden), while the maximum was 386% (Luxembourg).

The financial allocations for this priority theme changed substantially in the majority of Member States during the 2007-2013 programming period. Before they reached EUR 6 billion allocations increased in total by a net EUR 1.9 billion during the programming period, made up of increases of EUR 2.1 billion and decreases of EUR 182.2 million. This represents a net overall increase of 45%.

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<sup>7</sup> The priority theme "Energy efficiency, co-generation and energy management" also covered investments related for example to combined heat and power production using renewable energy sources and introduction of cross-border energy management.

<sup>8</sup> As the evaluation focuses on the 2007-2013 programming period and Croatia only joined the EU in 2013 in order to avoid the complexity of different time periods Croatia is not include in this evaluation. Furthermore, Croatia did not allocate any ERFD/CF funding for the priority theme on energy efficiency, co-generation and energy management.

<sup>9</sup> Calculated as the ratio of funds committed to funds allocated to this priority theme.

With regards to financial figures on expenditure for the relevant priority theme, EU27 Member States<sup>10</sup> spent in total EUR 3.5 billion on energy efficiency, co-generation and energy management by the end of 2013 and this increased to EUR 4.7 billion by the end of 2014.

### *National public support schemes for energy efficiency in buildings*

In total, 129 national<sup>11</sup> public financing mechanisms were identified to be in place between 2007 and 2013 in the EU27 providing support for energy efficiency interventions in public and residential buildings. The number of financing schemes in individual Member States varies, as well as the approaches to the use of ERDF/CF funding for energy efficiency investments in buildings. Energy efficiency mechanisms at national level were also subject to significant change over the 2007-2013 period, partly due to changes in political context, including progressive implementation of the Energy Services Directive 2006/32/EC<sup>12</sup>, and partly to constraints on public finances as a result of the financial crisis.

Two-thirds of the identified financing mechanisms provided support in the form of grants and the majority of funds used state budget sources. Further, two-thirds of the support schemes targeted residential buildings. Just over half of the EU27 Member States had financing mechanisms targeted at public buildings.

Cumulative allocated amounts in public support for energy efficiency in buildings at Member State level between 2007 and 2013 have been estimated for 9 Member States: BG, CZ, EL, HU, LT, PL, RO, SI and the UK. The total estimated cumulative public allocations to energy efficiency investments in these 9 Member States amounted to EUR 7.2 billion.<sup>13</sup> Out of these 9 Member States, the share of the allocations for energy efficiency in public and residential buildings in the specific Member States' total government expenditure was the highest in the Czech Republic at 0.778%.<sup>14</sup> While compared to public support schemes for energy efficiency in buildings, the situation in these 9 Member States shows a mixed picture. ERDF/CF allocations to energy efficiency, co-generation and energy management played a significantly higher role in Romania, ERDF/CF investments only had a minor role in the UK. It is however difficult to draw general lessons for the effect that public support at national level has on the context for ERDF/CF support to investments in energy efficiency in public and residential buildings; a case-by-case, Member State specific approach is necessary.

## 2.2 ERDF/CF interventions for energy efficiency, co-generation and energy management

During the programming period 2007-2013, the support from national and sub-national sources for energy efficiency interventions in buildings was complemented by financial support from the EU through the European Regional Development Fund and

<sup>10</sup> Including ETC programmes.

<sup>11</sup> The inventory also includes a limited number of sub-national and supra-national financing mechanisms within the identified 129 financing mechanisms.

<sup>12</sup> Directive 2006/32/EC of the European Parliament and of the Council of 5 April 2006 on energy end-use efficiency and energy services, OJ L 114, 27.4.2006.

<sup>13</sup> This estimate includes EUR 600 million which was identified to be provided by supra-national organisations, such as the European Bank for Reconstruction and Development (EBRD) and the EEA and Norway Grants, for energy efficiency in buildings.

<sup>14</sup> The estimated cumulative allocations for energy efficiency measures in public and residential buildings in these 9 Member States should be treated with caution as data cannot be considered fully reliable and the calculations are rough estimates which often use approximation. The calculations for the share of total government expenditure were based on the Eurostat database's information on 'General government expenditure by function (COFOG)'.



the Cohesion Fund. Support for energy efficiency was provided to existing public buildings, residential buildings and other target categories including small and medium-sized enterprises (SMEs). For the purpose of this evaluation only public and residential buildings were covered.

The public buildings supported included, among others, public administration buildings, schools, nurseries, hospitals, sports facilities, cultural institutions and buildings occupied by NGOs, and a host of other, primarily municipal buildings. For residential buildings these covered primarily multi-family houses and social housing.

The type of investments supported through the ERDF and Cohesion Fund were similar to those supported through national schemes and included the insulation of roofs, walls and basements, renovation and installation of doors and windows, modernisation of heating systems, improvements to lighting systems and the installation of ventilation systems. As has been the case in some national funding schemes, some Member States provided ERDF/CF support for energy audits of buildings.

The analysis undertaken in the first phase of this study focused on the financial information on ERDF/CF investments. An overview of the key findings at the EU27 Member State level is presented below. Detailed information is presented in Annex 1.

Financial information on ERDF/CF interventions are submitted by the Member States to the European Commission via system for electronic exchange of data concerning shared Fund management between Member States and the European Commission for the period 2007-2013 (hereinafter: SFC system). During the 2007-2013 programming period financial information was reported in the following five dimensions:

1. Priority theme code;
2. The form of finance dimension;
3. The territorial dimension;<sup>15</sup>
4. The economic activity dimension;<sup>16</sup> and
5. The locations dimension (NUTS levels).

During the 2007-2013 programming period the priority themes covered a wide set of thematic areas, such as R&D, transport, energy, environmental protection, tourism, culture, and urban and rural regeneration. In total, 86 priority themes were in place, including the priority theme "Energy efficiency, co-generation and energy management". The financial information reported for this priority theme makes up the core part of the present analysis. Nevertheless, it should be noted that financial figures reported for this priority theme cover a wide set of investments and no specific data is available on the specific share of energy efficiency investments in public and residential buildings at the aggregate level. This means that no direct conclusions could be drawn on the total level of energy efficiency investments in public and residential buildings.

In addition, the analysis also provides some insights on the form of finance dimension, which covers the following four categories:

1. Non-repayable aid, i.e. grant-funding;
2. Aid, including loans, interest subsidies and guarantees;
3. Venture capital, including participation and venture capital fund; and

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<sup>15</sup> The territorial dimension covers various territory types such as urban, rural areas and outermost regions.

<sup>16</sup> The economic activity dimension includes for instance fishing, manufacture of food product and beverages, construction and hotels and restaurants.

#### 4. Other forms of finance.

Apart from the above listed five dimensions, financial information is also reported in the following formats by the Member States:

EU allocations per Member State and Operational Programmes (OPs), which refer to the total amount of ERDF/CF funding allocated to the Member States and/or OPs. These figures are reported in each year.

As allocations are reported per priority theme, the intensity of funding can be calculated for each of them. In the present analysis the intensity of funding refers to the ratio of allocations for the energy efficiency, co-generation and energy management priority theme to the total allocations of ERDF/CF funding per Member State or per OP.

Project selection, reported yearly in the Annual Implementation Reports (AIR), refers to the funding commitments to selected projects, which in the framework of this evaluation encompasses projects linked to the relevant priority theme. The analysis was based on the funding commitments reported in the 2013 AIRs.

The ratio of commitments for the energy efficiency, co-generation and energy management priority theme as reported in the Annual Implementation Reports and the EU allocated amounts for this priority theme provide an overview of the rate of selection of projects for the theme.

Even though financial figures on actual expenditure are not reported via the Commission's SFC system, information on ERDF/CF expenditure in 2013 and 2014 at the level of Operational Programmes was collected as part of Work Package 13 (WP13)<sup>17</sup> of the Commission's ex post evaluation project, which considers "Geography of Expenditure". For the collection of this expenditure data national experts from the WP13 project team contacted the relevant Managing Authorities and asked them to provide the specific figures on expenditure at the level of the priority theme dimension and the locations dimension.<sup>18</sup>

#### 2.2.1 EU allocations and project selections for energy efficiency, co-generation and energy management at the level of Member States

The total allocations of ERDF/CF investment in EU27 and European Territorial Cooperation (ETC) areas amounted to EUR 269.6 billion. 25 Member States covering 215 programmes reported allocations for the energy efficiency, co-generation and energy management priority theme. For those Operational Programmes the total amount of ERDF/CF allocations was EUR 176.8 billion.

The total allocations for energy efficiency, co-generation and energy management amounted to EUR 6.1 billion as reported in 2013. In absolute terms, the Czech Republic (EUR 1.1 billion), Italy (EUR 1.1 billion) and Poland (EUR 578 million) allocated the largest amounts of ERDF/CF funding to this priority theme. The intensity of funding for the relevant priority theme was 2.25% at EU level.

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<sup>17</sup> Ex post evaluation of Cohesion Policy programmes 2007-2013, focusing on the European Regional Development Fund (ERDF) and the Cohesion Fund (CF) – Work Package 13: Geography of Expenditure

<sup>18</sup> Information on financial figures on 2013 and 2014 ERDF/CF allocations was also collected from Managing Authorities within WP13. Due to the differences of the data sources there are discrepancies between the financial figures on ERDF/CF allocations for 2013 as reported in the Commission's SFC system and the WP13 database. The main information source on financial figures used throughout this evaluation was the European Commission's SFC Monitoring System; the financial figures on 2013 ERDF/CF allocations were based on the SCF system and not the data collected under WP13.

The total commitments for project investments under the 'energy efficiency, co-generation and energy management' priority theme amounted to EUR 6 billion as reported in the 2013 Annual Implementation Report. In absolute terms Greece (EUR 838.4 million), Italy (EUR 838 million) and the Czech Republic (EUR 710 million) had the largest commitments to projects related to this priority theme. The rate of project selections at the level of the specific Member States and OPs shows a varied picture. While 14 Member States had a rate of project selection below 100%, 13 Member States exhibited a project selection at or above 100%. In Greece, Latvia, Austria and Luxemburg the project selection rate was even higher than 200%, meaning that these Member States committed twice as much funding as they initially allocated to the priority theme.

An overview of the above discussed set of financial information is presented at the level of Member States in Table 3.

Table 3: Overview of key financial information on ERDF/CF investment for the energy efficiency, co-generation and energy management priority theme at the level of Member States

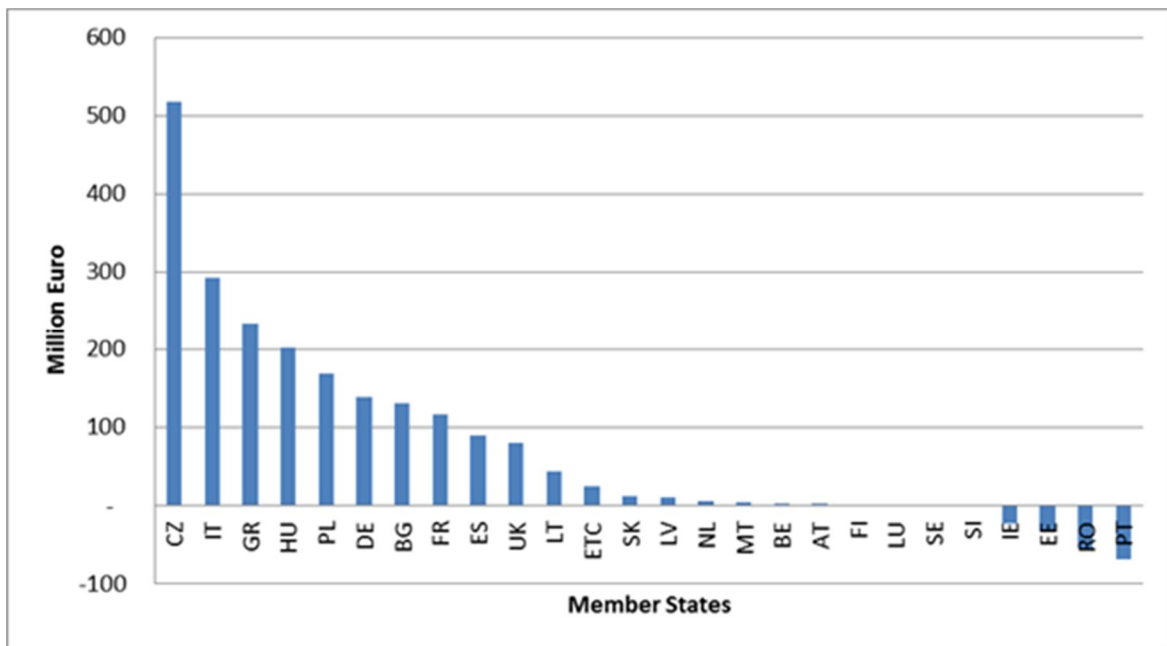
Member States	ERDF/CF total amount (million EUR)	Decided allocation for the priority theme at the end of 2013 (million EUR)	Intensity of ERDF/CF total for the priority theme (%)	Total projects for the priority theme as reported in AIR 2013 (million EUR)	Rate of selection of projects for the priority theme (%)
Czech Republic	22,455	1,140	5%	710	62%
Italy	20,992	1,087	5%	838	77%
Poland	57,178	578	1%	633	109%
Germany	16,100	391	2%	473	121%
Lithuania	5,747	374	7%	467	125%
Hungary	21,281	358	2%	385	108%
Greece	15,846	304	2%	838	275%
France	8,052	298	4%	373	125%
Bulgaria	5,488	257	5%	194	75%
Spain	26,596	237	1%	50	21%
UK	5,387	221	4%	153	69%
Romania	15,374	198	1%	104	52%
ETC	7,977	127	2%	216	170%
Slovenia	3,345	106	3%	142	135%
Slovakia	9,999	91	1%	98	108%
Portugal	14,558	77	1%	52	67%
Latvia	3,947	70	2%	187	267%
Netherlands	830	34	4%	28	81%
Estonia	3,012	29	1%	29	100%
Finland	977	24	2%	13	54%
Malta	728	19	3%	8	43%
Belgium	987	16	2%	10	61%
Ireland	375	16	4%	16	104%
Sweden	935	9	1%	1	12%
Austria	667	6	1%	18	299%
Luxemburg	25	1	2%	2	368%
Cyprus	493	0	0%	0	0%
Denmark	255	0	0%	0	0%
EU27 and ETC	269,608	6,067	2%	6,038	100%

Source: Monitoring data on ERDF/CF investments provided by the European Commission.

The monitoring data recorded in the SFC system showed that the financial allocations for the energy efficiency, co-generation and energy management priority theme changed substantially in the majority of Member States during the 2007-2013 programming period. In absolute terms, 18 Member States increased their allocations (including ETC programmes), 4 Member States decreased

their allocations, while allocations remained unchanged in 4 Member States (see Figure 2).<sup>19</sup> The total allocations increased by EUR 1.9 billion during the programming period 2007-2013. This represents an increase by 45%. This figure sums up the increases (EUR 2.1 billion) and decreases (EUR 182.2 million) of allocation changes for the relevant priority theme between 2008 and 2014. The increase was most substantial for the Czech Republic, where, compared to 2008, an extra EUR 518 million was allocated in 2014. At the same time, Finland, Luxembourg, Sweden and Slovenia did not make any changes to their allocations for the relevant priority theme and Ireland, Estonia, Romania and Portugal decreased their allocations.

Figure 2: Change in total allocation for the relevant priority theme in all Member States between 2008 and 2014 (EUR)



Source: Own elaboration based on monitoring data on ERDF/CF investments provided by the European Commission

Even though most of the changes occurred after 2009 no firm conclusions can be drawn from the data on whether the changes in allocations occurred as the result of the changes to the legal basis of ERDF/CF regulation (see Section 1.3). This issue and the reasons behind the changes in allocations have been analysed in the later sections of the report that focus on ERDF/CF interventions at the level of Operational Programmes.

90% of the total commitments for this priority theme were provided in the form of non-repayable grants, which amounted to EUR 5.4 billion. Commitments in the form of loans, interest subsidies and guarantees amounted to EUR 475 million, representing 8% of total commitments for this priority theme. Venture capital corresponds to 1% of total commitments.<sup>20</sup>

<sup>19</sup> There were no allocations for the relevant priority theme in Cyprus and Denmark.

<sup>20</sup> Nearly all of the venture capital expenditure reported is from Greek programmes, under the Hellenic Fund for Entrepreneurship and Development; however, it seems likely (although it has not been verified) that this represents either a misreporting of loan financing for residential energy efficiency, or a separate mechanism financing private sector energy investments that do not include energy efficiency in public or residential buildings.

### 2.2.2 EU expenditure on energy efficiency, co-generation and energy management at the level of Member States

As noted above, Managing Authorities were contacted as part of Work Package 13 (“Geography of Expenditure”) of the Commission’s ex post evaluation project, and financial figures on ERDF/CF expenditure by 2013 and 2014 respectively, together with information on ERDF/CF allocations by 2013<sup>21</sup> and 2014, were collected.

Table 4 below presents this information at the level of Member States for the priority theme on energy efficiency, co-generation and energy management. Between the end of 2013 and the end of 2014 the total programme expenditure on the relevant priority theme had increased by 33%; while expenditure on energy efficiency, co-generation and energy management in the EU27, including ETC programmes, by the end of 2013 was EUR 3.5 billion, this total had increased to EUR 4.7 billion by the end of 2014. In absolute terms, the Czech Republic (EUR 834 million), Italy (EUR 601 million) and Greece (EUR 593 million) spent the most on energy efficiency, co-generation and energy management by the end of 2014.

Table 4 also presents the ratio of expenditure and allocation for the priority theme on energy efficiency, co-generation and energy management by the end of 2013 and 2014, respectively. At the level of EU27, including ETC programmes, this was 59% by the end of 2013 and 67% by the end of 2014. Nevertheless, there is a great variation at the level of the Member States. For instance, in Lithuania the 2014 expenditure for the relevant priority theme was 97% of the 2014 allocations, while in Romania this was only 19%. At the same time, the ratio of expenditure to allocations also varies between the two years. For instance, the ratio of expenditure to allocation for the priority theme on energy efficiency, co-generation and energy management was 61% in Poland by the end of 2013 but this had increased to 75% by the end of 2014.

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<sup>21</sup> Due to the differences of the data sources there are discrepancies between the financial figures on ERDF/CF allocations for 2013 as reported in the Commission’s SFC system and the WP13 database. For further information on the differences between the SFC system data and the WP13 data please check the WP13 Final Report.

Table 4: Overview of key financial information on ERDF/CF investment for the energy efficiency, co-generation and energy management priority theme at the level of Member collected within Work Package 13 of this evaluation

Member State	Work Package 13 data				Ratio of expenditure and allocation	
	2013 Allocation (mn EUR)	2013 Expenditure (mn EUR)	2014 Allocation (mn EUR)	2014 Expenditure (mn EUR)	By the end of 2013 (%)	By the end of 2014 (%)
	A	B	C	D	B/A	D/C
Czech Republic	748	611	972	843	82%	87%
Italy	822	417	1005	601	51%	60%
Greece	955	474	966	593	50%	61%
Poland	682	414	734	553	61%	75%
Lithuania	458	431	469	456	94%	97%
Germany	456	275	500	355	60%	71%
Hungary	385	171	483	232	44%	48%
France	374	158	393	204	42%	52%
Bulgaria	159	93	228	167	59%	74%
Slovenia	94	80	141	123	85%	87%
Latvia	175	80	192	116	46%	61%
United Kingdom	144	58	148	85	40%	58%
ETC	94	53	99	71	56%	72%
Spain	55	51	77	51	93%	66%
Romania	180	34	264	50	19%	19%
Slovakia	83	39	105	44	46%	42%
Portugal	67	23	67	38	35%	57%
Estonia	29	28	29	29	99%	100%
Malta	8	8	18	27	100%	148%
Netherlands	28	18	29	20	64%	68%
Austria	18	11	18	15	61%	85%
Ireland	16	3	16	10	20%	62%
Belgium	11	8	10	9	69%	90%
Finland	13	6	13	8	51%	66%
Sweden	1	1	1	1	94%	94%
Luxembourg	2	0	2	1	20%	35%
Cyprus	0	0	0	0	n.a	n.a
Denmark	0	0	0	0	n.a	n.a
EU27 and ETC	6,057	3,544	6,979	4,702	59%	67%

Source: Database of Work Package 13: Geography of Expenditure, Ex post evaluation of Cohesion Policy programmes 2007-2013, focusing on the European Regional Development Fund (ERDF) and the Cohesion Fund (CF). Note: The table applies a gradient three colour coding system, in which red shows the high values, white shows the medium values and blue shows the low values.

## 2.3 Public intervention for energy efficiency in buildings

National and sub-national support schemes, and the expenditure in Member States of some supra-national institutions<sup>22</sup>, targeted a wide range of buildings, including public, residential and commercial buildings, and provided support for both existing and buildings to be constructed. The literature review suggests that there has been very little formal evaluation of the public support schemes targeting energy efficiency in public and residential buildings.

The inventory developed on the national public funding available for energy efficiency in public and residential buildings in the EU between 2007 and 2013 provides an overview of the 27 EU Member States. While the inventory primarily covers financing schemes which were made available at the national level by state intermediaries, such as public banks and energy efficiency agencies, a limited number of sub-national and supra-national funding was also identified. Other funding sources, such as energy efficiency obligation schemes, are not included.

Information from the two key energy efficiency databases, the Odyssee Mure Energy Efficiency Policies and Measures Database and the IEA Energy Efficiency Policies and Measure Database, were cross-checked. The Member States' Energy Efficiency Action Plans (NEEAPs) published in 2011<sup>23</sup> were also used as a source of information. Information was complemented by national official sources for the 13 Member States analysed in detail in this study (Bulgaria, Czech Republic, Germany, Greece, Spain, France, Hungary, Italy, Lithuania, Poland, Romania, Slovenia and UK).

The inventory provides information on each Member State and its financing mechanisms. The descriptors used for each mechanism include among others the type of financing mechanism, the source of funds, the eligible type of buildings, energy efficiency measures, geographical scope, and the extent of available and allocated funds.

### 2.3.1 Overview of findings

In total, 129 financing mechanisms were identified in EU27. There was a wide variation in the number of mechanisms used in different Member States, reflecting differences in administrative culture, and the nature of the objectives aimed at. For instance, in Greece only two financing mechanisms were identified, and in Denmark only one mechanism for financial support appears to have been provided for energy efficiency in public and residential buildings. This could be explained by the fact that Greece provided significant support for energy efficiency in buildings using ERDF/CF funding, while Denmark's energy efficiency policy was mainly built on voluntary schemes, supported by stringent building regulations, and information campaigns. In contrast, 10 financing mechanisms were identified in Germany, partly as a result of support being provided both at national and federal level, and partly due to various loan schemes which were provided by the publicly-owned KfW bank during the 2007-2013 period. Energy efficiency mechanisms at national level also changed significantly over the 2007-2013 programming period, due to pressures such as implementation of the Energy Services Directive, Energy Performance of Buildings Directive and to constraints on public finances as a result of the financial crisis.

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<sup>22</sup> Such as the European Bank for Reconstruction and Development.

<sup>23</sup> The 2011 NEEAPs were chosen as the main sources of information given that:

- The 2007 NEEAPs only provide an initial overview of the 2007-2013 programming period.
- The 2014 NEEAPs are not available for all of the Member States and provide information on future plans of a time period which is not covered in this study.



The inventory of the identified financing mechanisms is presented in Annex 2.

### *Type of financing mechanisms*

In order to support energy efficiency investments in public and residential buildings in the 2007-2013 programming period, Member States primarily provided non-repayable grants. More than two-thirds of the 129 financing mechanisms consisted of non-repayable grants.

The remainder of the financing mechanisms were in the form of loans. Member States deployed a range of different types of loans, including:

- Interest-free loans (for instance the interest-free eco loan in France and the Government Thermal Insulation Programme in Slovakia);
- Fixed interest-rate loans (for instance the KfW Programme Energy-Efficient Redevelopment in Germany and the Financial incentives for energy-efficient renovation and sustainable construction of residential buildings in Slovenia);
- Loans with credit guarantees (for instance the Energy Efficiency and Renewable Source Fund in Bulgaria and the Thermal Rehabilitation of Residential Buildings scheme in Romania).

Some Member States provided guarantees together with non-repayable grants (e.g. the Czech Panel Programme).

### *Source of funds*

The majority of the funding was provided by state funds. Nevertheless, funding from supranational organisations also played an important role in some Member States. Such schemes were offered by *inter alia* the European Bank for Reconstruction and Development (EBRD), the European Investment Bank (EIB), the UN Global Environment Fund (GEF) and grants from the European Economic Area (EEA) and Norway.

Seven Member States (Bulgaria, Poland, Czech Republic, Estonia, Hungary, Latvia and Lithuania) used the funds generated by the sale of Assigned Amount Units (AAUs) under the Kyoto Protocol and created Green Investment Schemes to provide support for energy efficiency in public and residential buildings.

Furthermore, some Member States used money from Power Plant Decommissioning Funds to support energy efficiency in public and residential buildings. These included the Bulgarian grants under the Kozloduy International Decommissioning Support Fund (KIDSF), the Slovak SLOVSEFF facility co-financed by the Bohunice International Decommissioning Support Fund, and the Lithuanian Ignalina Programme for 2007-2013.

### *Eligible types of buildings*

Two-thirds of the support schemes targeted residential buildings. Around 20 of the identified financing schemes supported specific types of buildings, such as:

- Obsolete blocks of flats, e.g. the Hungarian Green Investment Scheme's Climate-friendly Home Panel Sub-programme;
- Single or double dwelling family houses, e.g. Slovakia's programme on improvements in the thermal properties of buildings – building insulation;
- Social housing units, e.g. the French PALULOS grant scheme;
- Newly built residential houses, e.g. the German UmweltBank loans with eco-bonus.

Support for obsolete blocks of flats was common in the EU12, especially in those Central and Eastern European (CEE) countries where during the Soviet era large panel buildings were erected. Financing mechanisms targeting these types of buildings were identified in the Czech Republic (Panel Programme), Hungary (Green Investment Scheme, Climate-friendly Home Panel Sub-programme), Poland (Repair Premium), Romania (Multiannual National Programme for increasing the energy performance of the block of blocks of flats) and Slovakia (Housing Development Support Programme: removal of system defects in blocks of flats).

Multi-apartment buildings were supported more often than single or double dwelling family houses. Only 4 financing mechanisms were identified which specifically indicated that support is only provided for family houses.

Social housing units were targeted in France, while Germany, Ireland, Slovenia and the UK provided specific support for low-income households. The tackling of fuel poverty was the main objective of 4 financing mechanisms out of the 6 identified support schemes in the UK.

Only 5 of the identified financing mechanisms targeted specifically the construction of new energy efficient houses. Examples include the German UmweltBank loans, Hungary's Our Home and Building New Home Sub-Program under the Green Investment Scheme and the Promotion programme for energy-efficient new buildings in Luxembourg. However, it is clear that significant public funding is made available for new housing construction in general; and that in some Member States at least a proportion of this funding is focused on housing construction to higher energy efficiency standards.

Out of the identified financing mechanisms 16 supported residential and public buildings at the same time (see for instance, the Italian Kyoto Rotation Fund and Slovakia's Ekofund Programme focusing on improvements of energy performance of buildings). Furthermore, some mechanisms provided also support for commercial buildings.

Seventeen Member States (Belgium, Bulgaria, Cyprus, Estonia, Finland, Germany, Greece, Hungary, Italy, Latvia, Lithuania, Malta, Poland, Romania, Slovenia, Slovakia, and UK) had targeted financing mechanisms for public buildings. Some of these financing schemes supported only specific types of public buildings. For instance, education institutions received support in Germany (Future Investment Act) and Greece (energy upgrading of existing school buildings). These mechanisms were mostly funded from state budgets but supra-national institutions also played an important role. For instance, in Hungary, only one financing mechanism targeted energy efficiency in public buildings and it was funded by the EBRD.

#### *Other energy efficiency investments from public funds*

The analysis only addressed mechanisms which are focused on energy efficiency. There is likely to be a significant, but not separately identified, element of energy efficiency expenditure from public funds as part of mainstream operational budgets for public buildings, or as part of mainstream housing renovation expenditure. The mechanisms identified in the course of this evaluation therefore do not represent the totality of Member State spending on energy efficiency in public and residential buildings.

#### *Eligible type of energy efficiency measures*

The most commonly supported energy efficiency measures included the insulation of roofs, walls and basements, renovation and installation of doors and windows,

installation of ventilation systems and modernisation of the heating systems. Some of the financing mechanisms also supported replacements of electrical appliances (e.g. Luxembourg and Malta), and improvements to lighting systems. Cyprus and Hungary for instance specifically supported the replacement of efficient light bulbs. Some Member States provided support for energy audits and renewable energy sources.

#### *Eligible geographical scope*

In most cases, the information sources covered only reported a few sub-national mechanisms, mainly because they are focused on the national measures. Regional financing mechanisms were deployed in federal states, such as in Austria, Belgium, and Germany. Regional support schemes were also identified in Italy, Spain, Ireland, Lithuania, Poland and the UK.

#### *Available and allocated funds*

Given that the identified financing mechanisms cover different time ranges, that information on the amount of allocated funding was not available for all the identified mechanisms, and that in some Member States there was significant change to financing mechanisms over the course of the period (in response both to public expenditure constraints, but also to the need for action to meet Energy Services Directive obligations), it was not possible to estimate a cumulative allocated amount in national public funding in the EU27 between 2007 and 2013 to energy efficiency investment in public and residential buildings.

Nevertheless, estimates are available for 9 Member States (see Table 5). In order to provide information on the magnitude of the cumulative amount of allocated funding the allocations for energy efficiency in public and residential buildings are also expressed as a share of the specific Member State's total government expenditure.

The total estimated cumulative public allocations to energy efficiency investments at the Member State level in these 9 Member State amounted to EUR 7.2 billion between 2007 and 2013.<sup>24</sup> This is a broad approximation which is likely to underestimate the actual total allocations. The exact amount is however not known due to data availability constraints. A difficulty in drawing any more precise estimates in this respect indicates one of the barriers for the development of energy efficiency markets; the lack of viable estimation of the size of the markets and the complexity and overlapping nature of the measures in place to support their development may effectively discourage potential investors.<sup>25</sup>

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<sup>24</sup> This estimate includes EUR 600 million which was identified to be provided by supra-national organisations, such as the European Bank for Reconstruction and Development (EBRD) and the EEA and Norway Grants, for energy efficiency in buildings.

<sup>25</sup> For more on key barriers to energy efficiency improvements see: Broc, J., Czako, V., Bertoldi, P., 2013. On the way to change of scale: review of NEEAPs' energy efficiency strategies for buildings. Proceedings of the ECEEE 2013 Summer Study, 503-513

Table 5: Overview of estimated cumulative public allocations at the Member State level for energy efficiency measures in public and residential buildings in 9 Member States in 2007-2013 and the share of these allocations in total government expenditure

Member State	Estimated cumulative allocations at MS level to energy efficiency (mn EUR)		Share of total government expenditure (%) <sup>26</sup>	Note
	National allocations	Supra-national allocations		
Bulgaria	176.0		0.22%	The estimations cover the National Green Investment Scheme and exclude the national strategy for financing building insulation for energy efficiency 2006-2020 as no data on the implemented activities has been identified. No adjustments have been made for projects starting before 2007 or ending after 2013, as this level of detail is not available in the data. The estimations also include EUR 138 million support provided by supra-national organisations, such as the EBRD and EEA. <sup>27</sup>
	38.0	138.0		
Czech Republic	2,970.0		0.78%	The estimations cover three national financing mechanisms: the Green Savings Programme, the Panel Program and the Joint program to support the replacement of boilers.
	2,970.0	0.0		
Greece	431.6		0.06%	The estimations cover the Green Fund's Urban Revival 2012-2015 programme and also include EUR 400 million support provided by the EIB for the energy upgrading of existing schools is not included in the estimate given that only national support is indicated in the cumulative estimates.
	31.6	400.0		

<sup>26</sup> The totals presented in this table take into account the support provided by supra-national organisations, so are not directly comparable to total government expenditure by the relevant Member State.

<sup>27</sup> Excluded financing mechanisms include the Energy Efficiency and Renewable Sources Fund, Energy and Energy Savings Fund (EESF), Residential Energy Efficiency Credit Line (REECL), Programmes BG04 'Energy Efficiency and Renewable Energy' and the grants under the Kozloduy International Decommissioning Support Fund (KIDSF).

Member State	Estimated cumulative allocations at MS level to energy efficiency (mn EUR)		Share of total government expenditure (%) <sup>26</sup>	Note
	National allocations	Supra-national allocations		
Hungary	184.5		0.06%	This figure covers the Green Investment Scheme's relevant sub-programme, the National Energy Saving Plan and the Panel Programme. It therefore does not include allocations for loan constructions. Furthermore, as yearly allocations were not available for the Panel Programme it was assumed that the total allocations were distributed evenly between all years and the allocation was calculated for the relevant time period (i.e. 2007-2009).
	184.5	0.0		
Lithuania	152.3		0.22%	The estimations cover three national support schemes: the Special Climate Change Programme, the Ignalina Programme for 2007-2013, and the Lithuanian Environmental Investment Fund programme. Furthermore, EUR 20 million provided by the EEA and Norway grants and the Swiss-Lithuanian Cooperation Programme are also included in the estimations.
	131.8	20.5		
Poland	599.5		0.07%	The estimations cover three national support schemes: the Thermo-Modernisation Premium, the Repair Premium and sub-programme 1 and 5 of the Green Investment Scheme. Furthermore, EUR 100 million is included which was provided by the EEA and Norway grants. The figure does not include allocations from regional funds for environmental protection and water management for which there is no information available.
	499.5	100.0		
Romania	72.1		0.02%	The estimations cover four national support schemes. <sup>28</sup> The financing schemes for residential buildings were

<sup>28</sup> The identified support schemes include the Thermal Rehabilitation of Residential Buildings Programme, the Multiannual National Programme for increasing the energy performance of the block of blocks of flats, the National Programme "District heating 2006-2015 warmth and comfort" and the National programme for the increase of energy efficiency and use of renewable energy sources in the public sector for 2009-2010.

Member State	Estimated cumulative allocations at MS level to energy efficiency (mn EUR)		Share of total government expenditure (%) <sup>26</sup>	Note
	National allocations	Supra-national allocations		
	72.1	0.0		varied and amounted to approximately EUR 0.27 million in grants and guaranteed loans worth approx. EUR 64.36 million for the period 2007-2013. With regards to measures in support of energy efficiency in public buildings, the public financing schemes were more limited and mostly ensured via one public support scheme funded from the state budget. Thus, public support for energy efficiency interventions in public buildings amounted to approximately. EUR 7.43 million for the period 2009-2010.
Slovenia	145.5		0.144%	The indicated figure covers only the estimated amount of Eco Fund investment in public and residential buildings (2007-2013), of which EUR 46 million was in loans and EUR 99 million was in grants. Due to very unreliable data, the stated amounts can only signify a growing trend of grants in comparison to loans and does not indicate the exhaustive amount of funds allocated towards energy efficiency investments in public and residential buildings.
	145.5	0.0		
UK	2,500.0		0.05%	The indicated allocation almost exclusively focused on residential buildings and covers six national and sub-national financing mechanisms. <sup>29</sup>
	2,500.0	0.0		

*Note: The cumulative allocated amounts for energy efficiency investments in public and residential buildings are own estimates. Please note that the limitations of these calculations are specifically indicated on the right of the table. The calculations for the share of total government expenditure were based on the Eurostat database's information on 'General government expenditure by function (COFOG)'. The data was accessed on 01/05/2015.*

<sup>29</sup> The identified support schemes include the Salix Finance, Public Sector Central Energy Efficiency Fund (Scotland), The Warm Front Scheme (England), Home Energy Efficiency Scheme replaced by Nest (Wales), Central Heating and Warm Deal Program replaced by the Energy Assistance Scheme and the Affordable Warmth Scheme (Scotland), Warm Homes (Northern Ireland).

### 2.3.2 Complementarity of ERDF/CF investments and national allocations to energy efficiency in public and residential buildings

The role of ERDF/CF investments in public and residential buildings in view of the available national allocations shows a varied picture in the different Member States. Table 6 shows the estimated cumulative national (and supra-national) allocations to energy efficiency for those 9 Member States where estimates were available and the amount of ERDF/CF allocations to energy efficiency, co-generation and energy management. The ratio of ERDF/CF allocations to national (and supra-national) support is also presented, although clearly this is in large part influenced by the overall size of ERDF/CF spending in these Member States compared to national budgets. ERDF/CF allocations for energy efficiency, co-generation and energy management were significantly higher than other public sector funding<sup>30</sup> in Romania, while ERDF/CF investments only played a minor role in the UK.

Table 6: Overview of ERDF/CF investments for energy efficiency, co-generation and energy management and national and supra-national allocations to energy efficiency in buildings in 9 Member States between 2007 and 2013

Member State	EU ERDF/CF allocations for the energy efficiency, co-generation and energy management priority theme (million EUR)	Estimated cumulative national and supra-national public allocations to energy efficiency in buildings (million EUR) <sup>31</sup>	Ratio of ERDF/CF investments for energy efficiency, co-generation and energy management and national and supra national support for energy efficiency in buildings (%)
Bulgaria	256.7	176	146%
Czech Republic	1,140.10	2,970.00	38%
Greece	304.5	430	71%
Hungary	357.5	184.5	194%
Lithuania	373.8	152.3	245%
Poland	578.1	599.5	96%
Romania	198.1	72.1	275%
Slovenia	105.7	145.5	73%
UK	221.2	2,500.00	9%

Source: ERDF/CF investments are based on data provided by the European Commission from the SFC System. The cumulative allocated amounts for energy efficiency investments in public and residential buildings are own estimates. Note: The table applies a gradient colour coding system, which shows the high values in red, white shows the medium values and blue shows the lowest values.

<sup>30</sup> Support provided by supra-national organisation identified in Bulgaria, Greece, Lithuania and Poland are also included in the estimates.

<sup>31</sup> The cumulative estimates also include support provided by supra-national organisations in the case of Bulgaria, Greece, Lithuania and Poland (see table above).

### 3. Rationales for public and EU support to energy efficiency in buildings

#### 3.1 Summary of findings

Literature and policy papers identify three primary benefits from public support to energy efficiency improvements in public and residential buildings: cost savings, climate change mitigation and energy security. These benefits are well understood and clearly described across different sources. They are linked to the reduction of energy consumption and provide core justifications for energy efficiency investments in public and residential buildings.

In addition to the primary benefits a wide range of secondary benefits has been identified. Typically, the literature identifies these as under-appreciated co-benefits of energy efficiency. These benefits can be social, economic or environmental in nature.

Public intervention is intended to address market failures in the field of energy efficiency interventions in buildings. An important part of the rationale for public support to energy efficiency interventions in buildings are obstacles in the market, which make such investments seem less attractive or more complicated than their underlying merits would imply, and ultimately result in sub-optimal levels of investment. The reasons identified for these market failures include behavioural explanations and information asymmetries.

The analysis of the 41 selected OPs shows that the potential primary benefits of energy efficiency were reflected. The selected OPs referred to aims of climate change mitigation, energy security and savings. Also clear references to the EU climate and energy policy were made. In particular, the so-called 20-20-20 targets were mentioned.

Potential benefits for energy efficiency identified in the programme documentation were in most cases not specific to public or residential buildings. They related to energy efficiency in general. Further, inconsistencies in the stated and implicit rationales show gaps in the strategy of investments.

Managing Authorities identified a need for increased investment in energy efficiency investments in buildings in a large majority of the selected OPs. Despite this, the reasons for suboptimal investments were not considered in any detail.

Access to finance became an urgent issue due to the financial crisis. Importance of energy saving interventions in residential and public buildings increased as a result.

At the time when Managing Authorities initially developed the OPs, experience in the use of ERDF/CF funds for energy efficiency was lacking. Many programming authorities had limited understanding of energy efficiency in buildings and were not in a position to define a strategy and understand the rationale for investments. There has been a steep learning curve for the Managing Authorities and their partners in designing interventions for energy efficiency in buildings.

Support to public buildings was more common than for residential buildings. A minority of the selected OPs from the EU12 targeted residential buildings, despite



the existence of a rationale for supporting private investment in energy efficiency through public intervention. A majority of the selected OPs from the EU15 targeted and supported residential buildings after 2009 and subsequently increased their allocation to this theme.

In general, choices of types of supported buildings were not well justified in the programme documentation. When they were provided, such justifications were not always consistent with the types of buildings eventually targeted in practice.

Most Managing Authorities preferred grant schemes over loans or any other forms of financial engineering instruments to support energy efficiency in buildings. The selection of the form of support was based on pragmatic reasons, rather than on an understanding of the specific needs and market imperfections. The use of financial engineering instruments required a rigorous intervention design, which helped the Managing Authorities to better understand their market and needs.

### 3.2 The rationales for public support to energy efficiency in buildings as found in the literature

The main rationales for public support to energy efficiency improvements in public and residential buildings are well understood and clearly described in the literature and policy papers. A review of the literature identified a wide range of economic, social and environmental benefits linked to public support for energy efficiency investments in public and residential buildings, summarised in Table 7 below. The review also revealed a number of market imperfections, which result in sub-optimal levels of investments and provide justifications for public support.

Table 7: Overview of benefits

	A - Primary benefits	B - Secondary benefits or co-benefits
Economic	Less expenditure on energy allows for more efficient allocation of resources ensuring that further cost efficient energy efficiency measures are adopted Economic benefits associated with improved energy security, including reduced vulnerability to price shocks and supply constraints, reduced energy imports and improved trade balance	Macro-economic benefits including energy efficiency as part of a stimulus package  Exemplary role for public building investment
Social		Employment  Reduced fuel poverty/ Increased health benefits from improved heating  Health benefits from improved air quality
Environmental	Contribution to climate change mitigation through reduced CO <sub>2</sub> emissions from fossil fuel energy	Reduced pressure on environmental resources from energy infrastructure  Improved air quality

### 3.2.1 Primary benefits from energy efficiency investments in buildings

Three primary benefits from energy efficiency investments in buildings have been identified. Those primary benefits are linked to the reduction of energy consumption and provide core justifications for energy efficiency investments in public and residential buildings.

#### *Cost savings*

The economic rationale for investment in energy efficiency to reduce energy consumption in low energy performing buildings and new buildings is clear: a reduction in energy consumption as a result of improved energy efficiency should, logically, provide economic benefits in terms of cost savings of the kind associated in economic theory with improvements in the efficiency of a factor of production. The analysis generally shows significant cost-effective potential, even before wider public interest considerations related to climate change or energy security are factored into energy prices. However, this potential can only be reached after first investments are made which proves to be a barrier for interventions.

Policymakers often regard the case for government intervention to encourage the take-up of this potential as self-evident. It is rarely outlined in detail in policy documents. However, the fact that such apparently cost-effective investments are not made raises questions about whether there are hidden barriers not fully appreciated by policy-makers, and about the extent to which government should intervene.

#### *Climate change mitigation*

Given the significant role of emissions from energy use in global and EU CO<sub>2</sub> emissions, energy efficiency has the potential to contribute significantly to the emission reductions necessary to tackle the problem of global warming, and to meet the EU climate and energy targets.

Improving energy efficiency performance can, for a given level of demand for energy services, lead to lower energy consumption and reduced Greenhouse gas (GHG) emissions. To the extent that external costs linked to climate change (for example, the costs to society of impacts of higher temperatures, sea level rise, and more extreme weather events) are not reflected in energy prices, and to the extent that energy prices (even if such external costs are incorporated) are themselves ineffective in delivering socially optimal levels of investment in energy efficiency, there is a clear public policy rationale for intervention. This underlies much of the stated rationale for energy efficiency policy at both European and Member State level.<sup>32</sup> Moreover, improvements in energy efficiency in the residential sector and in public buildings have an advantage over other mitigation options (in particular those which impose costs on industries subject to global competition): they do not have the potential to create so-called “carbon leakage” impacts. “Carbon leakage” refers to cases where the emissions associated with EU production decrease, but EU consumption of energy-intensive goods and services does not reduce; this creates a risk that production shifts to other economies, with no or less stringent controls on carbon emissions, with the result that no net improvement in global emissions is achieved.

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<sup>32</sup> See for example: Agrotec, CDM (2010), Evaluation of the impact of investment as part of the 9.1 , 9.2 and 9.3 of the Operational Programme Infrastructure and Environment for the implementation of commitments related to energy saving [Ocena wpływu inwestycji w ramach działań 9.1, 9.2 i 9.3 na realizację zobowiązań związanych z oszczędzaniem energii], [http://www.ewaluacja.gov.pl/Wyniki/Documents/4\\_047.pdf](http://www.ewaluacja.gov.pl/Wyniki/Documents/4_047.pdf) or EDATER, Ex ante evaluation of measures aiming to optimise the use of the ERDF in Aquitaine – Flash evaluation preparing the mid-term revision of 2010 – final report [Évaluation ex ante des mesures visant à optimiser l'utilisation des crédits FEDER en Aquitaine – Evaluation flash préparatoire à la révision à mi-pacours de 2010 – Rapport final] [http://www.datar.gouv.fr/sites/default/files/aquitaine\\_eval-ex-ante\\_mesures\\_optimisation\\_feder.pdf](http://www.datar.gouv.fr/sites/default/files/aquitaine_eval-ex-ante_mesures_optimisation_feder.pdf)

With energy efficiency measures making energy demand more manageable, it will become more feasible to increase the share of renewable energy sources. This can equally contribute to climate change adaptation.

### *Energy security*

Improvements in energy efficiency that lead to reduced energy consumption can contribute to improved energy security at Member State and EU level. This has increasingly been cited as a rationale for energy efficiency interventions in policy statements in recent years<sup>33</sup>, partly in response to geo-political concerns over the stability of relations with major energy exporting economies, and partly in response to increased policymaker appreciation of the challenges of decarbonising energy supply. Reduced energy consumption and hence a reduction of energy imports can furthermore improve trade balance.

### 3.2.1 Secondary or co-benefits from energy efficiency investments in buildings

In addition to the primary benefits in terms of cost savings, climate change mitigation and energy security, a wide range of secondary benefits has been identified. Typically, the literature identifies these as under-appreciated co-benefits of energy efficiency. Much of the literature available on the subject is written from one perspective, sometimes with an institutional bias, where the importance of improved energy efficiency is assumed to be clear, and the identification of additional reasons for supporting energy efficiency therefore has additional rhetorical benefits in advancing the cause of energy efficiency investment in public policy-making. In recent years a number of policy documents (including at Commission and European Council level) specifically cite secondary benefits as reasons for investment in energy efficiency. They can be grouped broadly in three categories: social, economic and environmental benefits.

#### *Secondary social benefits*

These include among others: improved health, including through better heating and the avoidance of health problems associated with cold, but also through air quality co-benefits from reduced particulate emissions; the reduction of poverty, including of energy poverty; and job creation.<sup>34</sup>

#### *Secondary economic benefits*

These can be divided into the following two sub-categories:

- Collective economic benefits: For example, increase in GDP (including through the use of energy efficiency investments as an instrument of counter-cyclical investment), benefits to the economy of reduced fuel costs or beneficial impacts on

<sup>33</sup> See for example: EC (2104), 'European Energy Security Strategy', Communication from the Commission to the European Parliament and the Council, COM(2014) 330 final, <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52014DC0330&qid=1428057653387&from=EN>; and EC (2006) 'A European Strategy for Sustainable, Competitive and Secure Energy Green Paper', COM(2006) 105 final <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52006DC0105&qid=1428061113957&from=EN>

<sup>34</sup> EC (2008), 'A European Economic Recovery Plan', Communication from the Commission to the European Council COM (2008) 800 final, <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52008DC0800&rid=1>; Vine, E. (2003) 'Opportunities for promoting energy efficiency in buildings as an air quality compliance approach', Energy vol. 28/2003 issue 4, <https://publications.lbl.gov/islandora/object/ir%3A118887/datastream/PDF/view>; Mills, E., Rosenfeld, A. (1996) 'Consumer non-energy benefits as a motivation for making energy-efficiency improvements', Energy vol. 21/1996 issue 7-8. <http://evanmills.lbl.gov/pubs/pdf/nebs-mills-rosenfeld.pdf>

currency reserves from reduced expenditure on fuel imports. In these cases, there is usually a clear public policy rationale for intervention.<sup>35</sup>

- Private economic benefits: While in principle these are not likely to be directly relevant to public expenditure decisions, in practice they can form part of the rationale, sometimes with an explicit justification where there is a clear understanding of potential market failures that lead to sub-optimal choices by private businesses and individuals. There are also private benefits that contribute to wider government objectives. For example, individual gains in terms of skills relevant to energy efficiency or the development of business opportunities in a sector regarded as having potential for future growth, can increase the economy's capacity for future energy efficiency investment and reduce the costs of that investment.<sup>36</sup> A similar function is sometimes ascribed to energy efficiency investment in public buildings, which are considered to have an exemplary role, creating a wider beneficial impact than simply the future costs savings accruing to the budget of the public authority concerned.

### *Secondary environmental benefits*

While the primary environmental benefit of energy efficiency is its contribution to reduced atmospheric concentrations of greenhouse gases, secondary environmental benefits can also be ascribed, such as reduced pressure for development of new energy infrastructure or air quality improvements from reduced particulate emissions associated with fossil fuel combustion.<sup>37</sup>

Finally, it should be noted that some of the benefits ascribed to energy efficiency improvements are in competition with each other. For example, where health benefits depend on the choice of more appropriate heating levels, this will imply that at least some of the benefits of the energy efficiency investment are being consumed in the form of higher levels of comfort, which will reduce the benefits in terms of both greenhouse gas emissions and energy security. Other benefits, however, are essentially similar ways of measuring the same impact – for example, reduced pressure on natural resources from the exploitation of new energy sources can be seen as one expression of the benefits of improved energy security.

## 3.2.2 Barriers to energy efficiency investments

An important part of the rationale for public support to energy efficiency interventions in buildings are barriers in the market, which make such investments seem less attractive or more complicated than other types of investments, and ultimately result in sub-optimal levels of investments.

At the individual level, for households and organisations, energy is rarely an important factor of expenses. Hence, lacks in energy efficiency are not a priority for them to be addressed. Households that are in fuel poverty and dedicate a large share of their

<sup>35</sup> Holmes, I., and Mohanty, R. (2012) 'The Macroeconomic Benefits of Energy Efficiency: the case for action', E3G, <http://t.co/43ACgXU5>

<sup>36</sup> Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 on energy efficiency, amending Directives 2009/125/EC and 2010/30/EU and repealing Directives 2004/8/EC and 2006/32/EC, OJ L 315, 14.11.2012, <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32012L0027&qid=1428055867678&from=EN>

<sup>37</sup> UK Department of Energy and Climate Change (2012), 'The Energy Efficiency Strategy: The Energy Efficiency Opportunity in the UK', [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/65602/6927-energy-efficiency-strategy--the-energy-efficiency.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/65602/6927-energy-efficiency-strategy--the-energy-efficiency.pdf); Polish Ministry of Economy (2003) Poland's Climate Policy. The strategies for greenhouse gas emission reductions in Poland until 2020, [https://www.mos.gov.pl/g2/big/2009\\_04/cf234906b019de170218bf79f913990c.pdf](https://www.mos.gov.pl/g2/big/2009_04/cf234906b019de170218bf79f913990c.pdf)

budget to energy do not have the financial investment capacity to implement energy efficiency measures.

On the societal level, a key market failure related to energy efficiency is that the full costs to society of energy use – including the impact of carbon emissions on climate change and air quality, and the effects on energy security – are not reflected in prices. While some price instruments have been put in place at national and EU level, the consensus is that energy prices do not yet fully reflect the so called “external costs”, hence they do not create incentives to invest in energy efficiency. This provides a clear rationale for public intervention. The case in terms of broader economic benefits is less straightforward and depends on an assessment of the reasons for economic actors failing to invest in apparently cost-effective measures. One of the reasons may be budgetary constraints and difficulty of access to finance, which in particular in the context of the financial crisis made investments difficult. This can be seen for both investments in residential and public buildings.

The research for this evaluation revealed a set of studies identifying a number of behavioural explanations for sub-optimal choices in energy efficiency investment. They include a range of possible explanations for individuals making apparently imperfect investment decisions under bounded rationality. For example, as Gillingham et al. point out, energy efficiency investment decisions “fundamentally involve investment decisions that trade off higher initial capital costs and uncertain lower future energy operating costs.” They go on to point out that: “The available evidence suggests that systematic biases may exist in consumer decision making that could lead to overconsumption of energy and underinvestment in energy efficiency.”<sup>38</sup> Those biases include:

- uncertainty over future energy prices and its impact on consumers’ assessment of the riskiness of investment,
- a failure to assess the risk of future energy price increases
- the salience of the initial investment in decision-making, leading to a very high implicit discount rate.

Particularly important for residential buildings are information asymmetries. For potential beneficiaries it can be difficult to gain access to information on the potential benefits of energy efficiency options. There is often a lack of a clear track record with regard to the impacts of investing in energy efficiency, due to a lack of systematic energy audits and ex-post monitoring of investments; this can hamper the demonstration of impacts and incentivisation of investment. Also, the measures to be installed can have a high complexity and the average consumer struggles to understand them. This can be a major barrier to investments.<sup>39</sup>

Another barrier to investments in energy efficiency in residential buildings is the principal agent problem in case of rented accommodation. “When a landlord is not responsible for the energy-utility bill, he or she has little incentive to consider equipment’s energy efficiency beyond calculation of equipment’s initial cost.”<sup>40</sup>

The cumulative impact of these individual sub-optimal decisions in terms of both cost-effective delivery of carbon emissions reductions, and of energy security, can justify a public policy response. Government action in this area may therefore have similar

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<sup>38</sup> Gillingham, K., Newell, R. and Palmer, K. (2009) Energy Efficiency Economics and Policy, 2009 Resources for the Future, DP 09-13. <http://www.rff.org/documents/rff-dp-09-13.pdf>

<sup>39</sup> IEA (2007) Financing Energy Efficient Homes: Existing policy responses to financial barriers` <http://www.iea.org/publications/freepublications/publication/FinancialBarrierBuilding-1.pdf>

<sup>40</sup> *ibid.*

justifications to government policy used to encourage or require individuals to contribute to their own pension provision. There are good reasons for assuming that individuals' decisions are sub-optimal from their own long-term perspective<sup>41</sup> and that, even if prices fully reflected external impacts, this sub-optimal decision-making is likely to lead to higher societal costs. The market failure that needs to be addressed is, perhaps, best seen as the mismatch between the time preferences of individuals' investment decisions and the collective interest in and preference for time horizons which match more conventional discount rates.

There is less literature available on why sub-optimal decisions are taken by the owners of public sector buildings, although there are references, for example in the report prepared in 2010 by Fraunhofer ISI for the Odyssee-Mure project to budgetary constraints following the financial crisis: "also for Germany it is true that the economic crisis has enlarged the gap between the large investment needed to further improve energy efficiency, especially in the building sector, and the capacity of public funding."<sup>42</sup> While national budget constraints are indeed more stringent since the financial crisis, this gap appears to be fundamentally rooted in the distinction made between investment and operating budgets in the public sector, hence resulting in a mismatch of incentives similar to the principal/agent issue found in the private sector.

There is, of course, a straightforward and uncomplicated rationale for public budgets to invest in cost-effective energy efficiency improvements, particularly once the public interest in external impacts is factored into decision-making. It is less clear that public buildings should have priority for any available additional public expenditure allocated to energy efficiency. Where such priority is given, it is generally either explicitly or implicitly related to an exemplary role for public sector buildings; although in practice a decision-making bias as a result of an emphasis on the need to reduce future public expenditure (and thus, to reduce energy costs in public buildings) may also play a role.

### 3.3 The rationales for public support in the ERDF/CF Operational Programmes

#### 3.3.1 The benefits from energy efficiency investments in buildings

The potential primary benefits of energy efficiency — climate change mitigation, energy security and savings — were reflected in the Operational programmes. A thorough review of selected Operational Programmes finds that 34 out of the 41 OPs mention at least one of the primary benefits.<sup>43</sup> Behind this, however, the approach and wording varies a lot and similar benefits can be expressed in very different terms across OPs. For example, the Greek programme for Attica stated that it was very important to take significant energy-saving measures in public sector buildings, in order to reduce operating costs, while the German programme for Saxony identified reduced costs of energy for municipalities, businesses and households as a potential benefit of energy efficiency. An example of how energy efficiency benefits are presented in OPs is provided in Box 1.

<sup>41</sup> Although this does not apply to all of the biases identified. For example, the "irreversibility of energy efficiency investments and the associated option value of waiting to invest later" noted by Gillingham et al. (2012), op. cit.

<sup>42</sup> Fraunhofer ISI (2010) "Energy Efficiency Policies and Measures in Germany (ODYSSEE- MURE 2010 Monitoring of EU and national energy efficiency targets)", 2010

<sup>43</sup> No primary benefits of energy efficiency were mentioned by the Czech Environment OP, the Hungarian Environment and Energy OP, the Lithuanian Economic Growth OP, the Polish Podkarpackie OP and the Romanian Regional OP, as well as the Interreg programmes for France-England and Italy-Slovenia.

Climate change benefits were cited as a justification for funding by a significantly larger share of EU15 than EU12 programmes. As from Table 8 below shows, 86% of the programmes from EU15 countries cited reducing greenhouse gas emissions as a justification for funding, while only 54% of programmes from EU12 countries did so. This suggests that climate change mitigation benefits were a higher political priority for EU15 programmes, yet less so for EU12 programmes. A representative from one of the EU12 countries during the stakeholder seminar confirmed that, even though it was stated in the OP, reducing greenhouse gas emissions was not in reality the main priority and justification for supporting energy efficiency interventions back in 2007.

#### Box 1: Energy efficiency benefits presented in the London OP

The London OP has a particular policy focus on climate change, and the main rationale for the investments in energy efficiency is to reduce CO<sub>2</sub> emissions and energy consumption to reach the targets set out in local strategies. Other intended results and impacts are only implicit in the OP. These include the creation of new market opportunities for businesses around energy efficiency and supporting public buildings to play an exemplary role for further investments. It would have been beneficial to formulate these objectives more clearly at least in a revised OP to make the achievements of investments more transparent and measurable.

Table 8: Primary Benefits mentioned as justification for ERDF/CF support in the Operational Programmes

Justification for supporting investments in energy efficiency with public funds	Total nr of OPs*	thereof		thereof		
		EU 15	EU 12	Competitiveness	Convergence	European territorial cooperation
Primary Benefits						
Climate change mitigation						
Reducing greenhouse gas emissions	31	24	7	14	16	1
	76%	86%	54%	100%	70%	25%
Energy security benefits						
Reducing dependence from third countries and increasing security of energy supply	14	10	4	4	9	1
	34%	36%	31%	29%	39%	25%
Cost Savings						
Reducing energy costs	12	9	3	3	8	1
	29%	32%	23%	21%	35%	25%
OPs Included in the analysis	41	28	13	14	23	4

Source: Own elaboration based on in-depth review of 41 selected Operational Programmes

\*more than one indicator can apply

The Operational Programmes made clear reference to the EU climate and energy policy. In particular, the so-called 20-20-20 targets enacted through the climate and energy package in 2009 were mentioned, meaning that the Managing Authorities had acknowledged those targets in subsequent revisions of their OPs, or were responding already to the European Council's adoption of the targets in March 2007. In total, 15 OPs made reference to the EU climate and energy policies and targets. However, there was anecdotal evidence (from the case studies and the stakeholder seminar) that reference to climate and energy policy targets in some programmes reflected a perception of what the Commission wanted to see, rather than the real underlying rationale for the investments.

An example of little information given as a rationale for interventions in energy efficiency is presented in Box 2.

Box 2: The lack of focus on energy efficiency in the Italy-Slovenia Cross-border OP

The main aim of the Cross-Border Programme for Italy and Slovenia was to stimulate cooperation among people living in the areas along the border, and it therefore did not place much emphasis on energy efficiency as such. The programme mentions energy efficiency investments as a possible area to support under its environmental protection priority, but the OP did not further justify it. Even though the OP recognised that the areas covered by the programme had higher energy consumption than the national averages other social aspects related to energy efficiency were not discussed.

In reality, the analysis indicated that the potential benefits for energy efficiency identified in the programme documentation were not specific to public or residential buildings, but related to energy efficiency interventions in general. The review of selected Operational Programmes finds that only 17 OPs mentioned objectives (or intended benefits) that are specific to energy efficiency in buildings. This lack of specific rationales in the Operational Programmes is also reflected in monitoring systems. Overall, 25 OPs used at least one output or result indicator that is specific to energy efficiency in buildings. Only 19 OPs used a result indicator able to capture the effects (in the form of benefits) specifically from energy efficiency investments in buildings (see Table 8.A and Figure 1A in Annex 3). This is underlined by the example given in Box 3.

Also, the analysis shows inconsistency in the stated rationales presented in the programme documentation and the implicit rationales presented by the national authorities themselves. For instance, climate change mitigation was commonly indicated in the Operational Programmes as one of the drivers behind the support, while in the interviews, some Managing Authorities suggested that lowering of GHG emissions was not a real concern justifying the intervention. This further supports the finding that the stated rationales were sometimes as much a communication exercise towards the Commission rather than an opportunity to identify specific needs and relevant approaches to address them. Another (complementary) explanation lies in the fact that specific rationales for ERDF/CF support to energy efficiency investment in buildings were developed or refined later during the programming period. For instance, the Greek Competitiveness and Entrepreneurship OP and the Lithuanian Promotion of Cohesion OP made no reference to market failures, yet case studies revealed that ERDF/CF support was intended to overcome identified market failures through public support to energy efficiency in buildings in both countries.

Box 3: The rationales behind energy efficiency in the Hungarian Environment and Energy OP

The Hungarian Environment and Energy Operational Programme provided a wide set of rationales for investments in energy efficiency nevertheless these were linked to general energy efficiency improvements and not particularly to energy efficiency in buildings. The justifications for investing in energy efficiency included: reduced energy dependence, reduced energy bills, improved competitiveness of Hungarian enterprises and market stimulus, achievement of air quality, climate and energy objectives, and improved energy intensity of the economy. Given the lack of a direct link to energy efficiency in buildings the intervention logic of support in the OP was not considered robust.



Secondary benefits were taken into consideration in the rationales for ERDF/CF support to energy efficiency in buildings. In the programme documentation, the link was established between investments in energy efficiency and regional competitiveness and growth in 16 OPs, and references were also made in 15 OPs to EU strategies such as the Lisbon Strategy for growth and jobs. Contribution to (sustainable) urban regeneration or an infrastructure investment strategy was mentioned in 8 OPs. Altogether, secondary benefits contributed to bringing the rationales for public support to energy efficiency in buildings in line with the objectives of the European regional policy in support of jobs, competitiveness and growth (see Table 3A in Annex 3).

Table 9: Secondary benefits and other justifications use to justify ERDF/CF support in the Operational Programmes

Justification for supporting investments in energy efficiency with public funds	Total nr of OPs*	thereof		thereof		
		EU 15	EU 12	Competitiveness	Convergence	European territorial cooperation
<b>Secondary Benefits</b>						
<b>Secondary economic benefits</b>						
Infrastructure investment strategy	8 20%	5 18%	3 23%	1 7%	5 22%	2 50%
Promotion of energy saving technology	4 10%	4 14%	0 0%	2 14%	2 9%	0 0%
Strengthen regional competitiveness	16 39%	12 43%	4 31%	6 43%	8 35%	2 50%
Underlining exemplary role of public sector	8 20%	7 25%	1 8%	4 29%	4 17%	0 0%
<b>Secondary Social benefits</b>						
Reducing financial burden to low income households	8 20%	7 25%	1 8%	3 21%	5 22%	0 0%
<b>Secondary environmental benefits</b>						
Reducing air pollution	7 17%	3 11%	4 31%	2 14%	5 22%	0 0%
<b>Other Justifications</b>						
<b>Compliance with EU policy and targets</b>						
Contributing to EU climate and energy policy targets and EU strategies	15 37%	11 39%	4 31%	4 29%	10 43%	1 25%
Other, e.g. dissemination of best-practices, sustainable urban regeneration	28 68%	20 71%	8 62%	10 71%	14 61%	4 100%
<b>OPs Included in the analysis</b>	<b>41</b>	<b>28</b>	<b>13</b>	<b>14</b>	<b>23</b>	<b>4</b>

Source: Own elaboration based on in-depth review of 41 selected Operational Programmes

\*more than one indicator can apply

In-depth analysis shows a wide variety of contexts and needs, and points to the importance of secondary benefits such as job creation and poverty alleviation in the rationales for public support to energy efficiency.

In the course of the programme implementation, a number of national and local strategies were enacted. The importance of such strategies was emphasised by the Managing Authorities, but in practice limited articulation with ERDF/CF investment was identified. Initial National Energy Efficiency Action Plans were submitted near the beginning of the programming period (in principle by 30 June 2007), and they were integrated into strategies at regional level only progressively. In many countries, such as Greece, Poland, Lithuania and Hungary,

regional strategies were adopted during the programming period, but they were not reflected in the Operational Programmes themselves.

In the context of the financial crisis, support for economic activity and the creation of jobs in the market as a whole and in the construction sector in particular became a high priority for the Managing Authorities. In this respect, Managing Authorities followed the logic of the European Council's request for greater flexibility on energy efficiency investments, and the subsequent changes introduced by EU regulation EC397/2009 in May 2009. The 2009 rule changes were part of the European Economic Recovery Plan proposed in 2008 by the Commission, with the objective of stimulating demand while speeding up the shift towards a low carbon economy. As a consequence, the Managing Authorities increased significantly their fund allocations to energy efficiency in the course of the programming period, although they did not necessarily reflect this change in their Operational Programmes and stated strategies. While the particular context of the economic crisis may have justified the approach at the time (the importance of ensuring a maximum impact on short-term economic activity from public expenditure under cohesion policy), that justification is very time-specific, and relevant only where there is significant under-utilisation of capacity in the construction industry. Evidence from the case studies of an increase in costs of construction sector inputs to energy efficiency projects suggests that this is not necessarily the case anymore. Instead there is a risk of overheating in the sustainable construction sector in some Member States, as found in the case of Lithuania for instance (see Box 4), unless accompanying measures are taken to improve the supply of such services and support the qualification of the construction sector towards energy efficiency measures.

#### Box 4: Role of the economic crisis in promotion of JESSICA mechanism

The Lithuanian Promotion of Cohesion OP had originally been designed in a time of rapid economic growth with the aim to reduce energy dependency and improve living standards. However, in the view of the economic crisis starting in 2008 the Lithuanian OP came to be viewed as a key project to stimulate the economy by creating additional jobs and demand in the construction sector. Therefore in response to the economic crisis, the OP was revised and a new financial engineering instrument, the JESSICA Holding Fund, introduced. The JESSICA instrument, a subsidised loan, subsequently became the key financing mechanism of the national Programme for the Renovation of Multi-Apartment buildings (grants for renovations in certain problem areas still remained in place). The fact that this shift towards a loan-based support scheme for energy efficiency investments took place in times of crisis might seem odd, however, in view of the great need for energy efficiency improvements it was recognised that such a loan-based scheme could have a greater reach, as funds are paid back and can be reinvested.

A deficiency in the analysis of barriers to the development of supply chains for energy efficiency measures was identified in the OPs. While job creation – although mainly temporary employment in the construction sector - is listed as a benefit of investments, there is no consideration of the risk that the construction sector could also be a barrier to investment. Building professionals need to develop the skills to conduct energy efficiency works especially in Member States and regions where the sector of sustainable construction has not developed yet. This was identified only in a small number of OPs, such as the UK London and West Wales OPs. The impact on implementation of a lack of skills is for instance shown when problems with conducting energy audits were encountered. ERDF and CF are not the only tools to address the area of skill development but the problem should be taken into account in the design of OPs (in particular through the targeted project development assistance). Positive examples can be found in some of the Interreg programmes that focussed on

cooperation with universities, professional schools and architects to develop knowledge about energy efficiency measures.

### 3.3.2 The need for increased investments in energy efficiency

The need for increased investment in energy efficiency in buildings was identified by Managing Authorities in a large majority of the selected OPs. A thorough review of selected Operational Programmes finds that in more than two thirds of the cases (28 OPs), the SWOT analysis provided in the Operational Programmes identified a great potential for energy savings in the programming region. Of these, 19 OPs specifically cited energy savings potentials in buildings (see Table 4.A in Annex 3). This was usually expressed in terms of “low energy standards of buildings” and/or “large energy savings potentials in buildings”, yet without a deeper analysis of why existing incentives and measures were insufficient. One example of an Operational Programme where the assessment did go one step further is the Romanian Regional OP. The OP not only identified very poor thermal properties of residential buildings, but provided evidence of high average annual heating requirements (137-220 kWh/m<sup>2</sup>) of residential buildings. A subset of those OPs that identified large energy savings potentials in buildings also noted that there was a high demand for energy modernisation of buildings in their region (7 out of the 28 OPs) (see Table 4.A in Annex 3).

The reasons for sub-optimal investments were hardly addressed in the Operational Programmes. Even though most Operational Programmes justified energy efficiency investments by reference to a general need to reduce energy use or to reduce carbon emissions, little explanation was provided for why public support was necessary to deliver such investment; this was true for instance in the Polish Infrastructure and Environment OP, the Hungarian Environment and Energy OP, the Greek Competitiveness and Entrepreneurship OP and the Lithuanian Promotion of Cohesion OP. The review of selected OPs found that only 9 OPs mentioned some kind of market failures either in their SWOT analysis or their funding strategies. Only three of the five market failures identified in the literature were also cited by Operational Programmes. The market failures cited were a lack of access to finance of the public and the private sector, a lack of information about the benefits of energy efficiency investments and cognitive biases such as excessive concern over the up-front costs of investment. Almost all of those OPs stated that the market failures should be addressed, or that some specific objectives should be achieved in order to increase the level of investment in resource efficiency in buildings. These programmes include the Czech Environment OP, the Interreg programmes for Central Europe and France-England, the French OP for Lorraine, the UK OPs London and West Wales, the Polish OPs Infrastructure and Environment, and for Podkarpackie, and the Slovenian OP Environment and Transport Infrastructure.

#### Box 5: Market failures identified in the UK London OP

Market failures were identified on a general level in the London OP, which states that any investment that is mainly beneficial to the environment will not be made by businesses and individuals who act according to their own interests. A scoping study for the use of financial engineering instruments under the London OP conducted by Deloitte for the EIB came to the conclusion that the intervention would not be addressing a complete market failure but would rather be a response to market imperfections. High risks of funding for the private sector in the area of energy efficiency measures are caused by an uncertain demand, new technologies with limited experience regarding results, and a particularly long time before investments generate returns. Although this identified market imperfection was more orientated towards the originally proposed private sector focus of funding under the London Green Fund, the logic can be extended to the public and residential projects which

were, in practice, the main beneficiaries.

In some cases, a clear effort was made to formulate specific objectives and address the need to foster investment in energy efficiency in buildings. Interesting examples include the Italian programme for Veneto, which focused on the exemplary role of public buildings. Other examples are the Interreg France-England and the Italian Renewable Energy and Energy Saving OPs, which identified the need for improved public understanding of the benefits of energy efficiency as a key element of the rationale of intervention. Finally, the French OP for Picardie and the UK OPs for London and West Wales mentioned the need to create a self-sustaining energy efficiency sector in order to allow for increased energy performance in the construction sector.

The rationale for ERDF/CF support for energy efficiency in buildings was refined during the programming period. While setting up their interventions and instruments, the Managing Authorities and their Intermediary Bodies were in some cases at an early stage of refining their understanding of energy efficiency, and of the likely response of potential beneficiaries. A phenomenon of rationales being gradually deepened as programmes were developed and implemented could be observed, for instance in the case of the Lithuanian Promotion of Cohesion OP, where the implementation of the JESSICA facility required a gap assessment; they also uncovered market failures not only in terms of the lack of resources of building owners, but also the finance gap that resulted from banks being reluctant to finance building renovation because they did not understand the business case. Similarly, the setting up of combined grant and loan schemes in Greece after 2009 to finance energy renovation in the residential sector was for the Greek Managing Authorities the opportunity to investigate further the renovation needs and potential market failures to be addressed in order to ensure an adequate level for investment in energy efficiency in buildings.

#### Box 6: JESSICA

JESSICA (Joint European Support for Sustainable Investment in City Areas) is a European Commission initiative supported by the EIB and the Council of Europe Development Bank (CEB). It is designed to support investments in long term sustainable urban development in the context of cohesion policy.

The advantages of using JESSICA lie on the one hand in the fact that the fund is paid out in loans with favourable conditions which will be paid back. These returns can then be used again for further projects. The use of loans allows the creation of incentives for PPPs, and can make additional resources available. The EIB and CEB provide financial expertise to beneficiaries. JESSICA thereby contributes to a long term sustainable impact of ERDF resources.

Similar revolving funds were also established without the involvement of the EIB or CEB.

However, it is not always clear how that understanding was then used to design interventions in detail. As will be seen below, the choice of which buildings to target, and which types and levels of support to choose was made pragmatically without necessarily following the rationale highlighted by the preparatory studies. Also, there was little systematic attempt to monitor and evaluate the impacts of ERDF/CF support in accordance with such rationales and with the underlying intervention logic.

Difficulty of access to finance became an urgent issue after the financial crisis. Partly in order to maintain a high level of investment in the energy efficiency construction sector, Managing Authorities in Poland (see Box 7), Greece and Spain set

up grant schemes with very generous co-financing rates, sometimes above 70% and complemented these with subsidised loans up to 100%. This suggests that the cost savings generated through such energy efficiency interventions for the final beneficiaries were not factored in.

#### Box 7: Limited access to capital due to formal budgetary restrictions of public bodies

Despite the growth in GDP at a time of wider EU economic recession, the public finance sector deficit in Poland deteriorated. Alongside the public deficit, rules governing the budgetary discipline of local government units were cited as a reason for their limited investment capacity; modernisation and renovation of buildings, including energy efficiency interventions, constitute their running costs budget rather than a separate investment category. Another factor relates to a common practice of ascribing low priority to energy efficiency investments by the public authorities in contrast to other areas requiring interventions. The existence in practice of financial constraints on local and regional authorities, preventing them from carrying out energy efficiency improvements, seems clearly established. However, it is not clear that the appropriate response to this was the use of Poland's Cohesion Fund allocation or the specific design chosen under the Operational Programme "Infrastructure and Environment", rather than a more appropriate national policy to facilitate the funding of the relevant investments.

The high demand for energy renovation appeared as an opportunity for the Managing Authorities to absorb under-used funds from elsewhere in the OPs. The 2009 rules change enabled major changes to programmes. Managing Authorities from 31 OPs increased their fund allocations to the priority theme "energy efficiency, co-generation and energy management". On average, the 41 programmes supporting energy efficiency in public and/or residential buildings increased the allocation by 69.4% between 2007 and 2013, and in some specific cases this increase reached more than 1000%, such as in the Bulgarian Regional Development programme, where funding for the priority theme increased by 1675.2% and the Polish Lubuskie OP, where funding increased by 1,286.2%. In that context, and combined with very high levels of co-financing, the Managing Authority of the Spanish OP Andalucía managed to commit all of their relevant funds in a few days. Other programmes, such as the German OP for Saxony managed to commit the majority of their funds in a couple of months after the 2009 rule change. In 10 of the 31 programmes which increased their allocations, the main justification provided by the Managing Authorities was a high energy renovation demand. In 12 of the 41 programmes that supported energy efficiency in public and residential buildings, the Managing Authorities mentioned that the 2009 rule change was a driver for increasing the allocation to energy efficiency expenditure and/or introducing a new target building category. For instance, the political signal given by the 2009 rule change to allocate more funds to energy efficiency in buildings was mentioned by the North West England programme as a key factor. In other cases, the 2009 rule change provided if not an incentive, at least an opportunity to increase fund allocations to energy efficiency in buildings. As shown in case studies, in the Greek OP Competitiveness and Entrepreneurship and the UK OP for London, support to energy efficiency in buildings was not initially foreseen but was introduced after 2009 as a response to high demand and difficulties in finding match funding for other interventions (see Table 10 below and Table 5A in Annex 3).

Table 10: Reasons for amendments to Operational Programmes mentioned by the Managing Authorities

Reason for amendments	Total nr of OPs*	thereof		thereof		
		EU 15	EU 12	Competitiveness	Convergence	European territorial cooperation
Changes to funding eligibility following EC Regulation 397/2009	12	12	0	8	4	0
	29%	43%	0%	57%	17%	0%
High demand for energy efficiency investments	10	5	5	2	8	0
	24%	18%	38%	14%	35%	0%
Availability of additional funds	9	7	2	2	7	0
	22%	25%	15%	14%	30%	0%
Alleviate impact of economic crisis	3	3	0	2	1	0
	7%	11%	0%	14%	4%	0%
Other (e.g. changes in national policy)	7	5	2	3	4	0
	17%	18%	15%	21%	17%	0%
No information	8	4	4	1	5	2
	20%	14%	31%	7%	22%	50%
<b>OPs Included in the analysis</b>	<b>41</b>	<b>28</b>	<b>13</b>	<b>14</b>	<b>23</b>	<b>4</b>

Source: Own elaboration based on in-depth review of 48 selected Operational Programmes

\*more than one indicator can apply

### 3.3.3 Lessons learned

At the time of negotiating the first version of the OPs, experience in the use of ERDF/CF funds for energy efficiency was lacking. Managing Authorities had only limited understanding of energy efficiency in buildings at the beginning of the programming period and were not necessarily in a position to define a specific rationale.

Against this backdrop, the existence of a wide range of plausible benefits associated with energy efficiency investment has proven to be a strong point of the policy area. However, it also created challenges in terms of optimal targeting and design of interventions. To some extent, policymakers and programme authorities appeared to rely on the simple mental shortcut that, if there are multiple benefits, energy efficiency should be a priority; and they failed to ensure that the interventions funded delivered as many of those benefits as effectively as possible, or to address market failures in a targeted way.

Managing Authorities were careful to keep a high degree of flexibility on how to allocate and spend funding during the programming period. Keeping the initial rationale and targets broad was a way to avoid the administrative burden of changing OPs at later stages. As described in the following sections, a certain degree of flexibility is valuable in order to be able to shift focus as needs change. In that respect interviews with the Managing Authorities have shown that more specific rationales, targets and selection criteria were established at the level of each project or scheme co-financed by the ERDF but that was not always reflected formally in the OPs.

There is no one size fits all approach, and the patchy rationales for ERDF/CF support to energy efficiency in buildings reflect different strategic focuses and needs, and differences in cultural contexts. Indeed rationales vary considerably across OPs depending on local context. A distinction can for instance be made between OPs with a strategic focus on the reduction of CO<sub>2</sub> emission on the one hand (e.g. French Aquitaine, German Berlin, and Greek Attica programmes) and OPs with a focus on security of energy supply on the other hand (e.g. Polish Lubuskie and

Italian Calabria programmes). Another distinction can also be drawn between OPs focusing on competitiveness (of the region or the energy efficiency sector), such as Berlin and the Italian Renewable Energy and Energy Saving OP, and OPs focusing on social integration (fuel poverty alleviation), such as the German Saxony OP and the Lithuanian Promotion of Cohesion OP. These differences can be explained by varying socio-economic contexts, political background or geographical context, and hence different needs, which all can be addressed in by energy efficiency interventions. Also, OPs are designed against a sometimes complex background of existing national schemes and local initiatives to which they should be complementary. There was not, and there should not be, a one size fits all approach. The main common denominator is the reduction of energy consumption.

There has been a steep learning curve for the Managing Authorities and their partners to design appropriate interventions for energy efficiency in buildings. In the meantime, energy efficiency policy has been developing. The first National Energy Efficiency Action Plans under the Energy Services Directive 2006/32/EC<sup>44</sup> were submitted in June 2007. The second round of National Energy Efficiency Action Plans was due in June 2011 and the third round in 2014. Meanwhile, the Directive 2010/31/EU on Energy Performance of Buildings<sup>45</sup> was renewed during the programming period as well. A new Energy 2020 Strategy was adopted in 2010 putting highest priority on energy efficiency and the EU Energy Efficiency Plan<sup>46</sup> was adopted in March 2011. The negotiations for the new Energy Efficiency Directive were ongoing. As shown in the case studies, energy efficiency in building has progressively been taken into account in national and regional policies, and the national and regional authorities have progressively built up their capacities. This for example was the case in Lithuania, where the Managing Authority for the OP Promotion of Cohesion learned to use Jessica as a funding instrument in its close collaboration with the European Investment Bank (EIB). Moreover, the evaluation has identified deficits in the strategic planning of Managing Authorities (or lack thereof). Managing Authorities did not always succeed in articulating the 2007-2013 Operational Programmes with the new strategies, as shown for instance in the case of London. Despite the fact that energy efficiency in public and residential buildings in London was only added at a later stage and allocation to the relevant priority theme increased by 88%, no explicit justification for funding was provided in the new version of the OP. Better integration can be found in the Operational Programmes for the new programming period, as shown in the case of the Greek Competitiveness and Entrepreneurship OP and the Lithuanian Promotion of Cohesion OP.

The limited consideration of the rationales for energy efficiency investments in public and residential buildings in the OPs can be partially explained by the relatively low dedicated financial support allocated to the priority theme. Out of the whole ERDF/CF support available, only 2.3% were allocated to the priority theme "energy efficiency, co-generation and energy management" (see Table 2). Within the 41 selected OPs this share was at 4.9% but still only represented a minor part in the overall allocation. Since energy efficiency in buildings was not a priority in funding, no need was seen to provide for an elaborated rationale. However, even those OPs that allocated more than 10% of their ERDF/CF funding to energy efficiency in public and residential buildings on average did not present more primary or

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<sup>44</sup> Directive 2006/32/EC of the European Parliament and of the Council of 5 April 2006 on energy end-use efficiency and energy services, OJ L 114, 27.4.2006.

<sup>45</sup> Directive 2010/31/EU of the European Parliament and of the Council of 19 May 2010 on the energy performance of buildings, OJ L 153, 18.6.2010.

<sup>46</sup> EC, Communication to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, 'Energy Efficiency Plan 2011', COM(2011)0109 final.

secondary benefits of and needs for energy efficiency than those OPs of the sample that allocated less than 1% (see Table 1.A, Table 2.A and Table 3.A in Annex 3).

### 3.4 Programme design: the choice of target buildings and instruments

#### 3.4.1 Types of buildings

Almost all selected programmes targeted and supported public buildings (37 OPs). The only four programmes not targeting and supporting public buildings were the three UK OPs for East of England, West Wales and North West England, and the Romanian Regional OP. The public buildings eligible for funding in the 37 OPs included, among others, public administration buildings, schools, hospitals, swimming halls, and a host of other, mainly municipal, buildings, and buildings used or occupied by voluntary sector organisations. Throughout the programming period only the UK OP for London and the Greek Environment and Sustainable Development OP added public buildings as a target category to their programmes.

A majority of the selected programmes from the EU15 targeted and supported residential buildings after 2009 (16 OPs), and subsequently increased their allocation to this theme. ERDF/CF support to energy efficiency in residential buildings in EU15 Member States was made possible by the changes to eligibility criteria introduced by EU regulation EC397/2009 in May 2009. Until then residential buildings were eligible in EU12 Member States only. The maximum financial amount of ERDF funding that could be allocated to energy efficiency (and renewable energy) in residential buildings was increased from 2 to 4% for all Member States. These changes led 16 programmes from EU15 Member States to additionally target residential buildings and increase their allocations to “energy efficiency, co-generation and energy management”. According to the monitoring data these 16 programmes increased their financial allocation to this theme by 156% in total (see Table 5.A in Annex 3).<sup>47</sup> The residential buildings eligible for funding included primarily multi-storey buildings and social housing. However, none of these 16 programmes changed its funding rationale in the Operational Programme itself.

A minority of the selected programmes from the EU12 targeted residential buildings (5 OPs), despite the existence of a rationale for supporting private investment in energy efficiency through public intervention. In many EU12 countries, significant investment in the construction of new social housing estates continued almost up to the end of the 1980s. After the collapse of the Soviet Union some of the EU12 countries opted for transferring these units to private ownership. Ownership was given to existing (often low-income) residents for free or at a nominal cost. In many cases these residents today cannot financially afford to maintain their dwellings. Equally, there are often no appropriate legal arrangements that can help ensure the upkeep of the buildings and common parts. One outcome of this form of privatisation has been that the large heating plants that heated entire blocks or estates in communist times have been abandoned in some cities. Consequent problems of energy efficiency arise as each building must thus have its own boiler. Furthermore, during communist times most households did not pay for their energy

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<sup>47</sup> At the same time EU12 programmes also increased their allocations to “energy efficiency, co-generation and energy management” over the programming period by 227% in total. This was partly due to two outliers: In the Bulgarian OP for regional development allocation to “energy efficiency, co-generation and energy management” increased by 1,675% and in the Polish Lubuskie OP the allocation increased by 1,286%. Without these two outliers the increase is much more modest at 64%.



consumption, while today energy prices have drastically increased. The analysis suggests, however, that dealing with the low amount of energy efficiency investments in the privately owned housing stock through the ERDF/CF was not a high priority in EU12 programmes, in comparison with investment in energy efficiency in public buildings. Only the Bulgarian Regional Development OP, the two Lithuanian OPs, the Romanian Regional OP and the Polish OP for Podkarpackie provided financial support to residential buildings. Except for the Romanian Regional OP, they had targeted residential buildings since the beginning of the programming period. The Polish Pomorskie OP and the Hungarian Energy and Environment OP, for example, both show a strong focus in their Operational Programme on spending on public buildings, with no investment in residential buildings. There is limited detailed justification in the programme documentation for this focus, which according to the Managing Authorities can be partly explained by the existence of separately-financed programmes for the residential sector at national level. However, it is difficult to draw a clear link between the existence of funding schemes at national level and the development of the rationale in the OP for investments in residential buildings as in all but one Member State subject to in-depth review a scheme in support of residential buildings could be found (see Table 11) but the extent to which residential buildings were supported varied. This leads to the question of whether there was a clear understanding of the scale of the improvements necessary across the economy, and the scale of funds made available by programmes.

**Box 8: The lack of support for residential buildings in the Hungarian Environment and Energy OP**

The Hungarian Environment and Energy OP specifically indicates that a key focus area to improve energy intensity in Hungary should be related to the residential end-user sector, especially to the heating and electricity use. The inefficiency of the Hungarian residential buildings is also re-iterated in numerous national strategies. Nevertheless, the OP did not support residential buildings but only public (and enterprise) buildings. According to the Managing Authority the 2% ERDF threshold that was applied to allocations on energy efficiency and renewable energy sources meant that the actual allocations that could have been spent on the residential sector in Hungary were very low. When this threshold was increased to 4% in 2009 the available allocations were still considered low. Furthermore the institutional set up was not prepared for the inclusion of households as beneficiaries. It should be mentioned that residential buildings were primarily supported by national funds during the 2007-2013 nevertheless these sources were seen limited compared to the energy efficiency challenges in the households.

Table 11: Overview of the identified public financial mechanisms at Member State level in 13 selected Member States in 2007-2013<sup>48</sup>

Member State	Type of financing		Eligible types of buildings	
	Grants	Loans	Public buildings	Residential buildings
Bulgaria	x	x	x	x
France	x			x
Germany	x	x	x	x
Greece	x	x	x	
Hungary	x	x	x	x
Italy	x	x	x	x
Lithuania	x		x	x
Poland	x	x	x	x
Romania	x	x	x	x
Slovenia	x	x	x	x
Spain		x		x
UK	x	x	x	x

Source: Own elaboration based on review of national public financial mechanisms

In general, limited justifications for the types of buildings targeted are provided in the programmes' documentation; when provided, such justifications are not necessarily consistent with the types of buildings targeted in the end. The English OP for London, the Greek OP Competitiveness and Entrepreneurship and the Lithuanian OP Promotion of Cohesion considered in the case studies did provide funding for residential buildings, making use of loan mechanisms to some extent (or exclusively, as in the case of London). In both the Greek and the Lithuanian case there is a clear link between the investments in housing and pre-existing national strategies. The contribution of the programmes to delivery of national objectives on energy efficiency is recognised at national policy level. The UK OP for London, in part because of its more limited funding and scope, is less relevant to the delivery of national targets. In both this OP and the Greek OP Competitiveness and Entrepreneurship the increased focus on residential energy efficiency came about partly as a result of the 2009 rule change, and partly in response to limited uptake of funding by the private sector of the funds initially offered by the programmes. None of the three programmes, however, provides a detailed explanation of why the bulk of financing is focused on public buildings.

### 3.4.2 Choice of instrument

Managing authorities preferred grant schemes over loans or any other forms of financial engineering instruments to support energy efficiency in buildings. The analysis of the monitoring data provided by the European Commission for all programmes shows that 90% of the allocations for priority theme "energy efficiency, co-generation and energy management" were provided in the form of non-repayable grants, which amounted to EUR 5.4 billion. Commitments in the form of loans, interest subsidies and guarantees amounted to EUR 475 million, which was 8% of total

<sup>48</sup> The identified financial mechanisms primarily include national financial mechanisms nevertheless a limited number of sub-national and supra-national mechanisms were also identified.

commitments. The lowest share of commitments at 1% was provided in venture capital, amounting to EUR 99 million.<sup>49</sup> The in-depth review of the 41 selected programmes provides a similar picture: It shows that 39 programmes used grants as one form of finance to invest in energy efficiency in public or residential buildings, with only the Italian OPs for Campania and Sardinia not making use of grants. In addition to grants, 6 programmes used loans and 9 programmes used other financial engineering instruments. The 6 programmes using loans are the three Greek programmes of Attica, Macedonia-Thrace and Competitiveness and Entrepreneurship, the two Italian programmes for Campania and Sardinia and the Bulgarian programme for Regional Development. The types of other financial engineering instruments primarily used are interest subsidies, used by the same three Greek programmes, and the JESSICA fund, used by the same two Italian programmes, the UK London OP, the Spanish Andalusia OP and the Lithuanian Promotion of Cohesion OP. The JEREMIE Fund (Andalusia), the Guarantee Fund and Rotation Fund (Italian Renewable Energy and Energy Saving OP) and Equity Investments (London) were used only in one OP each. How the Greek Competitiveness and Entrepreneurship OP combined grants, loans and interest subsidies is presented in Box 9. As mentioned in the literature review, the use of loans and other financial engineering instruments not only achieves greater leverage, but also opens up opportunities to address market failures with greater precision, by providing incentives to applicants to ensure that their investments have a strong financial logic. However, loans also require beneficiaries to prove that they will be able to reimburse the loan meaning that in particular low income households are not able to apply to them.

The selection of types of support was based on pragmatic reasons, rather than on an understanding of the specific needs or market imperfections that should be addressed. Reasons put forward by the Managing Authorities at interviews for using *grants* instead of loans include:

- limited experience for administrators in using loans or other financial engineering instruments
- reluctance by potential applicants to engage with loans (especially in EU12 countries).

Reasons for using loans or other types of financial engineering instruments included:

- the need to secure more impact from limited funds using the leverage effect in a period of budget constraint;
- an assumption that it would be viewed favourably at European level, where the Commission has been progressively pushing for the use of financial engineering instruments;
- the wish to change the paradigm for public policy on energy efficiency, and in particular move away from the culture of grants in EU12 countries.

Box 9: The combined use of grants, loans and interest subsidies in the Greek Competitiveness and Entrepreneurship OP

The Greek OP analysed in from of a case study used a mix of non-refundable grants, loans and interest subsidies to support investment in energy efficiency. In general, the co-finance share from ERDF was 85%, with the remainder provided by the Greek state but the form of support and the specific co-financing rates varied for the targeted buildings and income levels of households, and changed in subsequent years of the programming period. For households a 15%-70% non-refundable grant funding was provided according to income criteria of household owners. Further

<sup>49</sup> EUR44 million was indicated as 'other forms of finance'. The figure for venture capital funding under the priority theme "energy efficiency, co-generation and energy management" – nearly all of which represents allocations in Greece – seems likely to be for private sector energy efficiency investments not covered by this evaluation.

interest-free revolving loan financing was provided (including loan approval expenses) for the remaining own contribution through a 1:2 co-investment ratio leverage with 4 selected banks. Local government received a 100% non-refundable grant funding which aimed to encourage municipalities to proceed with the investments; loans were regarded by the programme authorities as not being a credible financing form to attract municipalities in Greece, in particular given the present financial crisis conditions where the financial obligations of municipalities are increasingly relevant to overall Government indebtedness.

Cultural factors also play a role in the choice of instrument and similar macroeconomic circumstances may result in opposite responses from the Member States. The comparison of the Greek Competitiveness and Entrepreneurship OP, the Polish Infrastructure and Environment OP and the Lithuanian Promotion of Cohesion OP is striking: While in Lithuania the economic downturn accelerated the use of loans under the JESSICA mechanism, in Poland it was used as an argument against the use of JESSICA and in Greece the downturn led to an increase in the co-finance rate of grants. However, the focus in the Lithuanian programme on carefully considering the incentives being created by interventions, and adjusting interventions in order to maximise the impact of ERDF/CF expenditure on the delivery of its objectives, is one from which other programmes can usefully learn. JESSICA was adopted in order to use the leverage effect but also to support the paradigm shift from loan to grant wanted by the government.

Moving from grant based schemes to financial engineering instruments is a demanding choice for the Managing Authorities. It requires a paradigm shift in some Member States, involving a change in cultural behavioural patterns. The UK OP for London, the Lithuanian OP Promotion of Cohesion and the Polish OP Infrastructure and Environment provide an illustrative comparison. In the UK OP for London, the choice of a financial engineering instrument for supporting energy efficiency in buildings was evident although it was new in this area. The UK authorities already had experience in setting up and using financial engineering instruments e.g. in the field of enterprise support. The London Energy Efficiency Fund (LEEF) was established in 2011 within the framework of the London Green Fund set up in 2009 under the JESSICA initiative. Over the last years, understanding of energy efficiency in buildings has improved in the UK market and grants are less and less considered as a first-choice option for intervention design.

In EU12 countries, fighting against “grant dependency” was a challenge. This is partly due to the fact that beneficiaries in those countries received high amounts of funding in the form of grants or other non-contributory mechanisms such as price support in the past; but also due to the fact that households tend to be risk-averse regarding debt as they remember the bank crashes of the past. Against this backdrop, the choice of a loan instrument was less consensual in the Lithuanian OP Promotion of Cohesion and the authorities there had to make a strong political choice in favour of loans to make it happen. Initially, grants with 84% co-financing rate for residential buildings and 100% for public buildings were put in place in order to foster energy efficiency investments, reduce the energy bill for the residents and users, and increase energy security for the country. When the economic crisis hit, the government decided to set up a loan scheme under JESSICA. The objective was to move away from grants, which were seen to be detrimental to beneficiaries on the long-term and to benefit from the leverage effect offered by repayable grants in a context of constrained public finance. The decision to use JESSICA was neither a popular nor an easy one. It generated harsh political reactions. Uptake was slow and the instrument faced resistance from both the building owners and the banks. However, assertive effort from the Managing Authority and support from the EIB for the mechanism paid off: the instrument has reached full capacity and the Lithuanian case is now seen as a

good practice example. The Polish Infrastructure and Environment OP offers a contrasting picture: the use of loans under JESSICA was initially considered for the 2007-2013 programming period, but behavioural barriers combined with the financial crisis were given as a reason for not using loans after all. A loan instrument co-financed by the ERDF is now offered in the new programmes 2014-2020 and moving away from the grant dependency seems to be a matter of concern in Poland as well.

The use of financial engineering instruments required a more rigorous intervention design, which helped the Managing Authorities to better understand their market and needs. The in-depth review of selected Operational Programmes does not indicate a correlation between the specificity of the rationale as described in the programme documentation and the use of a financial engineering instrument. However, case studies have shown that the use of such instruments contributed to improved understanding of energy efficiency issues and ways to address them. Indeed, in line with the best practise promoted by the JESSICA initiative many financial engineering instruments were designed on the basis of a gap assessment which identified market failures or sub-optimal investment situations, respective investment needs, possible private sector participation, and the resulting added value from the financial instrument in question. In so doing they already met the requirements for financial engineering instruments set forth in the Common Provision Regulation for the 2014-2020 programming period. Moreover, the capacities to manage such instruments were developed mainly through partnerships with infrastructure managers and banks, as has been seen in the case of the JESSICA funds in the UK OP for London and the Lithuanian Promotion of Cohesion OP. Meeting those requirements was seen as an unsurmountable obstacle in some Managing Authorities, which provided grants instead. However, it proved to be a valuable experiment for the Managing Authorities that made the choice to take up the challenges and set up a financial engineering instrument.

## 4. Interventions for ERDF/CF support to energy efficiency in buildings

### 4.1 Summary of findings

#### *Financial allocations*

In the 41 OPs supporting energy efficiency interventions in public and residential buildings the total ERDF/CF allocations for the priority theme “energy efficiency, co-generation and energy management” amounted to EUR 4.4 billion. This represents 72% of the total allocations for the priority theme in all OPs, and 8.1% of the total ERDF/CF allocations in the 41 OPs, an amount significantly higher than the average of all OPs.

In the 41 OPs, the total commitments for projects under the priority theme “energy efficiency, co-generation and energy management” amounted to EUR 4.1 billion, as reported in the 2013 Annual Implementation Reports. The average rate of project selection for this priority theme was 94.2% in the 41 OPs.

Of the EUR 4.4 billion allocated to the relevant priority theme in the 41 OPs an estimated EUR 2.8 billion were allocated to *energy efficiency in public and residential buildings* and EUR 2.6 billion (94%) of these had been committed by the end of 2013.<sup>50</sup> This corresponds to 61.7% of the total allocations to the priority theme “energy efficiency, co-generation and energy management” and 3.1% of the total ERDF/CF allocations for these 41 programmes.

In the 6 OPs subject to case studies, the total ERDF/CF allocations for the priority theme “energy efficiency, co-generation and energy management” amounted to EUR 1.2 billion, while commitments totalled EUR 1.4 billion. This represents 10% of the total ERDF/CF allocations in the 6 OPs. Of these EUR 1.2 billion, it is estimated that EUR 780 million were allocated to energy efficiency interventions in public and residential buildings and EUR 926 had been committed by the end of 2013. This gives an average rate of project selection for this priority theme of 117.7% in the 6 OPs.

It is estimated that EUR 3.4 billion were allocated by all Operational Programmes to support energy efficiency interventions in public and residential buildings. This figure was obtained by extrapolating the estimate of funds allocated to energy efficiency in public and residential buildings in the sample of programmes reviewed.

#### *Changes to financial allocations*

The financial allocations for the priority theme “energy efficiency, co-generation and energy management” also changed for the 48 Operational Programmes during the 2007-2013 programming period. The total allocations increased by a net EUR 1.9 billion between 2008 and 2014 (63% increase), made up of increases of EUR 2.1 billion and decreases of EUR 135.8 million. EUR 1.8 billion of this increase can be

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<sup>50</sup> These estimates are calculated on the basis of information obtained from the programming documentation and Managing Authorities. For some programmes the allocation to energy efficiency in public and residential buildings was estimated on the basis of a few assumptions. More details are provided in section 4.2.1.

attributed to the 41 programmes that supported energy efficiency in public and residential buildings.

#### *Financing Mechanism*

The vast majority of the 41 OPs used grants to support energy efficiency in public and residential buildings. Setting the co-financing rate for grants at an optimal level proved to be a learning process for the Managing Authorities.

Loans and other financial engineering instruments, such as JESSICA funds and interest subsidies, were used by only 10 of the 41 OPs. Moving from grant based schemes to financial engineering instruments was demanding for the Managing Authorities. Managing Authorities also reported difficulties getting target beneficiaries to make use of financial engineering instruments.

#### *Project Selection Criteria*

A wide variety of project selection criteria were applied. The most frequently applied criterion was a requirement to achieve a minimum reduction of energy consumption by a project (16 OPs), followed by the requirement to carry through an energy audit (9 OPs). Other relevant project selection criteria included the cost-effectiveness of the investment (8 OPs), the contribution of the project to national or regional objectives (7 OPs), compliance with national or regional energy efficiency standards (6 OPs), the use of innovative technologies (6 OPs), a minimum project size (4 OPs) and the involvement of renewable energy sources (4 OPs).

#### *Accompanying measures*

Operational Programmes accompanied the financial support for energy efficiency investments in public and residential buildings with advice and training for target beneficiaries, training for the Managing Authority and Implementing Bodies, and information campaigns for the population at large.

## 4.2 Financial Input

### 4.2.1 Financial allocations

This section provides an overview on the key financial information for the set of 48 Operational Programmes selected for review. The information obtained at the level of Member States, which is presented in Section 2, did not permit an analysis of financial information on funds allocated and committed exclusively to energy efficiency interventions in public and residential buildings, as this information is not provided systematically at the programme level.

Funds allocated and committed exclusively to energy efficiency in public and residential buildings were, however, calculated for the sample of 48 OPs reviewed on the basis of the information provided by the programme documentation and interviews with the Managing Authorities. Despite the focus of this and other sections on the 41 programmes supporting energy efficiency in public and residential buildings, the financial information is presented for the entire sample of 48 OPs. The reason is that this allows an extrapolation of the allocations and commitments to energy efficiency in public and residential buildings to the population of all OPs.

*Allocations and commitments to the priority theme “energy efficiency, co-generation and energy management”*

The 48 selected OPs had allocated EUR 103.4 billion from the ERDF and Cohesion Fund by the end of 2014. This represents 38.4% of the total ERDF/CF allocation of EUR 269.6 billion for all programmes. Of this total allocation only a subset was allocated to the priority theme “energy efficiency, co-generation and energy management”, under which the vast majority of energy efficiency interventions in public and residential buildings has been funded in the 2007-2013 programming period.

The 48 OPs had allocated EUR 5 billion to the priority theme “energy efficiency, co-generation and energy management”. This represents 82.2% of the EUR 6.1 billion total allocation to this priority theme across all OPs. By the end of 2013 the 48 OPs had committed EUR 4.7 billion (94.5%) of the funds allocated to the priority theme.

On average, the priority theme “energy efficiency, co-generation and energy management” represented 4.8% of the total ERDF/CF funding in the selected 48 OPs. Energy efficiency was, of course, only one priority among many others in the selected OPs; however the allocation intensity for the selected programmes is significantly higher than for the overall population of programmes, in which energy efficiency represents only 2.3% of the total ERDF/CF funding.

The sample of 48 OPs is not representative of all Operational Programme. However, it represents 82% of the total allocations to this priority theme, hence allowing for strong general conclusions on the approach adopted in programmes which emphasised energy efficiency investments. The 48 selected OPs represent less than half of the total ERDF/CF allocation. Their allocations to the relevant priority theme are comparably higher than in other OPs. In absolute value, the Czech Environment OP (EUR 880 million), the Italian Renewable Energy and Energy Savings OP (EUR 475 million) and the Hungarian Environment and Energy OP (EUR 358 million) allocated the largest amounts of ERDF/CF to the relevant priority theme.

The total ERDF/CF allocations of the 41 OPs that supported energy efficiency in public and residential buildings amounted to EUR 90.6 billion. This corresponds to 33.6% of the total ERDF/CF allocation.

The allocation to the priority theme “energy efficiency, co-generation and energy management” in the 41 OPs amounted to EUR 4.4 billion. This corresponds to 72% of the total ERDF/CF allocation to this priority theme. By the end of 2013 these programmes had committed EUR 4.1 billion, resulting in a project selection rate of 94.2%. The average intensity of funding for the relevant priority theme in these programmes was 8% and thus significantly higher than the average allocation intensity to that priority theme for all Operational Programmes.

The allocation to the priority theme for the six OPs that were analysed in-depth in the case studies amounted to EUR 1.2 billion. Commitment reached EUR 1.4 billion by the end of 2013, implying a project selection rate of 117.7%.<sup>51</sup> The

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<sup>51</sup> This is possible due to the fact that some programmes shifted funds from other priority theme to the priority theme “energy efficiency, co-generation and energy management” and hence committed more than was initially allocated. Allocations were not always revised upward to reflect this. This was notably the case in Greece.



average intensity of funding for the relevant priority theme in these six programmes was 10% of their total ERDF/CF allocation.

It should be noted that energy efficiency in public and residential buildings concerns only part of the amount allocated or committed to the priority theme “energy efficiency, co-generation and energy management”. This theme also covers investments to energy efficiency of SMEs and investments in co-generation and energy management, which are outside the scope of this evaluation. The figures presented above therefore only provide limited information about the funds allocated specifically to energy efficiency interventions in public and residential buildings. Moreover, ERDF/CF support to energy efficiency in public and residential buildings could also be found in other priority themes. The following section provides additional analysis about the funds allocated to energy efficiency in public and residential buildings.

Table 12 provides key financial information for each of the 48 programmes reviewed. The table applies a gradient three colour coding system, in which red indicates high values, white shows medium values and blue shows low values. Those 7 OPs which did not support energy efficiency in buildings are indicated in italics, while the 6 OPs for which in-depth case studies were conducted are indicated in bold.

Table 13 further below then provides an overview of the samples of 48 selected OPs that spent the most on energy efficiency, the subset of 41 OPs that supported energy efficiency in public or residential buildings, and the 6 selected case studies.

Table 12: Overview of key financial information on ERDF/CF investment for the energy efficiency, co-generation and energy management priority theme for selected Operational Programmes

Operational Programmes	ERDF/CF total amount	Decided allocation for energy efficiency, co-generation and energy management at the end of 2013	Intensity of ERDF/CF total for energy efficiency, co-generation and energy management	Total projects for energy efficiency, co-generation and energy management as reported in AIR 2013	Rate of selection of projects for energy efficiency, co-generation and energy management
	(million EUR)	(million EUR)	(%)	(million EUR)	(%)
Czech Environment OP	4,643	880	19.0%	488	55.4%
Italian Renewable Energy & Energy Saving OP	804	475	59.0%	460	96.9%
Hungarian Environment & Energy OP	4,507	358	7.9%	385	107.6%
Polish Infrastructure & Environment OP	28,338	354	1.2%	347	98.0%
Lithuanian Promotion of Cohesion OP	2,670	300	11.3%	394	131.1%
<i>Czech Enterprise and Innovation OP</i>	3,121	254	8.1%	220	86.4%
Italian Campania OP	3,432	176	5.1%	18	10.1%
Spanish Andalucia OP	6,844	165	2.4%	5	3.0%
Greek Competitiveness & Entrepreneurship OP	1,456	154	10.6%	259	168.3%
<i>Bulgarian Competitiveness OP</i>	988	147	14.9%	80	54.2%
Bulgarian Regional Development OP	1,361	110	8.1%	114	103.9%
German Saxony-Anhalt OP	1,932	109	5.6%	95	87.0%
Italian Sicily OP	3,270	106	3.2%	21	19.6%
Slovenian Environment & Transport Infrastructure OP	1,562	106	6.8%	142	134.7%
<i>Romanian Environment OP</i>	4,412	92	2.1%	51	56.1%
German Saxony OP	3,091	86	2.8%	87	101.2%
Greek Environment & Sustainable Development OP	1,720	80	4.7%	283	353.7%
Lithuanian Economic Growth OP	3,077	73	2.4%	73	99.7%
Romanian Regional OP	3,966	72	1.8%	6	8.3%
Italian Calabria OP	1,499	59	3.9%	35	59.2%
French Nord-Pas-de-Calais OP	701	56	8.0%	53	95.4%
UK North West England OP	756	56	7.4%	29	52.1%
Italian Sardinia OP			8.2%		96.9%

Operational Programmes	ERDF/CF total amount	Decided allocation for energy efficiency, co-generation and energy management at the end of 2013	Intensity of ERDF/CF total for energy efficiency, co-generation and energy management	Total projects for energy efficiency, co-generation and energy management as reported in AIR 2013	Rate of selection of projects for energy efficiency, co-generation and energy management
	681	56		54	
German Berlin OP	876	53	6.0%	54	102.6%
Polish Podkarpackie OP	1,199	46	3.8%	47	103.6%
<i>German North-Rhine Westphalia OP</i>	1,283	40	3.1%	148	367.4%
Greek Attica OP	2,238	39	1.8%	136	346.4%
UK West Wales and the Valleys OP	1,250	39	3.1%	36	93.2%
<i>Romanian Economic Competitiveness OP</i>	2,537	35	1.4%	46	133.6%
UK London OP	182	34	18.8%	28	81.5%
German Lower Saxony OP	639	33	5.2%	19	57.2%
French Picardy OP	199	32	16.2%	33	102.5%
Polish Wielkopolskie OP	1,333	32	2.4%	31	98.4%
Italian Piemonte OP	423	29	6.9%	32	111.7%
French Lorraine OP	329	29	8.7%	26	92.1%
French Veneto OP	206	28	13.5%	23	81.7%
Greek Macedonia-Thrace OP	2,575	27	1.1%	129	470.6%
Polish Lubuskie OP	494	25	5.1%	26	102.1%
French Aquitaine OP	392	21	5.3%	28	132.3%
UK East of England OP	111	20	18.1%	18	87.0%
Polish Pomorskie OP	938	20	2.1%	24	122.8%
<i>Italian Lombardy OP</i>	211	20	9.4%	20	98.8%
Italian Learning Environments OP	255	20	7.8%	55	277.0%
Interreg Programme for Central Europe	246	15	6.3%	20	130.4%
<i>Interreg Programme for Spain and Portugal</i>	267	9	3.4%	9	100.0%
Interreg Programme for France and England	160	9	5.4%	10	116.6%
Interreg Programme for the North Sea Region	139	8	5.6%	15	198.4%
Interreg Programme for Italy and Slovenia	109	3	2.3%	3	103.9%
<b>Total</b>	<b>103,422.5</b>	<b>4,986</b>	<b>4.8%</b>	<b>4,714</b>	<b>94.5%</b>

Source: Monitoring data on ERDF/CF investments provided by the European Commission.

There is no clear relationship between the total allocation to the Operational Programme and the allocation to the priority theme “energy efficiency, co-generation and energy management”. As shown in Table 8 both smaller and larger OPs allocated large amounts to the relevant priority theme and had low or high allocation intensities. Of all OPs only the Italian Renewable Energy and Energy Saving OP allocated more than half of its total allocation to this priority theme. For all other OPs, energy efficiency, co-generation and energy management (and, one can assume, energy efficiency in public and residential buildings) made up a significantly smaller share of their total funds allocation. In total only 9 OPs had an intensity of funding higher than 10%, including the Lithuanian Promotion of Cohesion OP, the UK London OP and the Greek Competitiveness and Entrepreneurship OP, which have been analysed in more detail in the case studies.

A high intensity of funding was not necessarily associated with a high rate of project selection, suggesting a mismatch between strategic planning and demand for energy efficiency investments in the programming areas. As can be seen in Table 12 above there are OPs with a high intensity of funding (Czech Environment OP at 19%) that have only had a low project selection rate (55%), while there are others with a low intensity of funding (Greek Macedonia-Thrace OP at 1.1%) which resulted in a high selection rate (470%). Had the Managing Authorities allocated funds to the relevant priority theme taking into account the expected demand for investments – and in the absence of barriers to the take up of funds – one would expect to observe a project selection rate closer to a 100%, in line with demand for funding.

Table 13 below provides summary information of the data presented in Table 12 and for the subgroups of 48, 41 and 6 OPs and contrasts it with the financial information for all Operational Programmes.

Table 13: Overview of key financial information for the energy efficiency, co-generation and energy management priority themes

Selection of OPs	Total	Priority theme: "Energy efficiency, co-generation and energy management"				
	Allocated amount as reported in 2014	Allocated amount as reported in 2014	Projects as reported in AIR2013	Intensity	Project selection	Change in allocated amount between 2008 and 2014
	<i>billion EUR</i>	<i>billion EUR</i>	<i>billion EUR</i>	%	%	<i>billion EUR (change in %)</i>
	A	B	C	D=B/A	E=C/B	F
All EU27 and ETC OPs	269.608			2.25%		
All OPs reporting allocations for relevant priority theme	176.751	6.067	6.038	3.43%	100%	1.899 (+45.1%)
48 selected OPs reviewed	103.422	4.986	4.714	4.82%	94.5%	1.931 (+63.1%)
41 selected OPs supporting energy efficiency in public and residential buildings	90.603	4.395	4.140	8.05%	94.2%	1.801 (+69.4%)
6 selected OPs subject to case studies	37.153	1.200	1.412	10%	117.7%	473 (+65.1%)

Source: European Commission SFC.

Data on expenditure indicate that by 2013 the 41 OPs had spent 61.3% of their allocations to the priority theme "energy efficiency, co-generation and energy management". Data obtained from Work Package 13: Geography of Expenditure provides information on expenditures by each Operational Programme on the priority theme "energy efficiency, co-generation and energy management".<sup>52</sup> Of the EUR 4.4 billion allocated by the 41 OPs in 2013 to the relevant priority theme 61.3% had been spent by that same year. This share is nearly the same for all OPs (58.5%).

#### *Allocations and commitments to energy efficiency in buildings*

Energy efficiency in public and residential buildings concerns only part of the amount allocated or committed to the priority theme "energy efficiency, co-generation and energy management". No comprehensive or consistent data on allocations and

<sup>52</sup> However, due to the data comparability issues noted in Section 2.2, they are not included in the analysis of financial information for individual OPs in Table 12 and the summary information in Table 13. Instead, only the share of the 2013 allocation identified by Work Package 13 that was reported to have been spent by 2013 is used here.

commitments to energy efficiency in buildings was available from the monitoring systems. However the analysis enables estimates to be made based on the 41 OPs.

It is estimated that EUR 2.8 billion have been allocated to energy efficiency interventions in public and residential buildings in the 41 OPs reviewed. This represents 63.8% of the total allocations to the priority theme “energy efficiency, co-generation and energy management” in the 41 OPs. Given that the 7 OPs that did not support energy efficiency in public and residential buildings did not allocate any funds to this intervention, the total allocation for the full sample of 48 OPs remains the same at EUR 2.8 billion. However, taking into account these 7 OPs drives down the share of the relevant priority theme allocated to energy efficiency in public and residential buildings to 56.2% for the 48 OPs.

It is estimated that a total of EUR 3.4 billion had been allocated to energy efficiency interventions in public and residential buildings in all Operational Programme for the programming period 2007-2013.

Precise information on ERDF/CF allocations to energy efficiency interventions in public and/or residential buildings was obtained from the Managing Authorities for 25 of the 41 OPs reviewed<sup>53</sup>. For the remaining 16 OPs only vague indications of the share were obtained. These indications were provided in the form of qualitative appreciations by the Managing Authorities and Annual Implementation Reports, e.g. in terms of a share (“the majority” or “the minority”) of the total allocations to the priority theme “energy efficiency, co-generation and energy management”. In 6 cases, not even this information was available.

In order to obtain a reasonable estimate for the total allocation to energy efficiency in public and residential buildings it was therefore necessary to make an assumption about what majority and minority meant. Assuming that majority corresponds to a share of three-quarters, minority to a share of one-quarter and no information available to a share of a half, an approximate figure was estimated. This estimation suggests that EUR 2.8 billion were allocated to energy efficiency interventions in public and residential buildings among the 41 OPs.<sup>54</sup> The estimate further represents 63.8% of their allocations to the priority theme “energy efficiency, co-generation and energy management”.

Assuming that the project selection rate of 94.2% of the priority theme for the 41 programmes holds true for energy efficiency in public and residential buildings as well, it is estimated that EUR 2.6 billion have been committed for energy efficiency projects in public and residential buildings by the end of 2013.

Besides the estimated EUR 2.8 billion allocated through the priority theme on energy efficiency, co-generation and energy management, energy efficiency in public and residential buildings could also be funded through one of the other priority theme codes. These include investments in social infrastructure, in urban and rural regeneration, investments related to R&D and entrepreneurship infrastructure, in environmental management systems and in renewable energy and electricity

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<sup>53</sup> In addition to the information from these 32 OPs data is available for the 7 OPs that did not support energy efficiency in public and residential buildings since they did not provide any funds for these interventions.

<sup>54</sup> A sensitivity analysis revealed that the estimate is robust to the exact shares used in the calculations. When the shares of three quarters and one quarter are changed to two thirds and one third, the estimate falls slightly to EUR 2.78 billion, whereas when they are changed to nine tenths and one tenth, the estimates rises to EUR 2.86 billion.

infrastructure. However, in these cases only a smaller share of the funds was expected to have been spent on energy efficiency in public and residential buildings.

Each project could only be categorised under one single priority theme and therefore programming authorities have tended to choose for each project the priority theme that is primarily addressed by a project. This could be the case for example when in the context of a school's modernisation energy efficiency measures were also carried out in the school buildings. Unfortunately, no information is available as to the share of these energy efficiency investments in public and residential buildings outside the priority theme primarily assessed in this evaluation. As a result of these unquantifiable other investments, it is reasonable to assume that the estimate of EUR 2.8 billion is a conservative figure.

By extrapolating the figure of EUR 2.8 billion to the entirety of OPs it is possible to arrive at an approximation of how much was spent in total through the primary priority theme for energy efficiency interventions in public and residential buildings by the ERDF and CF in the 2007-2013 programming period. For this, a further assumption has been made, namely, that the share the 48 OPs take in the total allocation to energy efficiency in public and residential buildings by all OPs is the same as the share the 48 OPs represent in the total allocation to the priority theme (82.2%).<sup>55</sup> Based on this assumption the total allocation to energy efficiency interventions in public and residential buildings in the 2007-2013 programming period is estimated to be EUR 3.4 billion.

Table 14 below provides the estimates for funds allocated and committed that were calculated for the different subsets of Operational Programmes. The EUR 3.4 billion estimated to have been allocated to energy efficiency in public and residential buildings by all programmes in the 2007-2013 programming period compares to the estimated EUR 7.3 billion spent in that same period by other public sector mechanisms in the 9 Member States for which we have made estimates (see Section 2.3.1). From this it seems that the ERDF/CF contribution to public investments in energy efficiency in public and residential buildings is substantial. However, it should be kept in mind that some of the larger national public programmes are not included in the EUR 7.3 billion figure, such as the German KfW loan and grant programmes and the French tax credit scheme. Further, the last EEFIG report stated that "estimates suggest that € 60-100 billion is needed to be invested annually in EU buildings to achieve Europe's 2020 energy efficiency targets yet current investments are below half of these requirements".<sup>56</sup> From this it becomes clear that the EUR 0.48 billion in funding made available through the ERDF/CF on an annual basis represents only a very small share of total (public and private) investment needs.

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<sup>55</sup> The share of funds allocated to the full sample of 48 OPs was used instead of the share of funds allocated to the 41 OPs supporting energy efficiency in public and residential buildings in order to account for the fact that in the entire population of OPs there are some OPs that did not support energy efficiency in public and residential buildings at all.

<sup>56</sup> Energy Efficiency Financial Institutions Group (EFFIG) (2015): "Energy Efficiency – the first fuel for the EU Economy. Final Report", Retrieved from: <https://ec.europa.eu/energy/sites/ener/files/documents/Final%20Report%20EEFIG%20v%209.1%2024022015%20clean%20FINAL%20sent.pdf>

Table 14: Overview of estimates for energy efficiency in public and residential buildings

Selection of OPs	Energy efficiency in public and residential buildings	
	Estimated allocated amount, billion EUR (% of relevant priority theme)	Estimated projects, billion EUR
	G <sup>57,58</sup>	H=G*E <sup>59</sup>
All EU27 and ETC OPs	3.412	3.391
All OPs reporting allocations for the priority theme	(54.4%)	
48 selected OPs reviewed	2.805	2.649
	(54.4%)	
41 selected OPs supporting energy efficiency in public and residential buildings	2.805	2.649
	(61.7%)	
6 selected OPs subject to case studies	0.780	0.926
	(59.5%)	

Source: Own elaboration

Finally, in order to provide a contextual background to the above financial figures, the relative shares of the different sets of Operational Programmes are presented in Table 15, based on the information in Table 13 and Table 14.

<sup>57</sup> Information available on the allocated amount to public and/or residential buildings is not available for all programmes. Column G therefore provides estimates, which are a mix of exact figures and rough indications provided by the programme documentation or collected through interviews with the Managing Authorities. Whenever available information only indicates that 'the majority' of priority theme was allocated to public and/or residential buildings, this was equated with a 75% share. If, on the other hand, only 'a minority' of priority theme allocations was allocated to public and/or residential buildings, it was equated to a 25% share. 'Half' was equated with a 50% share, and if no information was available, this was equated to a 50% share as well. The results are robust to the underlying assumption of shares in that other possible values for the assumed shares (e.g. two thirds and one third) yield very similar results.

<sup>58</sup> The allocated amount to public and/or residential buildings in all OPs is an extrapolation of the estimate obtained from the 48 OPs, where it is known that these 48 OPs make up 82.2% of the total allocation to the relevant priority theme.

<sup>59</sup> E here refers to column E of Table 9



Table 15: Key information on the ratio of financial information on ERDF/CF investments in energy efficiency

	Total	Priority theme "Energy efficiency, co-generation and energy management"			Energy efficiency in public and residential buildings	
	Allocated amount as reported in 2014	Allocated amount as reported in 2014	Projects as reported in AIR2013	Change in allocated amount between 2008 and 2014	Estimated allocated amount	Estimated projects
	A <sup>60</sup>	B	C	F	G <sup>61</sup>	H <sup>62</sup>
Ratio of 48 OPs/ all OPs	38.4%					
Ratio of 48 OPs/ all OPs reporting allocations for energy efficiency	58.5%	82.2%	78.1%	101.7%	82.2%	78.1%
Ratio of 41 OPs/ all OPs	33.6%					
Ratio of 41 OPs/ all OPs reporting allocations for energy efficiency	51.3%	72.4%	68.6%	94.8%		
Ratio of 6 OPs/ all OPs	13.8%					
Ratio of 6 OPs/ all OPs reporting allocations for energy efficiency	21.0%	19.8%	23.4%	24.9%	22.9%	27.3%

Source: Own elaboration

#### 4.2.2 Changes to financial allocations

The allocations to the priority theme "energy efficiency, co-generation and energy management" including investments in energy efficiency in buildings increased substantially over the programming period. Among all Member States the total increase amounted to EUR 1.89 billion (45%). Among the 41 selected OPs this increase was higher, with a total increase that amounted to EUR 1.80 billion, representing a 69% increase.

<sup>60</sup> The figures in this table are calculated as relative shares from the information in Table 13 and Table 14.

<sup>61</sup> The ratio of the 48 and 41 OPs in column G indicates assumptions made in order to estimate the absolute allocated amounts to energy efficiency in public and residential buildings. Indeed, it was assumed that the shares of the 48 OPs in the total allocated amounts is the same for the relevant priority theme (calculated) and energy efficiency in public and residential buildings (estimated). In other words, the calculated share of 48 OPs in the total allocated amounts to the relevant priority theme is 82.2%; it results that the estimated share of 48 OPs in the total allocated amount to energy efficiency in public and residential buildings is 82.2% as well. The estimated share is the same for 41 OPs since the remaining 7 OPs did not allocate any amounts to energy efficiency in public and residential buildings.

<sup>62</sup> The same reasoning applies as for column G.

The monitoring data shows that 18 Member States increased their allocations (including the ETC programmes), 4 Member States decreased their allocations, while allocations for the thematic code remained unchanged in another 4 Member States.<sup>63</sup> In terms of the 41 OPs, the picture is very similar: 31 OPs increased their allocations, 2 OPs (Italian Piemonte OP by 9.7% and Polish Pomorskie OP by 22.4%) decreased them, and 8 OPs (the Interreg France-England, Italy-Slovenia and North Sea Region OPs, the German Lower Saxony OP, the Italian Learning Environment OP, the Lithuanian Economic Growth OP, the UK West Wales OP and the Slovenian Environmental and Transport Infrastructure OPs) kept their allocations unchanged (see Table 5.A in Annex 3).

According to Managing Authorities, the majority of the additional financial allocations to the relevant priority theme were channelled into energy efficiency interventions in public or residential buildings. They cited the main driver to be a high demand for energy efficiency investments by eligible beneficiaries. This was the case for instance for the Hungarian Environment and Energy OP, where the very high demand for investments in energy efficiency in public buildings resulted in the transfer of funds from another OP (see Box 10).

#### Box 10: Transfer of funds to the Hungarian Environment and Energy OP

The Hungarian programme significantly increased support for energy efficiency in public buildings in order to absorb underspends from another Operational Programme and to respond to the very high demand for support for energy efficiency investments. While flexibility in programme design can help to ensure that funds are invested in accordance with current real priorities and opportunities, particularly when economic circumstances have changed significantly from the point at which the initial programme documentation was written, there are risks that in some cases it can simply be a means to ensure that funds are spent, rather than that they are spent well in delivering the programme's original objectives.

Even though high demand was thought to be the main driver of increased allocations, it appears that further factors influenced the decision-making of Managing Authorities. Firstly, it is likely that the unfolding economic crisis played its part in fuelling demand for public support, and that energy efficiency investments were perceived by public authorities as a way to stimulate regional economies and increase their overall ERDF/CF project selection rate.

In addition, the increased allocations can be linked to the changes in the eligibility criteria introduced by the Commission in 2009 (see Section 1.3 and Section 2.3.1). This change was part of the EU recovery plan and the Commission hoped to create new opportunities for the Member States and regional authorities. Only 12 Managing Authorities pointed out that the 2009 rule change was a driver for increasing allocations and changing their OPs. Nevertheless, the rule change certainly was an enabler for most programmes. From the EU15, 17 out of the 31 programmes in the sample used the changes in eligibility criteria to target residential buildings in the social housing sector. This was, for example, the case for the Greek Competitiveness and Entrepreneurship OP, one of the analysed case studies (see Box 11). These programmes complemented the changes in the targeted building category with substantive increases in their allocations to the relevant priority theme. At the beginning of the programming period their share of allocation to the relevant priority theme among the 48 programmes reviewed was 13.3%. Their allocation subsequently

<sup>63</sup> There were no allocations for the relevant priority theme in Cyprus and Denmark.

rose by 121%, increasing their share of the allocation to the relevant priority theme to 18.2%. This suggests that the increased eligibility of investments in residential buildings led to substantial increases in funding and was an underlying driver of the overall increases in allocation (see Table 5.A in Annex 3).

Box 11: Changes in financial allocations as a result of the 2009 legal change in the Greek Competitiveness and Entrepreneurship programme

The allocations for energy efficiency in buildings increased significantly during the 2007-2013 programming period. The 2009 EC legal basis change was the main reason for the introduction of the energy efficiency funding for households. Without this legal basis change, it would not have been possible to introduce the corresponding mechanisms. Another change that supported the formulation of these mechanisms was the acceptance of financial engineering instruments (loans etc.) as an eligible form of finance for energy efficiency interventions in households.

#### 4.2.3 Financing mechanism

##### *Grants*

The vast majority of OPs used grants to support energy efficiency in public and residential buildings. The analysis of the monitoring data revealed that 90% of the total allocations for the priority theme “energy efficiency, co-generation and energy management” were provided in the form of non-repayable grants (see Section 2). These grants were usually combined with co-financing from other public or private sources.

Finding the optimal level of co-financing proved to be a learning process for the MAs, and the level of co-financing was very high in some case (above 70-80%). The case studies showed that higher financing rates were offered to increase absorption of funds, as in the case of the Polish Infrastructure and Environment OP, the Hungarian Environment and Energy OP (see Box 12) and the Greek Competitiveness and Entrepreneurship OP (see Box 13). Feedback from the Managing Authorities revealed that setting the appropriate co-financing level was a learning process. In the seminar, the Managing Authorities acknowledged that co-financing rates were set excessively high as an over-reaction to the difficulties initially encountered to absorb the funds.

Box 12 The exclusive use of grant-funding with high co-financing rates in Poland and Hungary

Under the Polish Infrastructure and Environment OP 85% co-financing was available to the beneficiaries through grants. Initially the co-finance share for the majority of beneficiaries was much lower (43%) but it increased over time, as tendering savings occurred, allocation grew and the final list of beneficiaries was established. The average co-finance share was 81% and was the second highest among the measures in the priority axis targeting the energy sector.

The Hungarian Environment and Energy OP provided support solely in the form of non-repayable grants. The co-financing rates gradually increased during successive calls under the programming period but were dependent on various issues. In general, co-financing rates were higher for public authorities than enterprises and the co-financing rates under the third-party project construction were also lower. Under the last project calls in 2013, central budgetary institutions were able to receive grant-funding with a 100% co-financing rate.

A very high co-finance rate for grants to support energy efficiency in public and residential buildings is questionable: grants provide a one-off support and are usually suitable for projects without revenue-generating capacity; while energy efficiency interventions in buildings can be a source of important cost savings to building owners and/or building users, therefore justifying private investment. Overly generous grant schemes might therefore crowd-out private investment. Loans and other financial engineering instruments would have been equally able to overcome existing market failures in these instances and, thanks to their revolving nature, at a lower cost than grants. This argument, however, does not necessarily apply in the case of grant support to low-income households when social considerations such as fuel poverty alleviation are taken into account.

Low co-financing rates, however, proved unattractive, especially after the 2008 crisis due to a lack of investment capacities from public authorities and households. In some programmes, like in the Greek ones, co-financing rates were driven up to 100% to increase absorption, which then led to very high demand. Subsequent revisions in co-financing rates in a small number of programmes suggest that some Managing Authorities tried to calibrate the rates to an optimal level (see Box 13).

**Box 13: Changes to the co-financing rates in the Greek Competitiveness and Entrepreneurship programme**

During implementation of the mechanism for Energy Savings in Households, it was quickly realized that the 35% maximum grant offered was not adequate to attract sufficient lower-income household owners, leading to the choice of a drastic increase of this maximum grant level to 70%. It is nevertheless debateable whether the extent of this increase was necessary to meet the needs, rather than an excessive response. Furthermore, during implementation of the mechanism for Energy Savings in Local Government it was realized that most Greek municipalities had difficulty in securing the necessary 30% own funding contribution, partly as a result of the financial crisis; which led to a decision to increase ERDF support to 100% financing in order for these investments to proceed. It is noted that 100% financing is the standard practice for co-financed energy efficiency interventions in public buildings in Greece.

*Financial engineering instruments*

Financing mechanisms other than grants were used for energy efficiency in buildings by 10 OPs, both in EU12 and EU15. These instruments included loans (6 OPs) and other financial engineering instruments (9 OPs), such interest subsidies, equity investments and JESSICA. With the exception of the Lithuanian OP Promotion of Cohesion, only EU15 programmes in Greece (Attica, Macedonia-Thrace and Competitiveness & Entrepreneurship OPs), Italy (Campania, Sardinia and Renewable Energy & Energy Saving OPs), Spain (Andalucia OP) and the UK (London OP) used financial engineering instruments other than loans. Only one of the 6 programmes using loans was from the EU12 (the Bulgarian Regional Development OP); the other five programmes were from the EU15 (the same three Greek OPs as before and the two Italian Campania and Sardinia OPs). The Greek Competitiveness and Entrepreneurship OP is an example of a programme that combined the use of grants, interest-free loans and interest subsidies (see Box 13).

Managing Authorities underlined that the use of loans and other financial engineering instruments required a high level of effort and expertise from their side, and imposed additional demands on target beneficiaries. The case studies on Lithuania and London where loans under a JESSICA mechanism were used (see Box 14) highlight the need to build up knowledge about the financial and legal basis for using loans, and to understand the potential of the technology, to be able to judge whether and when projects will be able to generate returns. It is clear that it was important to identify the right partners in terms of banks and experts for support.

Box 14: The use of JESSICA funds in the Lithuanian Promotion of Cohesion programme

The take-up rate of the JESSICA-supported national programme within the Lithuanian Promotion of Cohesion programme was very slow, as homeowners were reluctant to take on long-term loan commitments. In 2013, the JESSICA mechanism was therefore amended: municipalities were asked to select the most energy inefficient multi-apartment buildings for renovation. According to the new renovation model, homeowners do not need to take on any organizational and credit commitments directly. Credit commitments are made by a homeowners' association or administrator assigned by the municipality, borrowing in the name of the homeowners. By removing the organizational burden as well as direct credit commitments from the homeowners, the new model led to an intensification of modernisation of multi-apartment buildings under JESSICA programme. To further streamline energy efficiency interventions, and to address the collective action bottleneck in multi-apartment buildings, a simplified consenting procedure was applied; for interventions in residential buildings a simple majority of home owners (50% plus one) in one building was sufficient to enter the programme and use the support for investment covering the entire building and all its home owners. Close cooperation with the national energy agency was in place to maintain an overview of potential beneficiaries and timing of projects.

In some cases a significant amount of effort was put into convincing potential beneficiaries to use loans. In particular the Managing Authority from the Lithuanian Promotion of Cohesion OP referred to this problem, but other EU12 Member States also noted this as a factor preventing them from using loans. During a time of economic uncertainty households were found to be reluctant to take on loan commitments. Such concerns can slow down the uptake of funds.

## 4.3 Governance

### 4.3.1 Governance structures in Operational Programmes

Governance structures varied greatly across OPs reflecting factors such as the size of the region, the government structure of the Member State and the type of financing mechanism used.

The organisational set-ups of Managing Authorities, Implementing Bodies, Financial Intermediaries, etc. are very specific to each programme, making a cross-programme comparison difficult. Some examples can be found in the case studies, which show governance structures of different degrees of complexity. In Hungary, the Managing Authority at the National Development Agency worked with one intermediary body providing grants directly to beneficiaries. Other OPs worked with an implementing body in addition to the intermediary body (see Table 16).

Table 16: Overview of the governance structure of the case study programmes

Operational Programme	Managing Authority	Intermediary Body	Implementing Body
Greek Competitiveness and Entrepreneurship OP	Ministry of Development and Competitiveness	Special Agency for Coordination and Implementation of Actions in the Energy, Natural Resources and Climate Change Ministry Directorate for Renewable Sources and Energy Savings Centre for Renewable Energy Sources and Saving	-
Hungarian Environment and Energy OP	National Development Agency	Energy Centre Non-profit Ltd, later National Environmental Protection and Energy Centre Non-profit Ltd.	-
Lithuanian Promotion of Cohesion OP	Ministry of Finance	Ministry of Environment	Central Project Management Agency
		Ministry of Interior	Lithuanian Business Support Agency
		Ministry of Economy	Environmental Projects Management Agency
UK London OP	Department for Communities and Local Government	Greater London Authority (GLA)	<i>London Green Fund, including the London Energy Efficiency Fund and the Green Social Housing Fund</i> <sup>64</sup>
Polish Infrastructure and Environment OP	Ministry of Infrastructure and Development	Ministry of Economy	National Fund for Environmental Protection and Water Management
Interreg Italy-Slovenia OP	Joint Managing Authority - Autonomous Region Friuli Venezia Giulia	-	Joint Technical Secretariat

Source: Own elaboration

Structures can be seen to be more complex where JESSICA was used. The body acting as a holding fund manager was usually a bank (see Box 15) but in the case of London companies specialised in fund management were employed for this purpose (see Box 16).

Box 15: The governance structure of the Lithuanian Promotion of Cohesion OP

The functions of the Managing Authority were performed by the Ministry of Finance. In the area of financial engineering instruments, the Ministry of Finance participated in the selection of holding fund managers and performed other functions related to the implementation of FEIs. Three different institutions acting as Intermediate Bodies for energy efficiency investments in residential and public buildings were involved. The

<sup>64</sup> The London Green Fund is a JESSICA holding Fund and thus per definition cannot be considered as an Implementing Body (see Box 16 for further explanation).

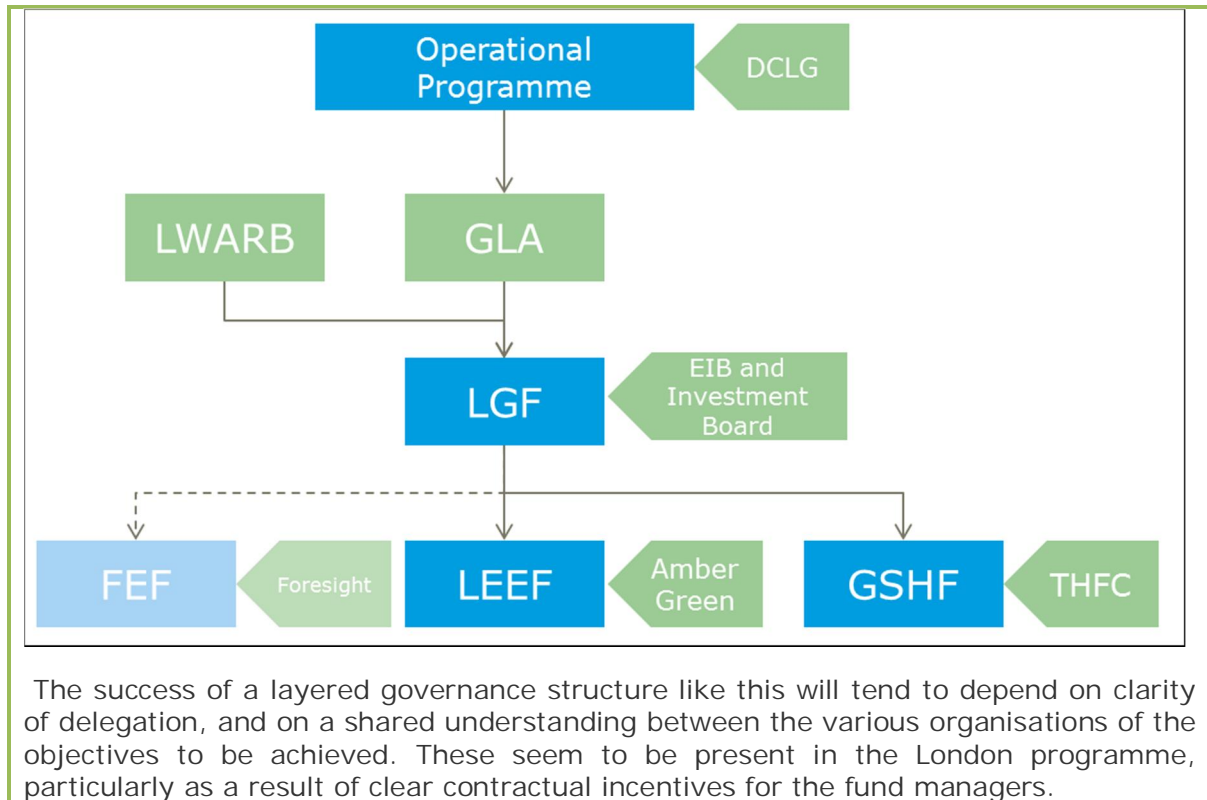
Ministry of Environment was responsible for the full-scale modernisation of multi-apartment buildings performed through the JESSICA holding fund. The holding fund manager, the European Investment Bank (EIB) was also responsible for the implementation of the fund and were supervised and approved by an Investment Committee – a collegial body consisting of two representatives of the Managing Authority and three representatives of the Ministry of Environment. The Ministry of Interior performed the functions of an Intermediate Body for subsidy measures of modernisation of multi-apartment buildings and social housing in problem territories, while modernisation of public buildings was entrusted to the Ministry of Economy. Intermediate Bodies executed a range of functions, including planning of energy efficiency investments and setting selection criteria for projects.

In the case of subsidy measures in problem territories, the Central Project Management Agency served the functions of an Implementing Body with the Lithuanian Business Support Agency designated as Implementing Body for energy efficiency investments in public buildings. The Environmental Projects Management Agency acted as an implementing body for the scheme “Promotion of modernisation of multi-apartment buildings”. These bodies checked and approved the project selection criteria for each project and supervised their implementation. The JESSICA holding fund was implemented by selected financial intermediaries. Three banks (AB Swedbank, AB Šiaulių bankas and AB SEB bankas) provide loans under the JESSICA HF. Furthermore, the Public Investment Development Agency was established in 2012, specialising primarily in the provision of loans for the modernisation of multi-apartment buildings and dormitories under JESSICA programme.

#### Box 16: The governance structure of the London programme

The London case study's governance structure for JESSICA investments in energy efficiency is illustrated below. The Managing Authority, as with all 9 regional programmes in England, was the Department for Communities and Local Government (the respective devolved administrations in Scotland, Wales and Northern Ireland are the managing authorities for the remaining UK Operational Programmes). In most regions, DCLG managed Operational Programmes through its regional branches; in London, however, these functions form part of the tasks of the Greater London Authority (GLA), which acted as an Intermediate Body.

Following the decision to set up a JESSICA holding fund (the London Green Fund), the European Investment Bank was appointed to manage it on the GLA's behalf (and on behalf of the separate London Waste and Recycling Board). When specific Urban Development Funds were then established under the London Green Fund, a public procurement exercise was used to appoint fund managers; in the case of the funds for public sector energy efficiency (LEEF, the London Energy Efficiency Fund) and housing (GSHF, the Green Social Housing Fund), Amber Green Fund Management Limited, and The Housing Finance Corporation, were respectively the successful tenderers, and were appointed for a 10 year period.



#### 4.3.2 Project selection criteria

Managing Authorities allocated support based on a wide range of often loosely defined project selection criteria. To some extent these were laid down in the Operational Programmes but case studies show that selection criteria were also defined independently from the OP.

The most frequently used project selection criterion relates to the reduction of energy consumption to be achieved by an intervention. This was required by 16 OPs. Of these, only four OPs required projects to achieve at least a specified minimum amount of energy savings. Two of them (Greek Competitiveness and Entrepreneurship OP, Polish Infrastructure and Environment OP) required a minimum energy consumption reduction of 30%, while the other two (Polish Lubuskie and Wielkopolskie OPs) required a slightly lower reduction of at least 25%. The other 12 programmes did not set a hard criterion of a minimum reduction. How much a project promised to reduce was, however, still an important decision criterion in these other programmes (see Table 6.A in Annex 33).

Measuring the energy reduction achieved requires knowledge of a building's energy consumption prior to the intervention, and this is why energy audits were carried out. However, such energy audits were used in only in 9 OPs, in most cases as a prerequisite for funding. All Polish OPs reviewed required an energy audit to be carried out, as did the UK London OP, the Italian Veneto OP, the Lithuanian Promotion of Cohesion OP and the Greek Competitiveness and Entrepreneurship OP. The use of energy audits in the Greek case study is presented in Box 17.

The use of energy audits for the selection of projects has proven to add a layer of complexity that was difficult to handle by some Managing Authorities, as illustrated in the case studies. Auditors need to be trained in using the relevant technology and results need to be made comparable across projects of



different size. In some Member States, such as in Poland, the capacity to conduct energy audits on a large scale was missing. Similarly, the Greek case study shows that there was an important lack of experience when the audits were first used. This required withdrawing support from projects initially judged to be eligible when mistakes in audits were realised. In London, such problems were avoided, partly because early policy development in this area meant that experienced auditors were available.

**Box 17: The use of energy audits in the Greek Competitiveness and Entrepreneurship OP**

The most important development in recent years promoting energy efficiency in buildings in Greece has been the adoption of the Energy Performance of Buildings Regulation [KENAK] in 2010, which provided a legal background to energy performance certificate requirements in the Greek OPs. Households applying for funding were required to submit an ex ante and ex post energy audit and resulting energy performance certificates to verify an energy upgrade by 1 class or 30% reduction in energy consumption. For public buildings only an ex post energy audit and resulting energy performance certificates were required to verify the 30% reduction in energy consumption as proposals were submitted in 2009, before the adoption of the KENAK regulation. Instead of ex ante audits, measurements and estimates of the municipalities were used.

The cost-effectiveness of energy efficiency investments was used as a project selection criterion in a small number of programmes. In total 8 OPs used cost-effectiveness as a criterion in the process of project selection, of which six were from the EU12 countries and only two from an EU15 country. The former include the four Polish programmes of Podkarpackie, Lubuskie, Wielkopolskie, and Infrastructure & Environment, the Czech Environment OP, and the Hungarian Environment & Energy OP. The two programmes from the EU15 that used the cost-effectiveness criterion were the UK London OP and the German Lower Saxony OP. These latter two funded deep renovations in public buildings only. Likewise, the six OPs from EU12 countries using the cost-effectiveness criterion also supported investments in public buildings only, with the exception of the Polish Podkarpackie OP. The latter provided support to public and residential buildings and used the cost-effectiveness criterion for both types. None of these programmes had set a minimum for the cost-effectiveness criterion, e.g. requiring a minimum of energy saved per EUR 1,000 (or equivalent) in investment).

A range of other project selection criteria were used by the Operational Programmes. Of these the following criteria were used by more than one OP: a criterion stipulating that a project had to contribute to national or regional objectives (7 OPs), the use of innovative technologies (6 OPs) and compliance with national or regional energy efficiency standards in buildings (6 OPs). The latter criterion relates directly to the minimum energy reduction requirement and, with the exception of the French Lorraine OP, was only required in programmes that also required a minimum energy reduction from a project. Finally, a minimum project size and the involvement of renewable energy sources were required by 4 OPs respectively (see Table 6.A in Annex 33 for a list of project selection criteria used by each OP).

In general, project selection criteria were set very loosely in a majority of programmes. This gave Managing Authorities some flexibility, which, in the light of the lack of experience with this type of intervention and the uncertainty about the type and amount of applications to be received, proved helpful. However, in cases like the Spanish Andalucia OP the low requirements set by selection criteria led to a significant oversubscription of calls for projects. This in turn left Managing Authorities

with the challenge of selecting the projects based on less transparent and potentially less consistent criteria (for example, the date of receipt of an application).

Conversely, there might have been instances where the high administrative hurdles imposed by the ERDF/CF in terms of paperwork and requirements for funding eligibility led potential beneficiaries to apply for other schemes instead, or not apply for support at all. This was reportedly the case in the Polish Infrastructure and Environment OP. In the case of Greece, on the other hand, high project selection requirements did not prevent an oversubscription of projects. In this latter case it is likely that the low to non-existent co-financing requirements had a major role in the oversubscription.

## 4.4 Operations

### 4.4.1 Eligible energy efficiency investments

Support to energy efficiency interventions in buildings was provided for a wide range of measures. The 41 OPs supported measures such as:

- Thermal insulation of the building shell (walls, roof, windows)
- Improvements to the heating system (e.g. boiler exchange)
- Lighting systems
- Energy management and control systems
- Air ventilation.

Operational Programmes differed to the extent to which the energy efficiency measures were all-encompassing. Some OPs provided funds for single measures such as exchanging boilers (e.g. in the German Saxony OP) or air conditioning (e.g. in the Greek OPs) in residential flats and houses, while others provided funds for deep renovations of entire buildings (e.g. the UK London OP the German Lower Saxony OP and the Polish Pomorskie OP).

Support within the six case studies also targeted a wide range of energy efficiency interventions, among which the innovative approach implemented in the London programme is presented in Box 18.

#### Box 18: Innovative energy efficiency investments in the London programme

One project funded in the London programme, through loans from the London Energy Efficiency Fund, involved innovative investment at the Tate, a major public art gallery. Total investment of GBP 260 million (approximately EUR 360 million) included GBP 18 million from LEEF (EUR 25 million), and has funded innovative energy efficient gallery-standard lighting; the use of waste heat recovery from an electricity sub-station; and bore-hole cooling using the River Thames. Considerable potential exists for making use of the technical understanding developed under this project to help similar investments in other cultural venues worldwide.

In addition to the physical energy efficiency interventions, in some cases support was also provided for the preparation of energy efficiency projects. The Polish Infrastructure and Environment OP stopped support for physical energy efficiency interventions in public buildings in 2013, and financial support was directed to the preparation of local low-carbon growth plans (see Box 19).

**Box 19: Support for energy efficiency investment plans in Poland**

The second call for applications under the Polish Infrastructure and Environment OP was launched in August 2013, almost five years after the first call. Projects were to prepare low-carbon growth plans for Polish communes. The plans provide a roadmap for energy efficiency interventions in public and private sector for communes, identifying the most pressing needs in terms of energy efficiency. 873 applications from more than 35% of Polish communes were submitted, of which 682 were selected for co-financing. These projects are expected to pave the way for effective energy efficiency investment developed under 2014-2020 programming period.

**4.4.2 Accompanying measures**

Most programmes accompanied the financial support to energy efficiency interventions in public or residential buildings with supporting measures such as information campaigns, counselling or training.

Training was offered either to the Implementing Bodies or target beneficiaries. Training for Implementing Bodies, which could also include personnel from the Managing Authority, was generally intended to explain the applicable EU regulations with regards to EU funding support for energy efficiency in public or residential buildings. This type of training was carried through primarily in programmes from EU12 Member States.

Training programmes for target beneficiaries were carried out before calls for applications, in order to explain application procedures and eligibility requirements. Targeted sustainability training was also made available. Advice was offered on an individual basis to target beneficiaries to support their applications and the implementation of energy efficiency measures. These training programmes, which were mainly offered by programmes from EU15 countries, constituted an important factor for successful interventions. This became apparent in the behavioural changes that the energy efficiency interventions led to in some cases. In the UK, for example, one problem encountered by the Managing Authorities was the so-called rebound effect. Energy consumption did not fall despite the interventions, as final recipients consumed more energy than before. The interventions had effectively reduced the incentives for building users to save on energy costs; although, as noted in chapter 3, some level of rebound effect is implicit when a key objective of the intervention is to reduce fuel poverty.

**Box 20: Awareness raising within the Greek Competitiveness and Entrepreneurship programme**

Within the Greek OP support was provided for actions towards awareness for the promotion of energy efficiency and the rationale use of energy and renewable energy sources. This action was directed at the general public and target groups such as local administrative staff, engineers and investors, and aimed to increase energy efficiency awareness and knowledge about economic, environmental and social benefits, together with an increase in the use of related technologies in the residential, tertiary, industrial and transport sectors. This action, in parallel with other awareness actions included within the programme's core mechanisms on energy efficiency, has contributed to raising the energy efficiency awareness of the population, as evidenced by the around 32,600 currently pending applications for the already over-subscribed Energy Savings in Households mechanism despite its slow take-off, as well as by the 191 out of total of 220 eligible municipalities applying for the Energy Savings in Local Government mechanism.

In Operational Programmes of the European Territorial Cooperation objective investments in energy efficiency measures in buildings were comparably low but a variety of activities around the topic were supported. This includes campaigns to raise awareness on the benefits of energy efficiency, training courses and informational initiatives. This was the case for example for the cross-border case study on the I Italy-Slovenia OP (see Box 21). Another example is provided by the Interreg France-England OP. The regional authorities worked together with architectural classes in universities to raise awareness and set up pilot projects. Other projects worked on ways to visualise energy consumption and climate performance of buildings. These were mostly pilot projects intended to identify lessons to be drawn for interventions outside these OPs. Good practice examples from these programmes can be taken to other ERDF/CF OPs.

Box 21: Information dissemination within the Cross-Border Programme for Italy and Slovenia

The ENRI project, which primarily supported the analysis of energy efficiency of buildings used by Italian and Slovenian NGOs, also included an information campaign on energy efficiency. A number of information dissemination events were organised, which were seen effective in addressing the lack of knowledge among the general public in this field. In general the good cooperation and communication between the Intermediary Body and the beneficiaries via the organisation of stakeholder platforms assured the information exchange between the beneficiaries.

## 5. Achievements of ERDF/CF support to energy efficiency in buildings

### 5.1 Summary of Findings

While achievements have been made through energy efficiency investments in public and residential buildings in the 2007-2013 programming period, these achievements are only partially captured by the programmes' monitoring systems. The extent to which the output, result and impact indicators reported on by Managing Authorities were designed appropriately to capture evidence of achievements was variable and inconsistent. While some set up several relevant indicators and reported on achievements made, others did not report on any relevant indicators, despite providing financial support to energy efficiency investments in public and residential buildings.

Result indicators proved to be the most useful indicators for understanding what has been achieved through energy efficiency investments in public and residential buildings. Unlike impact indicators they can - in theory - be directly linked to energy efficiency investments. Compared to output indicators they provide more interesting information on what has actually been achieved through the projects, i.e. what direct consequences the projects have had. Result indicators were also used most frequently for measuring achievements of energy efficiency investments in public and residential buildings. Of the 41 OPs, 35 used a result indicator, while 28 OPs used an output indicator and only 5 used an impact indicator.

The use of relevant and/or specific indicators of achievements in energy efficiency in public and residential buildings is not consistent across programmes. An analysis of the monitoring data for the 2007-2013 programming period indicates that not all programmes used an output, result and/or impact indicator relevant for energy efficiency interventions in buildings (i.e. capturing achievements of energy efficiency interventions, including in buildings but possibly in other intervention areas as well). Moreover, very few programmes used an indicator that was specific to energy efficiency in buildings (i.e. capturing exclusively achievements of energy efficiency interventions in buildings). Instead, a wide array of heterogeneous and in some cases unspecific indicators were used.

The most commonly used result indicators among the 41 programmes reviewed captured reductions of energy consumption (27 OPs) and reductions of greenhouse gas emissions (11 OPs). These indicators were either formulated so as to be specific to energy efficiency in public and residential buildings, or captured results from other interventions as well. The indicator on reduction of greenhouse gas emissions was a core indicator in the 2007-2013 programming period, the use of which was recommended by the European Commission. This was not the case for the result indicator on reduction of energy consumption.

Out of the 35 OPs making use of a result indicator, and 28 OPs making use of an output indicator, 25 reported on progress made in each case. Further, depending on the type of indicator (i.e. output, result or impact) slightly more or less than half of the programmes managed to achieve or nearly achieve their targets by the end of 2013. There are significant differences between programmes on the level of ambition in targets, and in how achievements have been measured for these and other indicators.

No complete picture can be provided of achievements across programmes. This is a consequence of the weaknesses of the monitoring systems, which often lack specific indicators, set unrealistic target values and failed to measure the achievements of project interventions. There is a strong demand by Managing Authorities for clear guidance on how to set adequate targets and measure achievements in this policy area.

Comparison of achievements across programmes can be made for the two most frequently used result indicators; however the findings need to be treated with care. The comparison shows that both the targets set and the achievements reported vary significantly across programmes, independently of how much was allocated to and spent on energy efficiency in public and residential buildings. This suggests that Managing Authorities faced difficulties in setting realistic targets. However, the differences across programmes might be exaggerated by the fact that Managing Authorities did not use standard procedures for measuring and monitoring project results. Especially in the area of energy and emissions measurements, different measuring procedures can lead to widely diverging results. Not too much weight should therefore be placed on the differences found across programmes.

Managing Authorities provided a range of reasons for not setting or achieving targets. These reasons include, among others, difficulties in estimating what would constitute a realistic target, difficulties reporting on progress made, slow deployment of funds, and a time lag in reporting on projects, particularly in relation to energy savings.

Some additional achievements were attained, especially those relating to increased awareness of the benefit of energy efficiency for both policy-makers and beneficiaries. Although they are not captured by the monitoring systems, these achievements are highly relevant given that energy efficiency in public and residential buildings was a relatively new area of intervention in the ERDF/CF.

## 5.2 Evidence of Achievements

While achievements have been made through energy efficiency investments in public and residential buildings in the 2007-2013 programming period, these achievements are only partially captured by the programmes' monitoring systems. Firstly, not all OPs that supported energy efficiency investments in public and/or residential buildings made use of *relevant* indicators linked to the effects of these investments.<sup>65</sup> That is, some OPs did not use indicators that could measure outputs, results or impacts of investments in energy efficiency at all. Definitions of outputs, results or impacts used in this evaluation are presented in box 22 below.

Among those OPs that used indicators relevant to energy efficiency investments, only a few made use of indicators that are *specific* to the achievements from energy efficiency investments in public and/or residential buildings. Second, of those OPs that did use a relevant indicator or even a specific indicator, not all programmes had reported any measurements by the end of 2013. Finally, Managing Authorities

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<sup>65</sup> A distinction is made here between *relevant* indicators that are, in one way or another, linked to energy efficiency interventions in public and/or residential buildings and *specific* indicators that exclusively capture the effects of these interventions. The former encompasses both the latter and indicators that also capture the effects of other types of interventions (e.g. investments in renewable energy).

reported in their Annual Implementation Reports on a number of more or less tangible achievements that resulted from the interventions in the 2007-2013 programming period, but which are not captured by any indicators. These are nonetheless relevant for understanding achievements, as they indicate that the ERDF/CF investments has a positive impact in terms of awareness raising and capacity building on energy efficiency.

When used, relevant and/or specific indicators were very different across programmes, limiting the possibilities to analyse, aggregate or compare achievements. The primary means by which achievements have been captured in the 2007-2013 programming period has been through the use of output, result and impact indicators. The monitoring database of the European Commission reveals that in total 222 indicators that can be linked to achievements from energy efficiency investments in public and/or residential buildings have been reported on by all OPs. Out of these, 45 indicators were identified as specific to energy efficiency interventions in buildings (for detailed information on these indicators see Annex 5). These indicators have been used by 24 programmes. Compared to the 215 programmes that reported on allocations to the priority theme “energy efficiency, co-generation and energy management”, this is not a high number.

#### Box 22: Output, result and impact indicators

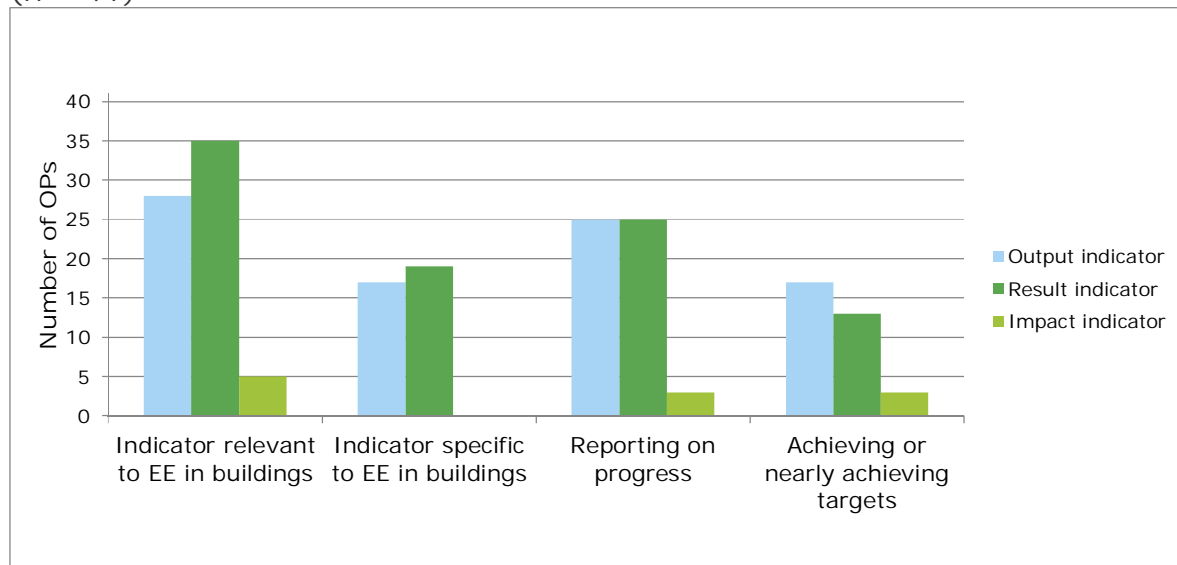
- Outputs are goods and services produced. Output indicators are usually measured in physical or monetary units.
- Results are direct and immediate effect on direct and final beneficiaries brought about by a programme. Result indicators provide information on changes to, for example, the behaviour, capacity or performance of final beneficiaries
- Impacts are long-term effects. The term is used in a generic way and includes effects beyond the direct and immediate effects and occurring after a certain lapse of time but which are, nonetheless, linked to the action taken and the direct beneficiaries (so-called specific impacts) or longer-term effects affecting a wider population (so-called global impacts).

A similar picture emerges from the review of Operational Programmes, although the selected programmes tended to use more relevant and/or specific indicators than the overall population of OPs. Of the 41 OPs in the sample that supported energy efficiency in public and/or residential buildings 35 OPs used a result indicator relevant to energy efficiency, 28 an output indicator and 5 an impact indicator. Further, of these 41 programmes, only 19 used a result indicator and 17 an output indicator that was specific to energy efficiency in public and/or residential buildings; while none of the impact indicators used was specific to energy efficiency in public and residential buildings. These findings indicate that in the sample of programmes reviewed a much larger share of OPs used a relevant indicator compared with the population at large. At first sight this is not surprising given that the sample is not representative and encompasses 82% of the total allocation to the priority theme “energy efficiency, co-generation and energy management” in the 2007-2013 programming period. It therefore suggests that the higher the allocation to energy efficiency is, the more relevant and specific the indicators are. However, this finding is not confirmed within the sample of 41 OPs supporting energy efficiency in public and residential buildings (see Table 23.A and Table 24.A in Annex 3)

Where indicators were used, the reporting of achievements was not always consistent. The indicators most frequently used in the sample were result indicators, followed by output and then impact indicators. Reporting on progress for relevant indicators was only partial and differed between the indicator types. Out of 28 OPs

that used relevant output indicators, i.e. linked to energy efficiency in buildings, 25 (89%) reported on progress. This was the case for only 25 out of 35 OPs (71%) using a relevant result indicator and 3 out of 5 OPs (60%) with a relevant impact indicator. This pattern can be explained by the increasing difficulty of capturing progress made as one moves from outputs to impacts. It is confirmed by the extent to which OPs achieved their targets by the end of 2013.<sup>66</sup> The data from the Annual Implementation Reports indicated that 17 out of 28 OPs (61%) *achieved or nearly achieved targets* set for relevant output indicators, 13 out of 35 OPs (37%) for their relevant result indicators and 3 out of 5 OPs (60%) for their relevant impact indicators. Figure 3 below displays these aggregate findings.

Figure 3: Number of OPs using relevant targets and reporting on achievement (n = 41)



Source: Own elaboration based on in-depth review of selected Operational Programmes

### 5.2.1 Outputs

There is a large variability in what output indicators capture across programmes, providing only limited insights as to how programmes compare in terms of achievements. As noted above, 28 of the 41 selected OPs that supported energy efficiency in public and residential buildings used at least one relevant output indicator, 17 of which used a specific output indicator (see Table 23.A in Annex 3). Of these 28 OPs, 7 used two output indicators and one programme (Lithuanian Promotion of Cohesion OP) used three. The most widely used output indicators only show quantity of relevant projects/operations/households. Specific output indicators for example captured “the number of energetically modernised households” or “the number of replaced heat appliances” as in the Greek OPs for Attica and Macedonia-Thrace. Other relevant indicators are more generic, as was the case in the German Saxony OP with the output indicator “the number of projects for environmental protection, in particular for CO<sub>2</sub> reduction and energy efficiency increase, noise reduction and climate adaptation”. Targets for these indicators measuring the number of interventions ranged from 6 in the German Saxony-Anhalt OP to 46,920 in the Romanian Regional OP.

<sup>66</sup> For output and result indicators a target has been considered as achieved or nearly achieved by the project team if at least 80% of the target was achieved by the end of 2013.



In total the reviewed programmes reported on 117 thousand interventions related to energy efficiency in public and residential buildings. These programmes managed to achieve 82% of their target levels in this respect by 2013. Of these 117 thousand interventions nearly all (approximately 113 thousand) can be directly linked to energy efficiency interventions in public and residential buildings, despite the fact that 11 out of the 28 OPs did not use output indicators specific to energy efficiency interventions in public and residential buildings. A vast majority of the interventions can be attributed to only 5 OPs: The Greek Competitiveness & Entrepreneurship OP (39,210 'energetically modernised households' and 36,669 'replaced energy intensive appliances'), the German Saxony OP (20,781 projects), the Greek Macedonia-Thrace OP (6,280 'energetically modernised households'), the Greek Attica OP (4,594 'energetically modernised households') and the Romanian Regional OP (2,836 'energetically modernised apartments'). The interventions of 13 OPs that supported energy efficiency interventions in public and residential buildings but did not measure relevant output indicators are not accounted for.

Operational Programmes can be classified by the extent to which they provided support to a small number of large (encompassing renovation) projects or a large number of smaller projects. The output indicators that count the number of relevant projects show whether programmes supported a large number of small projects, a small number of larger projects or a combination of both. At one extreme, programmes like the German Lower Saxony OP that supporting renovation of 4 public buildings (no target was set for the output indicator) and the German Saxony-Anhalt OP that supported 6 public building renovations can be found, and on the other hand there were programmes with output targets of several thousand projects, such as in the case of the Greek OPs, the Romanian Regional OP or the German Saxony OP (see above). In between there are also programmes that supported between 50 and several hundred medium size projects (e.g. the Polish Podkarpackie and Infrastructure & Environment OPs, and the Italian Piemonte and Renewable Energy & Energy Saving OPs) and programmes that combined support for projects of very different size (e.g. Bulgarian Regional Development OP).

There is only limited evidence suggesting that the number and size of projects is related to the funding strategy. One might expect that the size and number of projects supported is linked to the justifications provided for funding. On one hand, larger projects that involve encompassing renovations of public buildings could be expected to be related to funding justifications that stress the exemplar role of the public sector or fostering regional innovation. Smaller projects, on the other hand, that involve less-encompassing renovations (e.g. a simple boiler or air conditioner exchange) would tend to go better with support to residential buildings, and be associated with funding justifications that stress the need to reduce fuel poverty and increasing thermal comfort. The evidence does not allow confirmation or rejection of this expectation: of the 8 OPs that cited the exemplar role of the public sector as a funding justification, focused their support on a big number of projects. Three of them (the Greek Attica, Macedonia-Thrace and Competitiveness & Entrepreneurship OPs) even supported more than 1,000 projects each. In contrast, the UK London OP and German Lower Saxony OP are supported only a small number of deeper renovation projects, yet did not cite the exemplar role of the public sector as a justification for funding. This further supports the findings that the rationales presented in the OPs had little concrete implication for the implementation and achievements.

### 5.2.2 Results

Among the result indicators, “reduction of energy consumption” and “reduction of greenhouse gas emissions” were used most frequently, allowing for comparisons across programmes. The 41 selected OPs that supported energy efficiency investments in public and residential buildings used seven different (types of) result indicators. Of these seven indicators, the two result indicators used most frequently are the reduction of energy consumption or an equivalent formulation (27 OPs out of 41 OPs) and the reduction of greenhouse gas emissions (20 OPs out of 41 OPs). For the reduction of energy consumption indicator, 16 out of the 27 OPs used a variant of the indicator that was specific, i.e. that captured exclusively the achievements from energy efficiency investments in public and residential buildings, while for the reduction of greenhouse gas emissions 9 out of 20 OPs used an indicator variant specific to energy efficiency in public and residential buildings (see Table 24.A in Annex 3).

In addition, and to a much lower extent, programmes made use of the following result indicators:

- reduction of energy consumption in (% of) kWh per square or cubic metre per annum (the Italian Renewable Energy and Energy Saving OP, and the French Nord-Pas-de-Calais OP),
- energy savings in kWh per EUR 1 million investment (German OP Lower Saxony)
- percentage increase in energy efficiency of renovated buildings (Lithuanian Promotion of Cohesion OP),
- number of eco-enterprises participating in and/or benefiting from projects supported as part of the programme (Interreg France-England), and
- number of jobs created or saved (Romanian Regional OP and UK OP West Wales and the Valleys)<sup>67</sup>.

The programmes reviewed reported on reductions of energy consumption in the magnitude of 2,904 GWh per annum and of reductions of greenhouse gas emissions of 1,454 kilo tonnes of CO<sub>2</sub> equivalent per annum as a result of, among others, energy efficiency interventions. These achievements constitute the progress reported by the 27 OPs that used reduction of energy consumption and the 20 OPs that used reduction of greenhouse gas emissions as indicators to capture the achievements of energy efficiency in public and residential buildings. Compared to the targets set, these programmes managed to achieve 62% of their energy reduction and 23% of their emissions reduction targets by 2013. It should be noted, that of the 2,904 GWh per annum only 1,438 GWh can be directly attributed to energy efficiency interventions in public and residential buildings, while the remainder covers both energy savings from energy efficiency interventions and other interventions as well.<sup>68</sup> The energy savings of the 15 OPs that supported energy efficiency interventions in public and residential buildings but did not measure energy savings are not included in this figure. The same reasoning applies to emissions reduction, where 826.4 kilo tonnes of CO<sub>2</sub> equivalent per annum can be directly attributed to energy efficiency interventions in buildings and the emissions reductions of the 21 OPs that did not report on them are not included in the figure.

<sup>67</sup> Programmes also listed other indicators as result indicators, but these capture outputs instead of results. These include a.o. “the number of low carbon technologies installed” or “the number of projects aimed at improved air quality”

<sup>68</sup> This is due to the fact that only 16 out of 27 OPs used a variant of the energy reduction result indicator that is specific

The use of result indicators confirms the tendency identified in Chapter 3 that climate change mitigation was more relevant for competitiveness OPs while a focus on energy savings alone was more important for convergence programmes. The result indicator on reduction of greenhouse gas emissions was used by a larger share of the competitiveness and EU15 programmes, while the result indicator on reduction of energy consumption was used by a larger share of convergence programmes (yet equally across EU12 and EU15 programmes). This finding suggests that the primary focus of the programmes differed across regions and objectives. It is in line with the justifications provided by the Operational Programmes and Managing Authorities for supporting energy efficiency in buildings (see Section 3.3.1).

By the end of 2013 only a fraction of Operational Programmes reported that they achieved the targets set for their result indicators. Of those programmes that made use of the seven relevant result indicators, only 71% reported on progress made by the end of 2013 and about a half of these (37% of those with a result indicator relevant to energy efficiency in buildings) reported that they achieved or nearly achieved their targets by that date. Of those 7 programmes that made use of one of the 5 other relevant result indicators listed above, 4 reported on progress and out of these 3 achieved their targets. The 3 boxes below provide examples of programmes with high, mixed and low achievement of indicated targets.

**Box 23: High achievements in the Lithuanian Promotion of Cohesion programme**

Modernisation of public buildings was more successful than renovation of multi-apartment buildings as the latter was negatively affected by the economic crisis as well as a principal-agent problem. By the end of 2014, 864 public buildings were modernised (101,6% of the target value). For public buildings, the result indicator "Amount of energy saved in modernised public buildings (GWh)" was used, with a target value of 200 GWh. By the end of 2014, 236.6 GWh of energy had been saved as a result of energy efficiency investments in public buildings (118.3% of the target value). According to preliminary data of AIR of 2014, an energy efficiency increase of over 69% has been achieved in modernised multi-apartment buildings which represents 231.8% of the target value; although for a significantly lower number of buildings than planned.

**Box 24: Mixed achievements based on indicators in the Hungarian Environment and Energy programme**

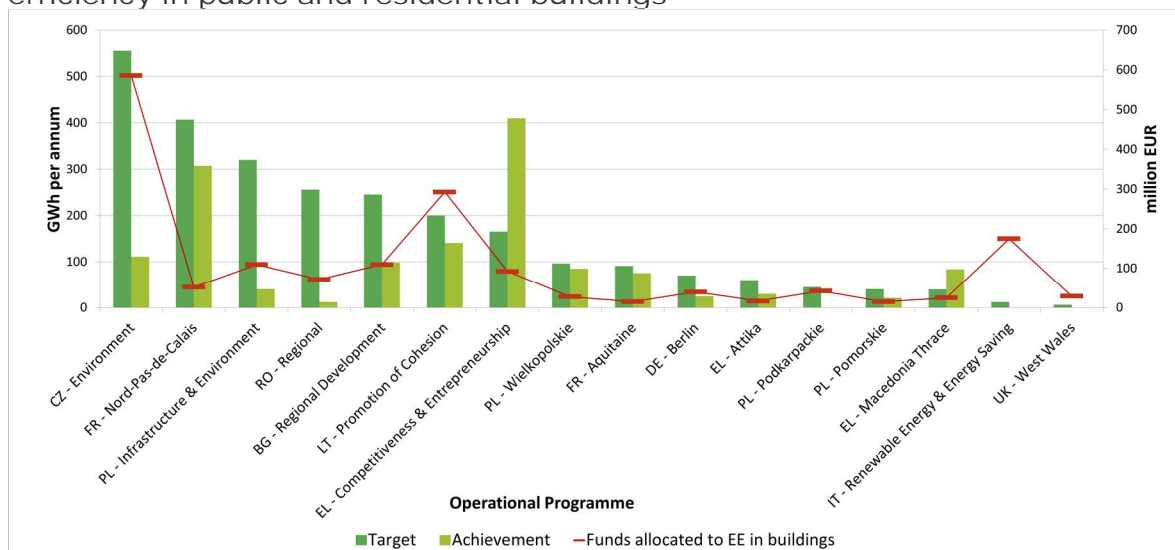
The indicators used show only limited evidence of the achievements in energy efficiency in public buildings under the Hungarian Environment and Energy OP. The OP reported on two result indicators (Energy savings as the result of energy efficiency measures and reduction of GHG emissions in CO<sub>2</sub> equivalents) but no output and impact indicators were used. The 2013 Annual Implementation Report indicated a significant under-achievement of both indicators - only 18% and 7% of the established targets were achieved respectively – nevertheless the latest results by the Managing Authority show a different picture. By June 2015, 76% of the energy savings target were achieved. This significant increase can be explained by the fact that information is now being reported more frequently from those projects which are now close to the end of their 5 year operational periods. Nevertheless, the GHG emission reduction target's achievements are still very low, at 25%. The discrepancy in achievements can be explained by the fact that the indicators capture more than the effects of energy efficiency investments in buildings alone.

Box 25: Limited achievements in the Interreg Programme for Italy and Slovenia

Given that the cross-border Operational Programme supported only one energy efficiency project, the scope of achievements is very limited. Furthermore, the majority of the supported activities under this project were linked to an overarching analysis of the status of energy efficiency of NGO buildings and only two physical energy efficiency investments. Despite the limited scope of achievements, the energy upgrade of the two supported buildings has led to a significant decrease of energy bills (up to 70%).

The level of targets set and achievements for the result indicator “reduction of energy consumption” or equivalent vary significantly across Operational Programmes. The target for this indicator ranges from a low of 2.4 GWh reduction of energy consumption per year in the Italian Campania OP to a high of 750 GWh in energy reduction per year in the Hungarian Environment and Energy OP.<sup>69</sup> Likewise, reported achievements range from 0.2 GWh per year in the Italian OP for Sardinia programme to 674.5 GWh per year in the Italian OP for Calabria. This spread is partly due to the fact that some programmes made use of relevant (hence non-exclusive) rather than specific (hence exclusive) result indicators, thus capturing the achievements from other interventions as well. Even taking into account this fact, a considerable variation is still visible, with the highest target at 555.6 GWh per year of reduced energy consumption from energy efficiency investments in public and residential buildings in the Czech Environment OP and 6.3 GWh in the UK West Wales OP (see Figure 4 below for the subset of programmes using a specific result indicator for reduction of energy consumption and Annex 3 for all programmes making use of this indicator).

Figure 4: Result indicator energy reduction through investments in energy efficiency in public and residential buildings



Source: Own elaboration based on in-depth review of selected Operational Programmes

<sup>69</sup> Operational Programmes provided their figures in either (kilo-)tonnes of oil equivalent (toe) or Gigawatt hours (GWh). The figures were all converted to GWh using the standard conversion rate of 1 toe = 0.01163 GWh. Differences were found across programmes also on whether they referred to primary energy savings or final energy savings (or did not specify either).

There is no relation between the amount of allocated funding and the level of targets set. Next to the targets and the 2013 reported achievements in GWh (left hand axis), Figure 4 above also displays the estimated allocation to energy efficiency in public and residential buildings in EUR million (right hand axis). As becomes evident from the comparison of targets and allocation, there does not seem to be a strong link between the size of the funding allocation and the target set. Especially striking are the cases of the French Nord-Pas-de-Calais OP, the Lithuanian Promotion of Cohesion OP and the Italian Renewable Energy & Energy Saving OP. In the former the estimate of funds allocated was EUR 52 million while the target set for reduced energy consumption was 407 GWh. In the latter two on the other hand, the estimated allocations were EUR 292.2 million and EUR 175 million respectively, while the targets were much lower at 200 and 12 GWh respectively. This strongly suggests that there was only a limited understanding by Managing Authorities regarding how much energy could be saved through energy efficiency interventions in public and residential buildings.

Cost-effectiveness calculations using available monitoring data reveals seemingly large variances across programmes. Despite of the comparability issues noted in section 2.2 for the available 2013 expenditure data<sup>70</sup>, the information can be used to construct a cost-effectiveness ratio of how much energy in MWh was saved for every EUR 1,000 spent. The reduction of energy consumption in GWh per year (reported by 13 of the 16 OPs using a specific result indicator on the reduction of energy consumption) was compared to the estimated amount of funds spent on energy efficiency interventions by these OPs<sup>71</sup>. The calculations indicate that the cost-effectiveness of interventions for these 13 OPs varies substantially. It ranges from less than 0.4 MWh saved per EUR 1,000 spent in the Lithuanian Promotion of Cohesion OP and the Czech Environment OP to approximately 10 MWh per EUR 1,000 spent in the French Nord-Pas-de-Calais and French Aquitaine OPs. However, it is important to stress that the interventions often include non-energy related investment; therefore (without a clear and standardised indicator) such comparisons need to be handled with care.

Differences in energy efficiency measures, units of analysis and reporting practices make a comparative analysis based on monitoring data meaningless. At first sight the calculations presented above suggest that the French OPs were significantly more cost-effective, especially if one takes into account the differences in input costs in these countries. However, it is likely that the observed variations are to a large extent due to a lack of standardised framework for calculating costs and benefits. First, the type of energy efficiency measures (e.g. thermal insulation, space heating, space cooling, domestic hot water, ventilation systems, lighting etc.) covered by the expenditure data are not always known, which makes any general comparison difficult. Second, the expenditure data and the outcome data need to cover the same set of activities. This is not the case in the Lithuanian Promotion of Cohesion OP, for instance, where the result indicator measures the reduction of energy consumption in public buildings, while expenditure data encompasses both public and residential buildings. Third, the reporting practice and frequency vary between programmes. For instance, in the Polish programmes energy reductions are measured and reported one year after completion of a project, while in the Greek programmes the energy reduction is reported based on theoretical values already

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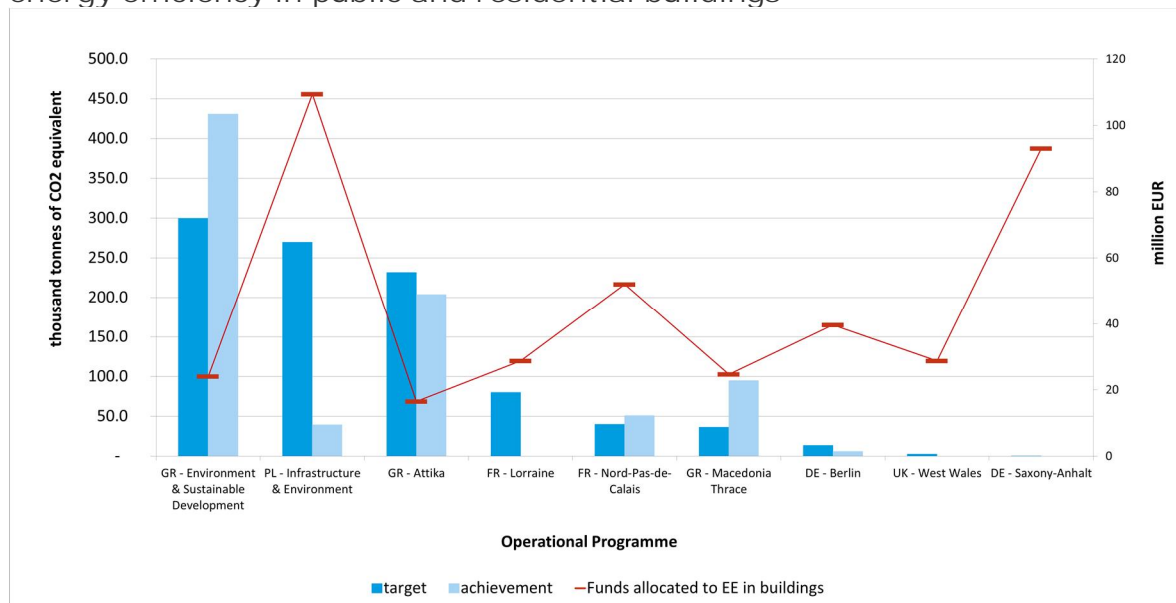
<sup>70</sup> The allocation data for each OP contained in the WP13 "geography of expenditure" dataset differ from the allocation data in the Commission's SFC system used throughout this evaluation.

<sup>71</sup> Due to the limitations noted in the previous footnote, only the share of the 2013 allocations to the priority theme "energy efficiency, co-generation and energy management" that was reportedly spent by 2013 was used from the WP13 "geography of expenditure" dataset. This information was combined with the estimated allocation to energy efficiency in public and residential buildings.

before project completion. Evaluating and comparing the cost-effectiveness of the interventions would therefore require a detailed and standardised data collection and reporting framework, which was not available. Finally, even if such a framework existed, the usefulness of the comparisons would be limited by the fact that not all interventions pursue the objective of reducing energy consumption. Some programmes invested in expensive demonstration projects, in which the absolute reduction of energy consumption was of secondary importance as such. For instance, the German Lower Saxony OP supported four deep renovations of public buildings and comparing the cost-effectiveness of such pilot demonstration project with programmes that invested into a large number of small but effective measures does not do justice to the former. As a result, comparing the cost-effectiveness of ERDF/CF investments in energy efficiency based on monitoring data is not appropriate.

Targets and achievements for the result indicator “reduction of greenhouse gas emissions” varied significantly across Operational Programmes. The spread is as large as for the result indicator “reduction of energy consumption” (or equivalent). The targets set range from a low of 0.25 kilo tonnes of CO<sub>2</sub> equivalent in the German Saxony-Anhalt OP to 2,316 kilo tonnes in the Italian Renewable Energy & Energy Saving OP. This spread is partly driven by the fact that 11 of the 20 OPs that used this indicator did not use it to capture exclusively the effects of energy efficiency investments in public and residential buildings. Yet even across those 9 OPs that exclusively captured the effects of these investments there is a significant spread from 0.25 kilo tonnes of CO<sub>2</sub> equivalent in the German Saxony-Anhalt OP to 300 kilo tonnes in the Greek Environment and Sustainable Development OP (see Figure 5 below and Figure 8.A in Annex 3 for all programmes making use of this indicator).

Figure 5: Result indicator GHG emissions reduction through investments in energy efficiency in public and residential buildings



Source: Own elaboration based on in-depth review of selected Operational Programmes

Energy reduction efforts from ERDF/CF interventions in public and residential buildings complement the energy reduction efforts of the EU28 Member States. The *planned* energy reduction of the 16 OPs that used a result indicator measuring the reduction of energy consumption from energy efficiency interventions

in public and residential buildings amounts to 2,608 GWh per annum<sup>72</sup>. This merely represents a planned reduction of 0.08% of the final energy consumption of the EU residential sector in 2013 (3.4 million GWh) and 0.1% of the final energy consumption of the residential sector in the 10 Member States covered by these 16 OPs<sup>73</sup>. It should be noted, that by far not all of the final energy consumption of (residential) buildings can be saved through energy efficiency interventions. Further, the energetic modernisation of the existing building stock targeted by the ERDF and Cohesion Fund programmes is only one of several complementary measures leading to reductions of energy consumption. Other important measures include the use of energetically more efficient electric housing appliances and the construction of energy efficient new buildings. To put this into perspective of other energetic modernisation programmes in Europe, the German KfW programme “Energy-efficient refurbishment” is reported to have led to an energy reduction of 8,750 GWh per annum in residential buildings over the course of the 2007-2013 programming period.<sup>74</sup> <sup>75</sup> This comes to show that at the aggregate level, the energy efficiency interventions of the ERDF/CF complement the energy saving efforts of the EU Member States in buildings. The contribution of the ERDF/CF energy efficiency interventions in buildings in the 2007-2013 programming period has been significant, as other achievements than direct energy savings have been attained, which are likely to have a medium- to long-term impact on the EU’s energy saving efforts in buildings (see section 5.2.4).

#### Box 26: Contribution of CF supported projects to climate policy in Poland

Under the Polish Infrastructure and Environment programme 413 public buildings were thermo-modernised by the end of 2014. The projects resulted in reduced CO<sub>2</sub> emission and energy savings, but the result indicator target values were not achieved. Nevertheless, according to the experts, even if the target values were met, energy efficiency projects in public buildings would have only a negligible impact in terms of overall energy savings and CO<sub>2</sub> emissions. This contrasts with the ambitions of the Managing Authority to create results in terms of energy saved and greenhouse gas emissions which would help fulfil the requirements stemming from EU and international laws with the energy efficiency interventions in public buildings supported by the CF.

The scope for comparison of the results presented in Figure 4 and Figure 5 above is limited due to diverging measurement practices. First, there are differences across programmes on whether they refer to primary or final energy consumption. Primary energy consumption is usually larger than final energy consumption due to the fact that it also takes into account conversion and distribution losses along the energy supply chain. Most programmes do not specify whether the indicator they used captured primary or final energy consumption. Further, the way a project’s contribution to a target is calculated also differs across countries. For example, in Greece the energy reduction by a project was measured directly after project completion making use of theoretical values of energy reduction that are associated with a typical intervention. In Poland on the other hand, energy reduction

<sup>72</sup> Altogether these OPs constitute 44% of the total ERDF/CF allocation to the priority theme “energy efficiency, co-generation and energy management” and 50% of the estimated total ERDF/CF allocations to energy efficiency in public and residential buildings.

<sup>73</sup> Eurostat: Final energy consumption by sector.

<http://ec.europa.eu/eurostat/tgm/refreshTableAction.do?tab=table&plugin=1&pcode=tsdpc320&language=en>

<sup>74</sup> Strunz, M. (2013). „KfW programmes on energy-efficient housing substantially contribute to the German energy turnaround”, *KfW Economic Research No 14*.

[https://www.kfw.de/Download-Center/Konzernthemen/Research/PDF-Dokumente-Fokus-Volkswirtschaft/Fokus\\_Nr\\_\\_14\\_January\\_2013.pdf](https://www.kfw.de/Download-Center/Konzernthemen/Research/PDF-Dokumente-Fokus-Volkswirtschaft/Fokus_Nr__14_January_2013.pdf)

<sup>75</sup> In 2013 the KfW disbursed a total of EUR 3.944 billion in loans and EUR 159 million in grants for these energy-efficiency refurbishments. Bank for Reconstruction (KfW) (2014) KfW Förderreport 2013

was measured directly at the building one year following the completed intervention. The latter option provides a more exact figure, but reporting will lag behind by one year in comparison to the Greek case. This means that measurements will only be available by the end of 2015. Additionally, measuring achievements one year after an intervention means that possible rebound effects that arise because a specific level of comfort has now become cheaper<sup>76</sup> will also be captured by these measurements. This is not the case where theoretical values are used as in Greece. Finally, there are many possible approaches to measuring the reduction of energy consumption. Their results will depend on contextual factors such as climate, or on the measuring conventions used. The larger the difference between average indoor and average outdoor temperature, the larger the energy savings measured from one and the same intervention will be. Difficulties comparing energy savings across Operational Programmes is not a problem faced only by the ERDF/CF, as evidenced by several efforts to harmonise energy savings calculations at the European level.<sup>77</sup>

### 5.2.3 Impacts

Impact indicators that capture the effects of interventions at the level of the whole economy were used only by a minority of programmes. From the sample of 41 selected OPs, 5 programmes used an impact indicator relevant to energy efficiency in buildings, out of which 3 OPs reported on progress made by the end of 2013. All 3 OPs achieved or exceeded their target. From the information available in the programme documentation it was not possible to assess to what extent these achievements can be attributed to the energy efficiency investments in public and/or residential buildings. The impact indicators that were used by the selected OPs were:

- *Level of greenhouse gas emissions in the programming area*, used by the Greek Competitiveness & Entrepreneurship programme. It measures by how much general greenhouse gas emissions have gone down in the country, respective of the 2007 base year;
- *Level of final energy consumption in the programming area*, used by the Italian Calabria OP;
- *Level of final energy consumption in the residential sector of the programming area*, used by the French Picardie OP only;
- *Energy intensity of GDP in kgoe per 1,000 EUR in GDP*, used by the Hungarian Environment & Energy OP<sup>78</sup> and the Lithuanian Promotion of Cohesion OP.

### 5.2.4 Other Achievements

Some energy efficiency achievements that could be captured through indicators were not reported to the European Commission. In addition to the achievements addressed by the indicators reported to the European Commission, some achievements relating to energy efficiency investments in public and residential buildings could be identified in the Annual Implementation Reports or interviews with the Managing Authorities and Implementing Bodies. An example of these kind of achievements are the improvements in air quality noted for the Czech Republic: Environment programme, where the Managing Authority estimated the value of the indicators "Reduction of emissions of solid polluting compounds" at 1,064 tons per year and "Reduction of NOx emissions" at 639 tons per year. These indicators were not reported to the European Commission.

<sup>76</sup> The rebound effect arises because less energy and thus energy cost is needed for a specific level of comfort and it therefore has become cheaper to increase the level of comfort. In the case of heating for example the cost of increasing room temperature by one degree Celsius has decreased, inciting building users to increase room temperature above the level prior to the energy efficiency intervention.

<sup>77</sup> Cf. the EMEEES project <http://www.evaluate-energy-savings.eu/>

<sup>78</sup> The Hungarian programme did not define any targets for this indicator and did not measure on progress made



Non-tangible, yet important achievements that relate to awareness raising and capacity building in the area of energy efficiency in buildings are not captured by the monitoring system either. Achievements related directly or indirectly to awareness raising and capacity building in the area of energy efficiency in buildings are difficult to capture through the use of indicators. However, given the fact that energy efficiency in public and residential buildings has been a relatively new area of intervention in the 2007-2013 programming period, these achievements constitute a significant contribution from the interventions. Four types of achievements have been identified:

- Policy learning and capacity building by programming authorities, including among others a better understanding of the benefits resulting from energy efficiency interventions, of how best to support energy efficiency interventions (including the choice of financing mechanism, project selection criteria and accompanying measures) and of how achievements can be measured.
- Better understanding of the benefits from energy efficiency interventions by target beneficiaries. The increased information available from peers, the media and from model projects demonstrating the potential benefits from energy efficiency interventions is likely to increase the demand for them in the new programming period. The increased awareness of the existence of direct benefits for project beneficiaries is also likely to increase their acceptance of loans and other financial engineering instruments as forms of support.
- Creation of a project pipeline for the new programming period. In several of the programming areas there have been target beneficiaries who did not receive funding support due to limited availability of funds or administrative hurdles that have since been overcome. These beneficiaries are likely to apply for funds in the new programming period, leading to a faster roll out of funds than in the previous programming period.
- Development of an energy services market in the programming areas. At the beginning of the programming period the energy services market in the vast majority of programming areas was not well developed, if it existed at all. Support for energy efficiency interventions is likely to have spurred the development of these markets in at least some of the programming areas. Side benefits of this energy services market development could include efficiency gains, cost reductions, innovative services and higher service quality. According to a representative of the Greek Ministry of Reconstruction of Production, Environment and Energy, energy auditing barely existed at the beginning of the programming period. In the years since it has developed into an established profession.
- Improved living conditions for low-income households. The thermo-modernisation of residential buildings improves the thermal comfort of those residents that did not have the financial means to heat their dwellings up to comfortable temperatures. The need to combat this fuel poverty through thermo-energetic modernisation of residential buildings had been identified by the UK OPs, as well as the Romanian Regional OP and the Polish Pomorskie OP. However, none of these Operational Programmes made use of an indicator able to capture these effects of improvement in living conditions.

### 5.3 Explanations to findings on achievements

#### *Setting of relevant indicators for energy efficiency in buildings*

Where energy efficiency investments were not a priority in the OP no relevant indicator able to capture the achievements of energy efficiency interventions was set. The only two programmes who did not set any relevant indicators able to capture, among other things, the effects of energy efficiency interventions were the Lithuanian Economic Growth OP and the Interreg North Sea Region OP. This can partly be explained by the fact that both of these OPs only allocated modest amounts to energy efficiency in buildings (EUR 18.3 million and EUR 5.9 million respectively).

#### *Setting of specific indicators for energy efficiency in buildings*

Limited experience with investments in the area of energy efficiency and the absence of a core indicator lead to the low number of specific indicators used. While nearly all 41 programmes made use of an indicator linked to energy efficiency in buildings, 16 programmes lacked an indicator exclusively capturing effects of energy efficiency interventions in public and residential building. For one, Managing Authorities lacked the necessary knowledge and experience about this new type of intervention and therefore found it difficult to set adequate targets, let alone adequately capture progress made. In addition, the absence of a core indicator<sup>79</sup> directly related to energy efficiency in public and residential buildings meant that Managing Authorities without the necessary knowledge of energy efficiency interventions did not have a pre-defined indicator that they could fall back to. A core indicator would have furthermore underlined the importance of energy efficiency to delivery of the EU2020 goals.

Managing Authorities saw advantages in not setting strict targets. It allows for some flexibility to react to changing circumstances by not committing to a specific type of intervention. The broad scope of the output indicator used in the Germany, Saxony programme (see Section 5.2.1) suggests that this reasoning might have played a role. Not having indicators and targets to be allows for flexibility in increasing support to the field of expenditure when resources become available elsewhere and support can be easily allocated elsewhere than in energy efficiency as there are no targets to be achieved.

#### *Setting targets*

The novelty of energy efficiency as a field of investment for ERDF/CF was underlined by the variation in targets set.<sup>80</sup> There is a high potential for learning and exchanging experiences in setting realistic targets. This is evident from the spread of targets set for the subset of programmes making use of a specific result indicator and the lack of a relation to funds allocated to this type of intervention (see Figure 4 and Figure 5).

#### *Achieving targets*

There are a number of reasons why Operational Programmes did not manage to show in their Annual Implementation Reports that targets were achieved or at least nearly achieved. These include a slow roll-out of funds, a failure to revise targets in the light of changes to the OPs, a time lag in the reporting of achievements only after project completion, and difficulties in measuring actual achievements from projects.

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<sup>79</sup> A core indicator is an indicator defined by the Commission on which OPs are encouraged to report.

<sup>80</sup> Energy efficiency investments in buildings were already supported in the previous programming period, however the funds allocated to it only made up about a tenth of the actual amount.

In relation to energy savings time lags in reporting were common. Managing Authorities pointed out that, particularly where funding mechanisms have only recently achieved high levels of allocations, there is a delay in projects being completed, and therefore in reporting their results. As noted above, accurate analysis of energy savings usually requires an assessment of actual energy use in practice which can only be done after a certain time delay.

Managing Authorities were eager to receive clearer definitions and guidelines for how to set up relevant targets and how to measure project's energy efficiency achievements in the new programming period. This became evident during the discussions at the stakeholder seminar.

Finally not all targets were achieved as roll-out of funds was slow. This in turn was due to several causes. For one, while a significant number of programmes experienced higher demand for funds than anticipated and/or funds available, some programmes experienced quite the opposite. Yet even a high demand and availability of sufficient funds to meet demand did not necessarily lead to a fast roll-out of funds.

## 6. Strategies for ERDF/CF investments in energy efficiency in buildings

### 6.1 General lack of good strategies

The analysis identified a gap between the defined strategy for investments and the objectives to be obtained. Chapter 3 above identified a general weakness among Operational Programmes in setting a clear rationale for investment, and using that rationale to develop interventions targeted at overcoming specific market failures. In particular, there was little attempt to draw links between the scale of ambition necessary to deliver EU climate and energy targets and the investment proposed under the OPs (see boxes 27 and 28). Where OPs set objectives for their investments in energy efficiency in buildings these were not sufficiently linked to overall goals. Other funding mechanisms available at national level were not always taken into consideration to ensure complementarity.

Box 27: Lack of strategic planning in the Polish Infrastructure and Environment OP

In the eyes of the Managing Authority and beneficiaries, strategic planning was lacking in the 2007-2013 programming period. No coherent action plan was developed across the country, as the communes, poviats and regions usually included energy efficiency interventions in their strategic documents related to different topics without coordination between each other. Energy efficiency investment plans were addressed in the regional strategies in a haphazard way and they were usually too general to provide concrete guidance and an investment plan. This weakness was addressed by the Managing Authority in the course of programming period. The support was shifted from physical intervention to strategic planning and investment documentation. This adjustment is expected to pave the way for effective energy efficiency investment developed under 2014-2020 programming period.

Box 28: Lack of strategic orientation in the Hungarian Environment and Energy OP

When the OP was written, no strategies existed in Hungary on energy efficiency in general or on energy efficiency in buildings. Such strategies gradually developed in the forthcoming years. Even though the experts interviewed agreed that there were no inconsistencies between the objectives of the OP and the later established energy and climate policies, the lack of a national strategy on energy efficiency in buildings had left the OP without a strategic orientation. To some extent this may explain the initial failure to focus on the potential savings from the residential sector.

Hungary's National Building Energy Efficiency Strategy was only published in 2015. As part of the strategy an extensive survey on the Hungarian building stock's energy performance was carried out. One of the key conclusions with regards to public buildings was that the highest energy consumption is in public health institutions. As no such assessments were made during the 2007-2013 period the OP has not established any priorities with regards to specific building types. A clearer focus could have ensured much higher energy savings.

Instruments such as energy audits or Energy Performance Certificates were used by some programmes as an element of the design of interventions, but often in an arbitrary manner. This highlights the general absence of clear strategies linking the rationale for intervention and the detailed design of interventions. It is partly due to the fact that energy audits and Energy Performance Certificates were not

commonly used in most of the reviewed OPs at the time programming decisions were made for the 2007-2013 period. Overall, Managing Authorities failed to make effective use of these instruments in improving the targeting of funds (for example, by identifying the buildings most in need of energy efficiency investment), and gaining a good understanding of the extent of energy savings achieved. Moreover, as the Greek Competitiveness and Entrepreneurship OP demonstrates, cohesion policy funds directed to energy efficiency in public and residential buildings in 2007-2013 could be used to incentivise a higher level of understanding and practical use of these instruments in the construction sector, thereby generating valuable policy synergies, and helping to improve the self-sustaining potential of the energy efficiency sector. These weaknesses contrast with the Member States' requirements related to energy efficiency in buildings stemming from EU legislation, particularly the Directive on Energy Performance of Buildings and the Energy Efficiency Directive.

## 6.2 Explicit rationales

Most Operational Programmes lacked a clear link between the investments made and the targets set to comply with energy efficiency policy. In some cases, a clearer effort was made to articulate this link. For instance, several German programmes based their energy efficiency interventions on the exemplary role of public buildings. French and UK programmes (Nord-Pas-de-Calais; London) addressed the issue of creating a self-sustaining energy efficiency sector. The Greek Competitiveness and Entrepreneurship OP identified the need for improved public understanding of the benefits of energy efficiency. It included a number of elements specifically focused at the public understanding challenge. However, with the exception of this Greek programme it is not always clear whether or how that link was then used to design interventions in detail. For all selected programmes there were no systematic attempts to monitor these impacts.

### Box 29: Struggles to create a lasting impact in the UK London OP

The choice of maximising the potential impact of funding by creating a loan fund has a clear strategic logic. However, the relatively limited scale of investment possible, given the size of the programme, and the difficulty in directing investment (given the competing sources of public funding), appears to have made it difficult to create a focused impact on delivery of underlying objectives such as the creation of a thriving energy efficiency services sector.

Where programmes focused on specific behavioural issues, and overcoming cultural barriers to energy efficiency, they seem to have had a more developed understanding of how they might maximise the impact of their investment. However, even in these cases, there has been little systematic monitoring of the impact of these accompanying measures.

### Box 30: Accompanying measures in Lithuania and Greece

The case study on the Lithuanian OP, although facing initial difficulties in securing take-up, demonstrated a clear focus on the incentives generated for potential beneficiaries, and the need both to persuade residents of apartment blocks of the importance of energy efficiency (through information campaigns); and to facilitate their participation (for example, through the new modernisation model's approach of removing the burden of management and credit agreements from them).

Within the Greek Competitiveness and Entrepreneurship OP, support was provided for actions towards awareness for the promotion of energy efficiency and the rationale of use of energy and renewable energy sources. This specific action was directed to the

general public and targeted groups such as local administration staff, engineers and investors, aiming through the resulting energy efficiency awareness in economic, environmental and social benefits along with an increase of related technologies in the residential, tertiary, industrial and transport sectors. In parallel with the other awareness actions included within the programme's core mechanisms on energy efficiency, this approach appears to have contributed in raising the energy efficiency awareness of the population, as evidenced by the around 32,600 currently pending applications for the already over-subscribed Energy Savings in Households mechanism despite its slow take-off, as well as by the 191 out of total of 220 eligible municipalities applying for the Energy Savings in Local Government mechanism.

As with the Lithuania new modernisation model, efforts were made in the Greek programme to ensure that the administrative burden of participation was minimised for home-owners, through the use of banks as intermediaries. The provision of information and training targeted at local administration staff; and the impact of the programme on improved sectorial understanding of energy audits and energy performance certificates, also appear to be useful examples of the potential for maximising the impact of investments.

#### Box 31: Assistance to project development in UK, London OP

The approach to project selection adopted by the London programme, and the practice of the fund managers giving practical advice to potential projects as they are developed, means that the individual projects have a robust strategy, based on achieving cost-effective savings in energy efficiency. However, this approach seems to have developed largely as a response to the difficulty in securing take-up of the available loan financing; and it appears unlikely that a similar approach would work at the larger scale of investment targeted by programmes with a larger volume of investment projects; other mechanisms, for example the sort of investment in the early stages of project development seen in the latter stages of the Polish Environment and Infrastructure OP, could be of value.

### 6.3 The existence of temporary or implicit rationales

In the context of the financial crisis and its impact on the construction sector, a tactical consideration of maintaining activity in the construction sector may have been relevant, and may to some extent have over-ridden strategic considerations. The particular context of the economic crisis may have justified the approach at the time. It was clearly important to the European Council, for example, to ensure a maximum impact on short-term economic activity from public expenditure under cohesion policy. However, this justification is very time-specific, and unlikely to be relevant except in cases where there is significant under-utilisation of capacity in the construction industry. Evidence from the case studies of an increase in costs of construction sector inputs to energy efficiency projects suggests that this is no longer the case. As with the absorption issue noted above, there is a clear risk that a short-term focus on maintaining economic activity in particular sectors becomes ingrained into stakeholders' assumptions about future funding and that the importance of delivering specific public policy outcomes is lost in the background.

There is evidence that in some OPs energy efficiency was used as a means of absorbing under-used funds from elsewhere in programmes. It emerged from discussion with Managing Authorities as part of the initial review of programmes, under several of the more detailed case studies, and from the workshop with

Managing Authorities, that energy efficiency was in some cases treated as a residual measure. While a more programmatic approach was taken to the delivery of more specific objectives in other fields (for example, waste management, or waste water treatment in the Polish Infrastructure and Environment OP), investments in energy efficiency were considered less a priority. Energy efficiency appears to have been treated more as a worthy outcome, but with no particular focus on the delivery of specific targets. A capacity to absorb available funds can be regarded as valuable flexibility, provided that the outputs and impacts of that expenditure are making a clear contribution to the delivery of policy objectives. However, there is a risk that using energy efficiency in this way leads to it being treated primarily as a means of ensuring that available funding is disbursed, rather than of ensuring that a useful contribution is made to specific policy objectives.

The strategic underpinning of decisions on whether to invest in residential or public buildings is also given limited exposure in programmes. Chapter 3 makes this very clear. While it is in principle surprising, given the needs identified in the residential sector, that no funds were made available for them in the Polish or Hungarian programmes analysed in case studies, this is partly explained by the existence of separately-financed programmes for the residential sector at national level, and the difficulty of constructing OP investments alongside these instruments. However, this leads again to the question of whether there was a clear understanding of the scale of the improvements necessary across the economy, and the scale of funds made available by programmes.

In the case of investment in public buildings, there is a clear risk that unstated tactical considerations are at play. In particular, the impact of energy efficiency investments on future expenditure from the public organisations involved may lead to allocation decisions which are not optimal in wider societal cost-benefit terms. At a time of increasing constraints on public expenditure, it would in some sense have been surprising if the impact on public sector budgets were not at least a factor in the background of programming decisions. There appears to have been no attempt by programming authorities to guard against the perception of overly favourable access to EU funds for public authorities. It has to be noted however, that where programmes outline specific rationales for the choice of public buildings as a target (for example, the Germany Berlin programme's focus on the exemplar role), the potential decision-making bias may be less present.

## 7. Policy implications

### 7.1 Rationales

#### *Operational Programmes should develop a robust rationale for their interventions in energy efficiency in buildings*

Chapter 3 above identifies a general weakness in terms of the rationale for and the strategy underpinning the contributions of OPs on energy efficiency in public and residential buildings. Programmes with a robust and clearly expressed rationale, which is then translated into a clear strategy for how ERDF/CF interventions will tackle the challenge of energy efficiency, seem to have a better chance of success and to be able to adjust interventions effectively in the light of experience. A careful focus by programming authorities on assessing the nature of energy efficiency challenges in the context of broader interventions at EU, national and regional level is recommended. It is important to identify the specific contribution that ERDF/CF support can make to overcoming particular market failures or weaknesses in the broader policy framework, or to facilitate the development of a self-sustaining energy efficiency sector. Interventions should be designed clearly showing how the targeted contributions are to be achieved cost-effectively, with a clear understanding of the incentives created. This could be improved through an increased focus on coordination with National Energy Efficiency Action Plans, which should be reflected in the Partnership Agreements in which the Member States outline how the European Structural and Investment Funds (ESI funds), including ERDF/CF, will be spent at national level.

#### *Understanding the wider context of energy efficiency policy is key to ensure that interventions contribute to the targeted objectives*

The success of support schemes established under cohesion policy are dependent on the wider context in which they are implemented. Policy signals are of key importance to energy efficiency investment. Interventions undertaken in the new programming period 2014-2020 will, for example, have an influence on the energy performance of buildings in 2050, and could help to reduce the costs of future retrofits. ERDF/CF contributions to energy efficiency in this area should be seen as an element in implementation of the Energy Performance of Buildings Directive and the Energy Efficiency Directive. Cohesion policy however cannot be relied on to overcome wider policy failures at Member State or EU level. Where the consideration of market failures recommended above identifies weaknesses in the broader policy framework, consideration should first be given to addressing those weaknesses at their source, rather than using ERDF/CF investments to work round them.

#### *Synergies with national (and private?) funding need to be ensured*

In the 2007-2013 programming period the synergies between the cohesion policy funds, other EU and international funding programmes or technical assistance support mechanisms (e.g. ELENA) and national public funding (e.g. Green Investment Schemes) for energy efficiency in public and residential buildings were generally not exploited, and in some the schemes overlapped and competed. It would be beneficial to use the complementarity of different available funding sources to leverage energy efficiency investment for a range of beneficiaries and types of interventions. This could be achieved through a coordinated set up of schemes that would eventually demarcate or target different categories and subcategories of beneficiaries and investment types. The complexity of the national funding picture from the point of view of potential beneficiaries was, in some programmes, a constraint on applicants coming forward with projects for ERDF/CF support. There is clearly a risk that applicants choose to delay investments while they decide which of the schemes is the most advantageous



available to them. Consideration should be given to ensuring, through well-publicised information portals or other mechanisms (although not necessarily through the use of ERDF/CF funds), greater awareness of the map of coordinated schemes available. The set of principles set in the new Cohesion Policy package offers a promising framework in this respect; it stipulates that EU funds should support policy implementation, but that the majority of climate related investment should be private sector funded, and/or through energy providers; that Member States and regions should ensure that public funding complements and leverages private investments and does not crowd them out; and that market mechanisms such as energy efficiency obligations schemes or ESCOs, etc. should be considered before public funding as an option to create value for energy savings. Moreover the Common Strategic Framework (Annex I to the CPR<sup>81</sup>) sets out the obligation for Member States and, where appropriate, regions to "ensure that the interventions supported through the ESI Funds are complementary and are implemented in a coordinated manner with a view to creating synergies".

#### *The scale of interventions needs to match their intended role in meeting policy targets*

The future context for energy efficiency investment will be framed by the Energy Union Package including the targets and revised legal acts due to be proposed by the Commission. The European Council set in October 2014 an indicative target at the EU level of at least 27% for improving energy efficiency in 2030. This will be reviewed by 2020, having in mind an EU level of 30%. The Energy Efficiency Directive and the Directive on Energy Performance of Buildings will be revised in 2016 and will include the Smart Finance for Smart Buildings initiative, while this year the Commission is expected to strengthen the targeted use of financial engineering instruments to support investments in energy efficiency, and prepare an 'EU strategy for Heating and Cooling'. These developments are welcome, provided they generate a dynamic which leads to the adoption of instruments, including through ERDF/CF, which are of the scale required to meet at least the targets set and create a sustainable dynamic beyond their time frames. As noted earlier in this report, it is not possible to calculate a single figure for the energy efficiency achievements of 2007-2013 programmes due to the disparate and non-comparable monitoring data provided by programmes. However, it is clear that EU funding alone will not be able to tackle the needs in the sector. .

#### *Good communication between agencies should be ensured*

The most successful schemes could be found in the Member States where communication between different public governance levels was relatively well developed. In future Managing Authorities could reinforce their cooperation with national and, if possible, local energy agencies. They should involve institutions and organisations with a good understanding of incentives and likely responses of the owners of public and residential buildings in the design and, where appropriate, implementation of programmes.

#### *Competencies of programme authorities and project promoters should be supported and reinforced*

The employees of institutions managing and implementing operational programmes did not always have the knowledge and expertise to ensure good design and effective

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<sup>81</sup> Regulation (EU) No 1303/2013 of the European Parliament and of the Council of 17 December 2013 laying down common provisions on the European Regional Development Fund, the European Social Fund, the Cohesion Fund, the European Agricultural Fund for Rural Development and the European Maritime and Fisheries Fund and laying down general provisions on the European Regional Development Fund, the European Social Fund, the Cohesion Fund and the European Maritime and Fisheries Fund and repealing Council Regulation (EC) No 1083/2006, OJ L 347, 20.12.2013

implementation of energy efficiency schemes of support. Also, the administrative capacity and technical expertise for implementing financial engineering instruments varies considerably across the EU. In future, to streamline energy efficiency investment in priority areas, it is essential that relevant staff have the right skills and understanding of the practical and contextual aspects of energy efficiency investment in buildings. In some cases, involvement of external experts to support the Managing Authorities could be envisaged. This area for improvement has been already tackled to some extent by the Common Provisions Regulation framing the programming period 2014-2020. Member States will be allowed to use ERDF/CF to improve their institutional capabilities and to help develop and implement the operational programmes. Article 59 of the Common Provisions Regulation allows support for actions that cover 'preparation, management, monitoring, evaluation, information and communication, networking, complaint resolution, and control and audit'.

## 7.2 Programme design: identifying the right interventions

### *The choice of financing mechanisms should be based on a clear rationale*

The analysis of Operational Programmes suggests that, in addition to the lack of a clear rationale identified above, there was often little explicit consideration of the most appropriate form of instrument, or, within instruments, the most appropriate gearing of support. This in turn leads in some cases to a lack of cost-efficiency in the delivery of public benefits from support to energy efficiency investments. Extremely generous grants (providing up to 100% support) were used in some cases, rather than potentially more efficient loans, grant-loan combinations, energy audits or awareness raising schemes or other approaches. Therefore Operational Programmes should develop a robust and clear rationale for choosing the preferred type of instrument and for the method of implementation.

### *The use of grants for public buildings should be considered primarily for supporting deep renovation or interventions with long-term payback*

While non-refundable grant based schemes are generally considered as less appropriate to steer sustainable, bankable energy efficiency investment in public buildings than loans and other financial engineering instruments, there is at least one reason why the continued use of support involving grants may be justified in order to achieve the EU long term goals in energy efficiency. To reach this aim the building stock would need to comply with nearly-zero energy standards implying deep energy improvements. Deep energy renovations imply higher costs than a traditional, usually partial, energy upgrade of buildings. They may also be less certain to deliver the projected energy savings (in the case of innovative technologies) and may for these reasons not be attractive for beneficiaries if financed on a loan basis. However, without a sufficient focus of energy efficiency instruments on the need for radical improvements in energy use over the medium term, there are risks that investments will be insufficiently ambitious, leading to a lock-in effect, where recently-renovated buildings are nevertheless still not sufficiently efficient to meet policy objectives over the coming decades. The future design of public support could therefore take this into account. Some level of high-profile investment in relatively new deep renovation techniques could help to stimulate a more self-sustaining market for them in future. This could also improve the skills level of the construction industry in energy efficiency investments and could mitigate the risk of locked-in investment in relatively low ambition energy efficiency improvement. The intensity and form of support could vary according to the ambition of energy upgrade with higher subsidies available when more energy reduction is possible (e.g. differentiation between deep, medium, and shallow improvements), with linked use of financial engineering instruments such as loans, where appropriate. The framework for deep renovations is set by the Directive on Energy Performance of Buildings and is intrinsically linked with long-term planning

and ensuring that unambitious investments do not lock in an insufficiently energy efficient building stock to meet future EU climate and energy targets.

*Generous grants for public buildings should be handled with care*

There is, as noted above, a need for a more explicitly targeted approach to the design of interventions. In particular, the form or support (or financing mechanism) should be chosen with care. For residential buildings, a higher ratio of grant funding (as compared to loans) may be more appropriate for fuel poor home-owners. For public buildings, however, the risks involved in channelling generous levels of support to public authorities are significant: it may represent a dilution of the primary intended impacts of ERDF/CF support in order to maximise beneficial impacts on current and future public expenditure. It may also weaken the exemplar role of such investments, by removing the need to demonstrate that energy efficiency investments are self-financing over the medium term and it may make public authorities reluctant to make energy efficiency investments from their own resources while they await the next opportunity to apply for generous ERDF/CF instruments. There may be particular institutional constraints present in some Member States which make it difficult to use loans (for example, constraints were identified on the ability of municipalities in Poland to enter into multi-annual loan commitments). However, as noted above, such weaknesses in the policy framework should ideally be addressed at their source, rather than through reliance on ERDF/CF funding, in this case for example, by finding a mechanism to enable loan commitments on an “invest to save” basis. Vehicles such as energy service companies (ESCO), or other approaches which rely on private sector funding to deliver energy savings, could also be considered. In the 2014-2020 programming period, Managing Authorities are allowed to provide support through a combination of financial engineering instruments with grants, and to structure such instruments using Energy Performance Contracting (EPC). Under more market oriented approaches of this kind, the role of non-repayable grants would be significantly reduced; and (as with all instrument choices) be based on market failures and investment needs identified in the ex-ante assessment.

*Managing Authorities should be encouraged to reflect cultural specificities and behavioural incentives when designing interventions, and should have the scope to do so*

All selected OPs were forced, to a greater or lesser extent, to cope with the disruption generated by the economic crisis. However, similar macroeconomic circumstances provided opposite impulses to the Member States: while in Lithuania the economic downturn accelerated the use of loans under JESSICA mechanism, in Poland it was used as an argument against the deployment of JESSICA and in Greece it has led to an increase in the co-finance rate of grants. To some extent, these approaches reflect different cultural responses in the Member States concerned which should be taken into consideration when comparing these cases. However, the focus in the Lithuanian programme on carefully considering the incentives being created by interventions, and adjusting interventions in order to maximise the impact of ERDF/CF support on the delivery of its objectives, is one from which other programmes can usefully learn.

*Behavioural responses need to be understood and should be taken into consideration when designing new funding approaches*

Moving from grant based schemes to financial engineering instruments required a paradigm shift in some Member States (e.g. Lithuania), involving a change in behavioural patterns. There was a need to tackle loan-aversion of potential beneficiaries that was rooted in historically justified mistrust in banking institutions or knowledge gaps. This applies to potential beneficiaries of both: public and residential buildings. Effectively bringing about these changes to behavioural patterns will be one of the challenges Managing Authorities will have to address in the new programming

period. Possible mechanisms to overcome these could be based on information and awareness raising campaigns, as well as on a careful consideration of the incentives created by instruments, and the risks of perverse incentives (see below). Behavioural strategies could be complemented with new technologies allowing for better energy management in buildings, such as smart meters, under the 'Supporting energy efficiency, smart energy management and renewable energy use in public infrastructures, including in public buildings, and in the housing sector' priority theme of the ERDF/CF thematic objectives dedicated to 'Supporting the shift towards a low-carbon economy in all Sectors'.

*The incentives created should be considered carefully in order to limit the risks of creating perverse incentives*

As noted above, the impacts of ERDF/CF interventions on the incentives faced by owners of public and residential buildings need to be carefully considered by Managing Authorities, taking into account the broader market, regulatory, and public expenditure context in the Member State or region concerned. It is particularly important to be aware of the potential creation of perverse incentives as a result of the design of interventions. For example, there is a risk that the prospect of more generous incentives being introduced in future could increase the likelihood of energy efficiency investments being stalled in the short term (public authorities or home owners may decide that they will not make financially beneficial investments now, because of the hope that they will secure generous grant funding from programmes in future). As noted above, both National Energy Efficiency Action Plans and Partnership Agreements, as well as operational programmes themselves, can contribute to improving predictability in this respect in the programming period 2014-2020.

*The development of "off-the-shelf" financing templates should be continued*

Future policy developments driven by the Commission will aim at encouraging the Member States to prioritize energy efficiency in their policies, especially in terms of energy efficiency of building sectors that offers huge potential for improvement. As announced in the Energy Union communication<sup>82</sup>: "the Commission will support ways to simplify access to existing financing and offer "off-the-shelf" financing templates for financial engineering instruments to the European Structural and Investment Funds managing authorities and interested stakeholders, promote new financing schemes based on risk and revenue sharing, develop new financing techniques and support in terms of technical assistance. Financial support needs to be combined with technical support to help aggregate small-scale projects into larger programmes which can drive down transaction costs and attract the private sector at scale". The Common Provisions Regulation providing common rules applicable among other to ERDF/CF in the programming period 2013-2020 introduced a basis for "off-the-shelf" instrument specifically targeting energy efficiency in building sector known as the Renovation Loan. These instruments should be ready-to-use for a swift roll-out; their terms and conditions are pre-defined by the Commission. The conclusions of the evaluation confirm that the Commission's plans go in the right direction, while the bulk of work will need to be done at national, regional and local levels.

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<sup>82</sup> EC (2015), A Framework Strategy for a Resilient Energy Union with a Forward-Looking Climate Change Policy, COM(2015)80 final

### 7.3 Implementation: maximising the effectiveness of interventions

#### *Adequate project selection criteria should be set*

Project selection criteria should be appropriate to the objectives of interventions; should be transparent and well-understood by potential applicants; and should be constructed so as to avoid risks of perverse incentives. The effects of inadequate project selection criteria could be observed for example under the Poland: Infrastructure and Environment programme which included a minimum grant level which led to portfolio applications from groups of municipalities with little coherent collective logic, leading in practice to significant management and information exchange difficulties. In future, project evaluation could involve, among others, specific criteria related to energy financing. The amount of energy saved compared with a baseline scenario should be accounted for, and the criteria should be designed to foster deep renovation projects in line with the Directive on Energy Performance of Buildings.

#### *Facilitation measures to homeowners should be put in place*

For investments in the residential sector, a number of programmes initially struggled to find ways to make energy efficiency investments sufficiently attractive to homeowners. The reasons varied depending on the nature of the housing stock, and the culture of housing finance. For example, in Estonia the challenge combined the problem of securing agreement in multi-owner apartment blocks, and distrust of loan mechanisms. In Greece, it was initially difficult to secure sufficient enthusiasm at the levels of loans and grants provided.

However, the development of mechanisms to remove administrative burdens from households seems to have been successful – by giving municipalities in Lithuania the role of identifying apartment buildings for investment and managing the loans on behalf of residents or by using financial intermediaries in Greece, thereby taking direct responsibility for paying contractors away from homeowners. Design of successful facilitation will depend on the specific background and culture of housing in each programme area but the value of mechanisms which reduce transaction costs for households is potentially relevant to all programmes focusing on residential investment in owner-occupied housing. Moreover, the support mechanisms should address situations of energy poverty occurring, in general, when heating costs surpass 10% of the family income. Accounting for such social issues, exacerbated by the economic crisis, has been planned for the new programming period in which energy poverty can justify deployment of grants or higher grant intensities.

#### *The exemplar role of public buildings should be promoted*

As noted above, the potential role of public buildings as exemplars is an important potential justification for focusing investment on them (it is also stipulated in the Directive on Energy Performance of Buildings). Several programmes (particularly in France, the UK and Germany) identified this as part of their rationale for investment. Where investment is focused on public buildings, it is important to make use of this exemplar role. A first step is to ensure that they provide either a convincing demonstration of the financial benefits of energy efficiency investment (which is more consistent with the use of loan mechanisms) or a demonstration of the potential for deep renovation (which is more consistent with grant mechanisms, as suggested above). In either case, it is important to consider how information about the investment will be disseminated effectively, and used to promote wider understanding of the benefits and potential of energy efficiency interventions. This approach is in line with the Energy Efficiency Directive's introduction of specific renovation targets for central government buildings, with and the Directive on Energy Performance of Buildings requiring energy performance certificates to be issued for and displayed by public buildings frequently visited by the public. Apart from the promotion of energy

efficiency, the exemplar role of public buildings also involves the testing and developing of new techniques and financing models that can be then applied more widely, and potentially goes hand in hand with the integrated approach under the Common Provisions Regulations for 2014-2020. The integrated approach is expected to ensure sustainability of energy efficiency investment thanks to coherent planning of urban development, and to deliver holistic renovation in which the buildings where ERDF/CF investments are made are not always selected merely on the basis of their energy efficiency improvement potential, and energy upgrades may be carried out alongside other types of refurbishment work required in public buildings.

*Project development assistance and capacity building should be offered widely*

Energy efficiency of buildings was an unprecedented type of investment for most of the Managing Authorities. They struggled therefore to ensure sufficient knowledge and know-how to design and implement programmes efficiently. Moreover, beneficiaries generally lacked understanding and knowledge about small-scale financing options for energy efficiency investments. Some programmes provided advice and a cooperative approach to the development of projects (for example the London Energy Efficiency Fund); others (for example, the Polish Infrastructure and Environment OP) provided funding for the early stages of project development. If wider spread, project development assistance facilities and capacity building schemes provided to public and private project promoters such as public/private infrastructure operators or ESCOs, will advance innovative, bankable and sustainable energy efficiency investments under cohesion policy. Some project development assistance vehicles introduced in the 2007-2013 period will be continued over the 2014-2020 programming period. These include: the European Local Energy Assistance (ELENA) and Joint Assistance to Support Projects in European Regions (JASPERS). Moreover under the Horizon2020 programme, project development assistance can also be provided to sustainable energy project promoters. These facilities can be used as examples for Managing Authorities for setting-up similar facilities at the Member State or Regional level. Moreover, as mentioned above the Common Provisions Regulation (art. 59) allows earmarking of part of ERDF/CF funding for technical assistance, at the initiative of the Member States.

*Accompanying measures should be considered used to limit negative behavioural impacts*

The potential rebound effect, which can occur when lower energy bills lead to higher energy consumption, particularly for investment in residential buildings, justifies the introduction of accompanying measures targeted at the users of buildings. Such measures (for example, training, information campaigns, and advisory services) could allow building users to understand how to save energy, why it matters, and how it benefits them. In some cases, particularly where fuel poverty leads to health impacts, for example in elderly households, it should be recognised that some dissipation of carbon benefits in increased comfort of residents is consistent with the objectives of the support. More broadly, programmes should aim to maximise the impact of energy efficiency investments in creating a more self-sustaining dynamic for energy efficiency. This could for example be achieved through improved skills in the construction sector, encouraging the development of relevant professional services, and improved understanding of instruments such as energy audits and energy performance certificates (see below). This policy implication is already partly addressed in the framework for the 2014-2020 programming period, where part of ERDF/CF support can be used for capacity building of public authorities and stakeholders and strengthening of the local sustainable energy supply chain.

*The use of energy audits should be the norm*

Varying approaches were observed to the use of energy audits, to a large extent influenced by the extent to which they were a well-understood instrument in the Member State in question. Some programmes chose not to make use of them, some programmes made use of them as a matter of course, and others (for example, the Greek Competitiveness and Entrepreneurship OP) made the choice to require them. The latter led to an improved understanding of the instrument in the construction sector. Overall it is found that energy audits can help to ensure rigour both in the assessment of project applications, and also in the evaluation of the impacts of investment on energy use and associated CO<sub>2</sub> emissions. Their use should therefore be the norm, except where there are overriding reasons against. One example of such reasons is avoiding complexity of paperwork for small value interventions.

*Support schemes should remain flexible to allow for responsive adjustment of programmes*

As the 2007-2013 programming period shows, changes in general macroeconomic conditions affect the readiness of both public and private actors to invest. Also, not all market failures can be identified and taken into account at the stage of programming of the operations. In the case of interventions which are relatively new to a Member State or region concerned, it can be difficult to predict in advance what the likely level of response will be from building owners. Flexible design of support scheme that allows responsive adjustment of the programme by the Managing Authorities proved beneficial in some of the evaluated Member States. In general, greater experience in the use of ERDF/CF to deliver energy efficiency in these sectors should enable programming authorities to design interventions which are better calibrated to likely demand, with less under- or over-subscription of projects. However, where interventions break new ground (for example, a focus on residential housing in regions which have hitherto focused only on public buildings or a new focus on energy efficiency in regions which did not make significant investments under the priority theme “energy efficiency, co-generation and energy management” in the 2007-2013 programming period) Managing Authorities may need to foresee an element of flexibility in their approach, so as to be able to adjust interventions to initial experience. According to ERDF and CF regulations adopted in 2013 all types of buildings can be supported in the new programming period, leaving the Managing Authorities more room for manoeuvre in this respect compared to the initial phase of 2007-2013 programming period.

## 7.4 Defining and monitoring of the desired results

*Goals for the contribution from ERDF/CF to the delivery of climate and energy targets should be set explicitly taking into account the context of other financial and policy instruments*

Although much hope was placed in the contribution of ERDF and CF investments in delivering climate and energy policy objectives, they are not a silver bullet to meet the energy efficiency goals set in the EU legislation, even in those Member States which chose the highest intensity of ERDF/CF allocations. As noted above, cohesion policy investments need to be set in the context of the broader mix of policies at EU, national and regional level in delivering energy and climate targets. Goals for the contribution from ERDF/CF to the delivery of climate and energy targets should therefore be set explicitly taking into account the context of other financial and policy instruments and should clearly identify the specific contribution of Cohesion Policy. The practice observed in most Operational Programmes of setting broad targets for contributions to emission reduction or energy savings, without providing any indication of the broader context, should be avoided. Where the level of financial contribution from ERDF/CF is

limited in comparison to the demands created by national and EU policy objectives, it will be important to maximise the focus of interventions on helping to create a self-sustaining dynamic for the energy efficiency sector, through inter alia: improved public and administrative understanding, improved skills in the construction sector, the demonstration and validation of new funding models, or an exemplar role for public buildings. Targets and indicators should be set which identify and monitor the specific contribution from ERDF/CF investments.

The approach adopted under the current framework is more targeted and result-oriented than the one observed in 2007-2013; and therefore better oriented to translating of the policy objectives set out under Europe 2020 Strategy into concrete investments in Member States and regions. It has been recognised that the ERDF/CF can contribute to accelerating the implementation of EU legislation on renewable energy and energy efficiency, in particular the Directive on Energy Performance of Buildings, the Energy Efficiency Directive, the Renewable Energy Directive, and the integrated Strategic Energy Technology Plan. This will be facilitated by significantly higher ERDF/CF allocation to sustainable energy investments over 2014-2020, representing more than a doubling of the 2007-2013 amounts.

*To ensure standardised and relevant monitoring indicators should be set reflecting the relevant objectives*

The results available from monitoring systems for 2007-2013 programmes did not provide fine grained information about energy efficiency investment in public and residential buildings. They were also difficult to compare between programmes and in many cases failed to provide information that was relevant to the rationale for interventions. This could be due to a range of factors, including cultural differences that define the way in which energy efficiency in buildings can be approached in different Member States. Also, Member States and regions have different circumstances, history, and priorities to be addressed through public support. In the 2007-2013 programming period, the rationales for support to energy efficiency investment stated in the programme documentation of the Member States were often broad and generic. For example, climate change mitigation was commonly indicated in Operational Programmes as one of the drivers behind the support, while in interviews and in the workshop, some Managing Authorities suggested that reductions in GHG emissions were not a real driver behind including energy efficiency interventions in the programme. In future, Managing Authorities could be encouraged to present their specific rationale for support to energy efficiency in public and residential building (e.g. stimulation of a market for energy efficiency investment). Those specific rationales should then be used to develop programme specific indicators capable of providing information on the success with which the programme meets its objectives, which could be reported on alongside common indicators (see below).

*Reporting should be more standardised*

Alongside the potential for different rationales and targets being used to represent the specific situations addressed by Operational Programmes, there is nevertheless scope for some harmonisation of monitoring systems. To date, diverse methods were used to capture the achievements and feed into monitoring reports. This made the reported results and impacts difficult to compare. The increased standardisation of reporting brought about through the introduction of the new common indicators should help to tackle this problem. Improvement is likely to be observed if the 'Guidance Document on Monitoring and Evaluation – European Regional Development Fund and Cohesion Fund – The Programming Period 2014-2020, Concepts and Recommendations'<sup>83</sup> adopted in January 2014 is followed. The guidance defines the need for an impact and

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<sup>83</sup> Ibidem



implementation evaluations planned at the early stages of the programming period. However, more progress could be achieved through a concerted effort by energy policy experts at EU and national level to offer advice to Managing Authorities on appropriate approaches to monitoring of impacts and achievements; including, in particular, standardisation of the reporting of emissions reductions. The focus of such effort could be put, among others, on the methodological challenges relevant to energy consumption measurements (primary vs. final) and levels of avoided CO<sub>2</sub> emissions depending on energy generation mixes.

#### *Behavioural change and awareness increase should be followed*

The report and the recommendations above note the importance of behavioural issues in the success of energy efficiency investments. Behavioural issues include for example: weak understanding of the benefits of energy efficiency, reluctance to enter into loans or other long-term commitments, administrative barriers to participation by households or co-ownership structures, and inappropriate use of energy efficiency improvements once installed, in both residential and public buildings. In demonstrating awareness of the importance of such issues, and designing interventions and accompanying measures intended to overcome them, Managing Authorities should also consider the potential for monitoring the effectiveness of their interventions on public attitudes and understanding.

## 7.5 Conclusions

The overall conclusions based on the policy implications presented in detail above are as follows:

- There is a need for operational programmes to set a clear rationale for their interventions, and in doing so to take account of the wider context of energy efficiency policy, including the scale of ambitions, and the types of national and regional funding support mechanisms available.
- The choice of intervention mechanism should be carefully considered, and supported by a clear rationale. Very generous levels of grant financing for public authorities, beyond the level necessary to fund well-justified projects, should be avoided. However, grants may be particularly well-suited to deep energy efficiency interventions where beneficiaries may face uncertainty about the pace and scale of payback of the investment.
- Programme authorities should actively examine loans and other mechanisms (such as energy service contracts) as a more cost-efficient means of supporting energy efficiency. The development of “off-the-shelf” templates for such instruments can be of significant value to programme authorities.
- Careful attention should be paid to project selection criteria in order to maximise the effectiveness of funding in delivering policy objectives, and to avoid the risks of perverse incentives created by poorly designed criteria.
- Supporting measures (such as facilitation for homeowners, and capacity-building, training, and information campaigns) can play an important role, particularly where the types of intervention made available are new to the Member State or region. Specific attention should be given to project development assistance, where its availability would increase the effectiveness of EU expenditure and improve the capacity of beneficiaries, for example in structuring larger and more aggregated projects.
- The competencies of programme authorities in the area of energy efficiency investment should be reinforced; they should ensure (through recruitment, training, or the use of external expertise) that they can draw on the right level of understanding of energy efficiency investment in buildings and its context.
- The use of energy efficiency audits should be the norm for ERDF/CF investment in this area.

- Cultural specificities, potential behavioural responses, and the incentives created by intervention design are all important to the success and impact of interventions, and should be carefully considered in programme design.
- Good inter-agency communications are important, particularly between Managing Authorities and agencies responsible for energy policy, in order to ensure that the delivery of cohesion policy and energy efficiency policy objectives is mutually reinforcing. The agreed common indicators 2014-2020 for energy efficiency investments encourage more standardisation of the reporting of results and impacts. There is potential for more guidance to be offered to Managing Authorities by energy efficiency policy experts on appropriate approaches to reporting.

## 8. Annexes

Annex 1: Presentation of financial information on energy efficiency in public and residential buildings under ERDF/CF

## Annex 2: Inventory of national public financing schemes for energy efficiency in public and residential buildings

Annex 3: Overview of reviewed Operational Programmes

## Annex 4: Programme and country reports

## Annex 5: Presentation of physical information on energy efficiency investments in public and residential buildings under ERDF/CF

## Annex 6: Case study reports



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