Guidance for UK Emissions Trading Projects

Advice to Policy Makers

Phase 2 Policy Document

A report for the Department of Trade & Industry

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1. Phase 1 Main Document
2. Phase 1 Priority Sectors and Projects
3. Phase 1 Summary
4. Phase 2 Policy Document
5. Phase 2 Technical Document

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Acronyms

AIJ	Activities Implemented Jointly
BAA	British Airways Authority
BAT	Best Available Techniques
BAU	Business As Usual
BM-SR	Battle-McCarthy/Sheppard Robson
CCGT	Combined Cycle Gas Turbine
CCL	Climate change levy
CCLA	Climate change levy agreement
CERUPT	Dutch emissions reduction units procurement tender for CDM
CDM	Clean Development Mechanism (defined in Article 12 of the Kyoto Protocol)
CER	Certified Emission Reductions (generated from CDM projects)
CES	Centre for Environmental Strategy, university of Surrey
CHP	Combined Heating and Power
CIBSE	Chartered Institution of Building Services Engineers
CMM	Coal mine methane
CO_2	Carbon dioxide
COP	Conference of the Parties to the United Nations Framework Convention on Climate Change (UNFCCC)
CP	Commitment Period
DERV	Petrol and diesel
DETR	Department of Environment Transport and the Regions
DEFRA	Department of Environment, Food, and Rural affairs
DTI	Department of Trade and Industry
DfT	Department for transport
EB	Executive Board for the CDM
EBAT	Emissions based additionality test
ECA	Enhanced Capital Allowances
EEBPP	Energy Efficiency Best Practice Programme (now Action Energy)
ERUPT	Dutch ERU Procurement Tender
ERU	Emission reductions units
EUETS	EU Emissions Trading Scheme
EU	European Union
FEAP	Fuel Economy Advisors Programme
GHG	Greenhouse gas
GTPs	Green Transport Plans
HMG	Her Majesty's Government
HVAC	Heating Ventilation and air conditioning
IEA	International Environment Agency
IET	International Emissions Trading
IMC	International Mining Consultants
IPCC	Intergovernmental Panel on Climate Change
IPMVP	U.S. Department of Energy (USDOE) International Performance Measurement and Verification Protocol

IPPC	Integrated Pollution Prevention and Control
IRR	Internal Rate of Return
JI	Joint Implementation (outlined in Article 6 of the Kyoto Protocol)
JIN	Joint Implementation Network
JTW	Journey to Work
KPI	Key Performance Indicator
KP	Kyoto Protocol
LCPD	Large Combustion Plant Directory
LEC	Levy Exemption Certificates
LFG	Landfill Gas
MCA	Multiple Classification Analysis
MVP	Monitoring And Verification Protocol
MERV	Monitoring, Evaluation, Reporting, Verification
MOD	Ministry of Defence
M&V	Monitoring And Verification
NETA	New Electricity Trading Arrangements
NHS	National Health Service
OECD	Organisation for Economic Co-operation and Development
PCF	The World Bank's Prototype Carbon Fund
PROBASE	Procedures for Accounting and Baselines for JI and CDM projects (EU-Fifth Framework Program research team)
ROC	Renewable Obligations Certificates
RRR	Required Rate of Return
SPRU	Science Policy Research Unit, University of Sussex
SHS	Solar Home Systems
TRL	Transport Research Laboratories
UKCP	UK Climate Programme
UKETS	UK Emissions Trading Scheme
UN FCCC	United Nations' Framework Convention on Climate Change
WSP	WSP International Management Consulting

Executive Summary

1 Introduction

This study has been commissioned by the Department for Trade and Industry (DTI) with the aim of '*Developing Guidance for UK Emissions Trading Projects*'. There have been two phases to the study. In the first phase we reviewed the range of possible methodologies for assessing the carbon reductions arising from Greenhouse Gas (GHG) emission reduction projects and suggested some packages of measures in the Phase 1 report 'Advice to Policymakers'. In this second phase, we build upon the work in Phase 1 and aim to provide further policy guidance on carbon accounting modalities for GHG emission reductions from projects.

This Policy Document represents one part of the output from Phase 2 of the study and is supported by a Technical Document, which reports the analysis in more detail.

The study is co-ordinated by the Centre for Environmental Strategy (CES) at the University of Surrey and involves the Joint Implementation Network (JIN) in the Netherlands and the Science Policy Research Unit (SPRU) at the University of Sussex.

The UK government specified a list of policy questions to help them take decisions regarding the main design elements involved in accounting for the carbon emission reductions produced by projects. In trying to answer these questions, a detailed analysis has been carried out on six case study projects in the priority sectors. These sectors were specified by the government at the start of Phase 1 of the project as Transport, Built Environment, Methane, Combined Heat and Power (CHP) and Electricity Supply.

The main focus of the study is on issues of additionality, both in the sense of policy additionality and also the wider additionality of the projects and the relationship between additionality and baselines. However, project boundaries, leakage and monitoring and verification issues are also addressed. In the process some aspects of the practicalities involved in operationalising these projects are considered and an example of possible general guidance has been produced.

Case study projects were provided by firms in the priority sectors after a series of meetings with sector representatives. Potential projects submitted to the study are listed in Annex 1 to the Technical document. From this set of projects the government chose six projects in the transport, built environment and methane sectors for further analysis as there have been very few studies in these sectors. A brief description of the projects is given below.

Built Environment

- WSP International: A comparison of the existing Satellite1 building at Stansted Airport with the recently completed Satellite 3 building.
- Sheppard Robson/Battle McCarthy: a large prestige office building in the category of owner/occupier new build.

Transport

- Fuel Economy Advisors Programme (FEAP): The FEAP is co-ordinated by TRL and is targeted at the road haulage subsector particularly the majority (88%) of the 80,000 hauliers who are small businesses with less than 5 lorries, and aims to improve fuel efficiency in that subsector by 5-10%.
- Green Travel Plans (GTP): This project was provided by the Department for Transport (DfT) and Napier University. GTPs co-ordinate a package of measures to reduce the carbon emissions associated with travel to, from and for work.

Methane

- Alkane - capture of coal mine methane from abandoned mines for electricity production.
- Onyx: landfill gas flaring: from three closed landfills for electricity production or conversion to carbon dioxide.

These six case studies have been used in the analysis to explore the issues surrounding the assessment of emission reduction projects.

2 Analysis results

The main issues to be studied were concerned with additionality. In particular, Her Majesty's Government (HMG) wanted to know a) how a policy additionality test could be implemented and b) how the current range of additionality tests could be characterised and under what conditions they could be applied. The case studies were used to explore how the different additionality tests performed under the specific project circumstances in different sectors. In the process, other issues concerning the assessment of the carbon reduction were also explored including baselines, boundaries, leakage and monitoring and verification (M&V).

2.1 Policy Additionality

Policy additionality refers to the additionality of the project with respect to official government policies. Where a project is responding to a mandatory requirement in existing, or soon to be enacted legislation, then the project cannot be considered policy additional, as it would have happened anyway.

In practice, the policy situation is usually more ambiguous than this. We therefore interpreted *policy* additionality in a *strict* sense. A project may be said to be policy additional if there are no policies that *require* it to go ahead. A project is *additional* in the wider sense if it would not have taken place in the absence of the crediting scheme. The existence of policies which create *incentives* for the project to go ahead may still be a relevant factor in a) making an overall decision on the additionality of the project; b) determining a counterfactual emissions baseline; and/or c) choosing the crediting lifetime.

The possible influences of existing policies are explored within each of the individual case studies. The details of the assessment are given in Chapter 3 of the Technical document and the full results are summarised in section 3.1.2 of this Policy Document.

From this analysis, a strict policy additionality test appears to be possible for the projects studied. For FEAP in the transport sector, CMM and landfill projects, no test is required, as these are automatically policy additional. The GTPs have a more complex policy environment which has to be taken into account. The built environment is relatively simple, where in order to be considered policy additional, the project will have to exceed the performance standard in Part L2 of the building regulations.

The judgement of policy additionality in the strict mandatory sense can therefore be relatively straightforward for these project types. It is the policies which make use of *economic instruments* and *voluntary approaches* that create difficulties. This is because there are a wide range of factors that influence the decision to proceed with a particular project, of which government policy is only one element. Key factors in all cases are the economic viability of the project, the contribution of carbon credits to this viability and various other barriers to implementation.

In assessing additionality with respect to non-mandatory policies, we conclude that it is not possible just to aggregate policies and assign additionality on some sliding scale of effect on the project. There is almost always a gap between what would happen if policies were 100% effective and the reality within the sector. In addition, decisions on project implementation are complex and there exist barriers in the sectors that will affect that decision. Consequently, caution must be exercised in accounting for incentives that might increase the likelihood that a project is BAU (business as usual). In this situation, we recommend that non-mandatory policies should be seen as inputs into the wider additionality assessment of the projects. Where the additionality test is unable to take them into consideration the test may be adjusted to be more stringent or reductions discounted, if there are a number of strong relevant policies. To test this out, a list of relevant non-mandatory policies was compiled for each case study and this list was used as an input to the general additionality assessments in the next section 2.2.

2.2 *Analysis Results*

2.2.1 Initial Assessment of Additionality Test Options

In the assessment of the case study projects, five main additionality tests were explored. These tests are listed and explained in section 2 of this report and in chapter 2 of the Technical document.

They include *three separate additionality tests*:

- **Combined Barriers test**
  This is a combination of the list barriers, quantitative barriers and 'real' barriers tests. It can take account of the non mandatory policies.
- **'A Priori' test**
  This means that a project type has been judged to be always additional. The assumption is that project types are categorised as 'a priori' on the basis of a transparent assessment that they have a high probability of additionality and if some were additional they would not be a risk to the environment as the reductions are small.
- **Emissions Benchmark Additionality Test (EBAT)**
  This is an emissions performance benchmark for a project type set at a stringent level designed to reduce BAU projects but not discourage new projects based on sector characteristics and non mandatory policies. The project either beats the EBAT and is additional, or not.

And *two baseline tests* that incorporate additionality;

- **Stringent Benchmark**
  This is an emissions performance benchmark baseline that is set at a stringent level to discourage some BAU projects as well as act as a baseline. The level is lower than the EBAT. It is based on sector characteristics and non mandatory policies.
- **Conservative Scenario.**
  Of a set of possible scenarios based on expected future changes and any non-mandatory policies, the most conservative is chosen to discourage BAU projects.

No Investment Additionality test was included at the request of HMG, as it was considered to be open to gaming and required confidential information.

An initial assessment of these additionality tests was required by HMG to determine which tests should be applied to the case study projects. A multi-criteria assessment was carried out using criteria specified by the government. These were transparency, objectivity, practicality, verifiability, applicability, accuracy, and consistency. This analysis is discussed in section 4 of this report and in detail in chapter 2 of the Technical document.

The results show that the 'A Priori' test is robustly preferred and it is well-balanced on integrity and cost efficiency. This preference is based on the assumption that to be 'A Priori', a project type has been assessed as a low risk to the environment in terms of the size of the reductions and additionality. It is also important to note that the apparent preference for the 'A Priori' test is only because the criteria relate to operation in practice and do not refer to the difficulty of establishing robustly the ‘A Priori’ project types. The ‘A Priori’ test is however simple and effective.

The EBAT, stringent barriers, and Conservative Scenario form a set of options whose individual overall performance can vary slightly under different assumptions but which are all roughly equally next preferred after ‘A Priori’.

Exploration of the advantages and disadvantages of the options shows that EBAT and the stringent benchmark baseline have the advantage of efficiency but have less accuracy and less applicability compared to Conservative Scenario baselines with their in-built additionality assessment. EBAT and stringent benchmarks are not applicable in every case but are very good for minimising gaming and transaction costs. Combined barriers are more difficult than the others to apply. They have slightly higher environmental integrity and applicability than the EBAT, but are less verifiable, consistent, transparent, objective and have less practicality. Where Emissions Benchmarks such as EBAT and Stringent Benchmarks are not applicable or available then combined barriers could still be acceptable.

However gathering the data to construct an EBAT or stringent benchmark, and choosing where to set the EBAT so that it can discriminate against the non additional projects but not discourage investors, is difficult and involves data collection and resources. If the practicality definition is widened to account for not only the ease of application, but also the difficulty in constructing the benchmarks, then EBAT and stringent benchmarks become less preferred.

2.2.2 Case study Analysis

The analysis of the case studies is described in Chapter 3 of the Technical report for each of the projects in turn and is summarised here in this Policy Document in section 4. The overall results are given in Table 1. The main conclusions and recommendations are as follows.

Conclusions and Recommendations on Assessment Methods

1. The combined barriers test came nearest to a ‘one size fits all’ test. It proved to be useful and informative in all cases and though subjective in nature gave an overall picture of the project. It could be applied to all the projects, as could the conservative scenario approach.
2. The recommendations for the project types showed that for low carbon reduction projects, stringency is not required and the barriers test or an 'a priori' assignment (if justified) can be applied.
3. When there is a high carbon reduction then stringency may be required and Combined Barriers test plus a conservatively set baseline, EBAT plus a baseline, the stringent benchmark or conservative scenario are most appropriate. The choice between them then depends on the availability of the test and the practicality of application.

4. The EBAT and stringent baseline approaches could not be applied to the project case studies because of a lack of data and because they are not appropriate for small projects with low carbon reductions (see point 2 above). In the methane sector they did not apply as they are emissions benchmarks for technologies.
5. Most of the project baselines have required some form of exploration using a scenario approach in order to see where they may be simplified and to gauge any loss in integrity. The choice of the conservative scenario was based on consideration of policy constraints in the future leading to stringency in the scenario.
6. Non mandatory policies could only be included in EBAT, Stringent Benchmarks and 'A priori' when they are being formulated. Both the combined barriers test and conservative scenarios were able to take them into account. Only the Combined barriers test was able to deal with any economic effects.
7. The project boundaries were relatively simple in most cases so that the starting point of one level upstream and one level downstream as a minimum appeared to be sufficient for these projects. It would be reasonable to apply the same process to other project types.
8. The leakage assessment for the chosen case studies showed that this was not a problem except possibly with the GTPs where some factors outside the project boundary cannot be controlled by the project developer. There was no way in the GTP case of estimating the effect and no need with such a small carbon reduction. No leakage correction factor is recommended for the case study projects. This result cannot be extended to other project types, as the leakage paths are specific to the project type.

Conclusions and Recommendations on Project types/Sectors

9. By carrying out a detailed assessment of the case study projects it can be clearly seen that which projects have a low carbon incentive in terms of tonnes of carbon dioxide reduced (Table 1). The ratio of the reductions to the coal mine methane project is instructive and illustrates what is meant by low carbon incentive. The low carbon incentive reflects the relatively small amount of emission reductions from one project. In these cases bundling several projects together will be required with simplified procedures to minimise transaction costs.
10. From the ratio figures, the Green Transport Plan appears to be the least viable of the projects in view of not only of the very low carbon credits available compared to the other projects, but also the low capacity for bundling plans in sufficient numbers.
11. If a project type is likely to be additional and it has a low carbon incentive, it will not have a serious effect on the environment if some projects are non additional. This low environmental risk is good grounds for assigning the status of ‘a priori’ additionality. This applies in the case of the built environment, the FEAP and the GTP projects.
12. The Landfill gas-flaring project is different. Though the carbon incentive is high we still recommend that it be categorised as ‘a priori’ additional as it would never take place without the carbon incentive and thus is clearly additional. There can be only positive environmental benefits. This does not apply to landfill projects where there is electricity generation for ROCs. The projects can still be credited for their conversion of methane but their additionality needs to be checked with the combined barriers

test. There is a danger though of creating a perverse incentive not to utilise the gas if it is easier to get credits for flaring. However ROCs should be a sufficient incentive.

13. In the coal mine methane project, the problem is the current market for electricity. Though these projects are additional at present some sort of financial assessment needs to be made in the future if market conditions change to check additionality. Only the combined barriers test allows some assessment of the non mandatory policies which affect the economics of a project.
14. The balancing and banking method (Section 4.4.4 of this report and section 5.2.6 of chapter 3 of the Technical Document) to even out the flow of credits from the methane sector projects is recommended to minimise overcrediting risks though the uncertainties in the baseline may make this difficult in practice.
15. In the built environment, the GTP, and the methane sector projects, models are required to generate the baseline level. However for simple buildings in the built environment a model would not be required. Where models are used they have to be recommended or validated by the government.
16. For the built environment, the FEAP and the CMM for electricity and heat projects, the verification of the reductions could be carried out on existing verifiable data such as energy bills/supply invoices. There should therefore be no reason for high transaction costs for the projects. A case could be made for including copies of the relevant bills with the application for credits. Independent verification could be limited to random spot checks for the small scale projects.
17. For the Landfill gas flaring, an M&V protocol for the company exists and could be used to ease the verification process so that there should be limited scope for large transaction costs. For the GTPs questionnaires are required which is an expensive verification option.

3 Policy Implications

The policy implications emerging from the analysis and results are discussed in section 5 of the Policy Document where we bring together the main design elements for an assessment of the carbon reductions for projects.

3.1 Policy Additionality

Starting with the Policy additionality test, we propose a decision tree for the implementation of the test based on the insights from the analysis. This is discussed in detail in chapter 1 of the Technical document and in section 5.1.1 of the Policy Document. A step by step process is set out, covering the issues of existing mandatory legislation, planning conditions and partial additionality. The treatment of the non-mandatory policies is also considered at this stage and recommendations made on their inclusion in the wider additionality assessment.

3.2 Additionality

The process of assessment of additionality was considered in terms of three main stages in section 5.5 of this report. These are:

- the formulation of the test;
- the application of the additionality tests from the regulators viewpoint; and
- the suitability of the test for the sector/project type.

Each of these stages is taken in turn. The formulation of the additionality tests is described and summarised. The EBAT, Stringent Benchmark and 'A Priori' tests all require resources and effort to produce before being applied by developers. It should be noted that the 'A Priori' test has to be based on a rigorous and transparent assessment of the risk to the environment based on the likelihood of additionality of the project type and the consequences to the environment if it were non-additional. This latter is reflected in the size of the carbon reductions. Some suggestions are made on information that could be provided for the remaining tests to make application easier.

The application of the tests from the point of view of the regulator was discussed earlier in the initial assessment of additionality (section 2.2.1). Given additionality tests suitable for the project type and sector, the preference in terms of application would be for 'A Priori' for its simplicity once formulated, then the EBAT, Stringent Benchmark and Conservative Scenario, followed by the Combined Barriers test.

The third stage, the suitability of the additionality test is the key to the decision on which type of test should be applied to which project type. We suggest that there are two facets to suitability. The first concerns the carbon incentive for the project. When there are few carbon credits, then a stringent approach is unnecessary and the 'A Priori' test (if justified) or the Combined Barriers test on a representative project should be used along with a streamlined benchmark baseline if possible as these tend to be small projects.

Where there are high carbon credits then a more stringent approach should be taken. The EBAT, Combined barriers, Stringent Benchmark baseline and the Conservative Scenario Baseline are then appropriate.

The other facet to suitability is that the test should be able to be applied in the sector. In our study EBAT and Stringent Benchmarks did not apply to methane sector projects as the projects are not concerned with emissions performance levels. In the Built Environment and FEAP project, there was insufficient data in the sector to construct the tests though they would have been inappropriate anyway.

From the analysis results and the policy analysis, a decision tree for the implementation of the additionality tests was constructed and is given in section 5.5.1.

In section 5.6, some policy questions posed by the government at the start of the analysis are answered, informed by the additionality process described above.

The question of using a separate additionality test or one included in the baseline is discussed in terms of suitability, flexibility and then practicality. Tests that are not stringent are appropriate for small scale projects while projects with a large carbon incentive need stringent levels set for both additionality and baselines and so the baseline methods of Stringent Benchmark, Conservative Scenario, EBAT or Combined Barriers are suitable for large scale projects. The advantage of the separate test is the ability to tailor the additionality testing and the strictness of the baseline separately. The practicality of the test for the regulator bearing in mind the characteristics of the sector are then taken into consideration for the final choice of test.

The question of how a separate additionality test would correspond to the baseline is dealt with in terms of the balance to be achieved between engagement of project developers and environmental integrity. This judgement has to take account of the project circumstances in terms of activity in the sector, size of carbon incentive, the current and future policies and uncertainty in the assessments.

How baseline based additionality tests can be made consistent, minimise gaming and maximise additional reductions is considered in terms of the standardisation of procedures and baselines and validation as well as the judgement concerned in maintaining integrity while encouraging participation.

Finally the design elements which have to be tailored or can be applied generically are considered. The additionality test and the baseline have to be tailored to the project type and sector while leakage, boundaries and crediting lifetimes may be applied generically.

3.3 Practicalities

During the discussions with project developers it also became clear that there were many practical problems associated with the project cycle for the projects. These are highlighted in section 6 and include questions of ownership in relation to emission reductions, the interest in participation from the sectors, the ‘bundling’ of projects and the question of transaction costs. The incentive structure in the built environment needs to be dealt with explicitly as a developer does not necessarily own the reductions generated. Suggestions are made on how these problems may be approached. There is a need for further pilot studies in some sectors to realise the full potential reductions which may be gained.

Finally reference is made to some illustrative general guidance for developers which has been prepared in order to indicate how the insights gained in this study may be progressed for project entry into the UK Emissions Trading Scheme (section 7 in the Policy Document and section 9 of Chapter 3 of the Technical Document).

Table 1: Summary of case study recommendations

Design Element	Built Environment	Fuel Economy Advisors Programme	Green Transport Plan	Coal Mine Methane	Landfill Gas Flaring
Carbon Incentive	a) 180tCO_2/y for 7000m2 for Sat3 b) 1800tCO2/y if portfolio of 10 projects	a) 5 lorries @ 2.4tCO_2/y/ lorry =12tCO_2/y b) bundled 1200tCO_2/y for 5% to 4800tCO_2/y for 20% reduction for a fleet of 500	0.025-0.07tCO_2/y for 1000 employees	85530tCO_2/y	a) 10000tCO_2/y average b) 30,000tCO_2/y Bundled for 3 sites
RATIO to Coal Mine Methane See conclusion 1 section 4.5	a) 2 b) 20	a) 0.14 b) 14	2 to 8x10^{-4}	1000	a) 120 b) 360
Additionality 'A Priori'	Additional 'A Priori' or	Additional 'A Priori'	Additional 'A Priori'	Additional	Additional 'A Priori' or
Combined Barriers	Barriers			Combined Barriers or financial test	Combined Barriers if electricity production
EBAT					
Stringent Benchmark					
Conservative Scenario				Baseline based on IMC model plus banking to balance flow of reductions	Baseline based on GasSim model
Baseline	Part L2 benchmark baseline using carbon emissions method	Simple benchmark on existing practice for fuel consumption/ tonne km/y	Baseline based on Napier Model		
Boundaries	Building and energy supply	Lorry and fuel supply	Several elements defined	Project site and electricity supply	Landfill site or landfill site but electricity system if electricity is produced
Leakage	Not expected to be a problem as monitored data from building	No mechanisms identified	Several possible mechanisms but impossible to quantify and audit. No correction	Not applicable except possible valve leakage	Not applicable except possible valve leakage

			as already low incentive and low environmental risk		
M&V	Electricity bills for separate ring mains if possible, heat supply bills, degree days, Emissions factor for energy supply Spot check on representative building	Receipts for fuel consumption, tachometers, manifestos for goods. Spot check basis for verification for one typical project	Questionnaires to monitor and spot check verification	Weekly measurements of parameters available and verifiable through billing	According to M&V protocol
Crediting lifetime	3 by 7 year revisions	10 years	10 years	10 years	10years

1 Introduction

Entry into the UK Emissions Trading Scheme (UKETS) can take place in three ways; through a cap and trade route for which 34 organisations successfully bid in March 2002, through a sectoral baseline and credit route (the Climate Change Levy Agreement (CCLA) sector) and through greenhouse gas (GHG) emission reduction projects. This study is concerned with the project based entry route for the UKETS and its aim is '*Developing Guidance for UK Emissions Trading Projects*' for the Department for Trade and Industry.

The study is co-ordinated by the Centre for Environmental Strategy (CES) at the University of Surrey and involves the Joint Implementation Network (JIN) in the Netherlands and the Science and Policy research Unit (SPRU) at the University of Sussex. The project was divided into two phases.

In the first phase the policy issues surrounding the assessment of emission reductions from projects were considered. The report from Phase 1 is available on the following website: http://www.surrey.ac.uk/CES/. In the report, we summarised and evaluated the available knowledge on the elements involved in accounting for carbon emission reductions in line with the international project based mechanisms under the Kyoto Protocol. These GHG accounting elements and issues are:

- Policy Additionality
- Additionality
- Project boundaries
- Baselines
- Leakage
- Calculation of reductions and equivalence of service
- Safeguards for environmental integrity
  - Crediting lifetime
  - Data quality assessment
  - Monitoring and verification protocols

This study builds upon the work in Phase 1 and is concerned with the second phase of the work which aims to provide further policy guidance on accounting modalities for project greenhouse gas (GHG) emission reductions based on analysis of possible case study projects in the priority sectors. These sectors were specified at the start of Phase 1 of the project as Transport, Built Environment, Methane, Combined Heat and Power (CHP) and Electricity Supply. The overall report of the study is composed of two main documents; a Policy Document with executive summary, which is the current document and which briefly describes the analysis carried out as well as the policy recommendations, and a Technical Document, which contains the detailed analyses on which the policy recommendations are based.

Firms in the priority sectors provided case study projects after a series of meetings in the sectors. Potential projects submitted to the study are listed in Annex 1 to the Technical Document. A brief description of the projects and the firms offering the projects are given in Table 2-1. From this set of projects the government chose six projects in the transport, built environment and methane sectors for further analysis.

The approach adopted in the study is to generate policy advice through a detailed assessment of the case studies on the options for policy additionality, additionality, baselines, boundaries, leakage and monitoring and verification. A particular focus of the study is the assessment of additionality of projects.

The report starts with an investigation of policy additionality. A project is policy additional if it is not required or mandated through national (or EU) policies. The policy additionality analysis is designed to answer the specific questions posed by the government on operationalising policy additionality and its relationship to the wider determination of additionality. We do this by analysing each case study in turn regarding the mandatory policies operating in the sector and then regarding the other relevant policies which will influence whether the project 'would have been carried out anyway'. From this analysis we construct an approach to the assessment of policy additionality and suggest a decision tree for developers and validators.

This is followed by an initial assessment of the options for the wider additionality assessment. A project is additional if it would not have been carried out anyway as part of a business as usual (BAU) case. The aim of the test is to avoid crediting projects that would have happened anyway. There are many different methods in the literature for assessing project additionality but none are watertight. The additionality test options in this initial assessment included emissions benchmark approaches (Sathaye, 2001) but investment additionality methods were specifically excluded at the request of the government. The purpose of the analysis of the additionality options is to assess the methods from the point of view of the regulator according to a set of criteria specified by the government, before applying them in the next stage of the study.

In the next stage, the case study projects are analysed in detail with respect to the range of accounting modalities. In each case study assessment, we use a standard format where we deal with the following issues.

- Carbon incentive calculation
- Additionality Test Options
- Baselines
- Project Boundaries
- Leakage and
- Monitoring and Verification

The results are then summarised and discussed to provide guidance on the specific project types and on the options for additionality and baselines. The overall policy implications of the analysis are examined and a possible decision tree for the choice of additionality option and baseline is then generated. Finally the policy questions posed by the government are taken in turn and discussed in the light of the results.

The practicality issues surrounding the implementation of carbon crediting in the sectors are then considered. These issues include possible activity in the sectors, the ownership of the carbon credits, bundling issues, transaction costs, and links to the UK emissions inventory.

The technical document report of this study contains an illustrative example of what a guidance document looks like. Preferably, it consists of two volumes: one introductory, booklet-like volume which introduces the project developer into the specifics of emissions trading projects under the UK ETS and into the several issues related to designing such projects; the second volume provides specific guidance for each priority sector with, where possible, generic values for the steps to be taken in the project design phase.

2 Case Studies

The case studies that are discussed throughout the report are listed in Table 2-1 and described below as background to the analysis. This list of projects was chosen by the government from a list covering all the sectors.

Table 2-1 List of case study projects

Case Study/Sector	*Proposed by*
Built Environment	
Comparison with existing building	Sheppard Robson/ Battle McCarthy
Built Environment	
Satellite 3 at Stansted, New Build	WSP International
Transport	
Fuel economy Advisors Programme (FEAP)	Department for Transport and Transport research laboratory (TRL)
Transport	
Green Transport Plans (GTPs)	Department of Transport/Napier University
Methane Sector	
Coal mine Methane	Alkane Energy
Methane Sector	
Landfill Gas Flaring	Onyx

2.1.1 Built Environment

Battle McCarthy/Sheppard Robson Project

Sheppard Robson/Battle McCarthy supplied an example of a large prestige office building in the category of owner/occupier new build. This was a relatively new existing building complying with the 1995 Part L building regulations. Battle McCarthy/Sheppard Robson conducted a detailed exercise to compare the existing building with what could have been done given a low carbon remit.

WSP International Project

This is the recently completed Satellite 3 building at Stansted. The target was for the carbon intensity (kgC/m^2/year) of this building to be 20% below that of British Airports Authority's (BAA) best performing existing Satellite building. The design of satellite buildings is unique to the airport industry so no widely accepted energy efficiency benchmarks are available. BAA used internal benchmarks for this project, derived from existing satellite buildings at other airports.

2.1.2 Transport

Fuel Economy Advisors Programme (FEAP)

The FEAP is targeted at the road haulage subsector particularly the majority (88%) of the 80,000 hauliers who are small businesses with less than 5 lorries, and aims to improve fuel efficiency in that subsector by 5-10%. The programme itself is an information and education campaign to raise awareness with individual hauliers about the potential for reducing their costs, increasing their profits and benefiting the environment. The FEAP provides information and advice on ways to minimise fuel consumption which include

- Vehicle logistics
- Aerodynamics and load management
- Driver behaviour and training
- Vehicle maintenance

Green Transport Plan (GTP)

This project was provided by Department of Transport who commissioned Napier University to develop proposals for project crediting for a wide range of organisational travel plans.

Travel plans co-ordinate a package of measures to reduce the carbon emissions associated with travel to, from and for work. These include the promotion of walking, cycling and public transport; reducing car access; charging for car parking, and organisational measures such as car sharing schemes. Depending on the nature of the site(s) they can vary enormously in scale, scope and degree of specificity.

2.1.3 Coal Mine Methane (CMM)

It is possible to capture the methane from existing abandoned mine vents by applying a vacuum to the mine workings. The gas extracted from abandoned mine sites typically has a methane content of 70% (15% nitrogen and 15% carbon dioxide).

The CMM project analysed in this study is currently under review by the Alkane Company. The project consists of capping an abandoned mine, drilling a borehole and fitting an extraction plant with two 1.4MW generators for electricity generation with a feed into the grid. Currently the methane escapes from the mine via fissures and vents and contributes directly to global warming.

Landfill Gas

This project is composed of a cluster of three closed landfill sites owned by Onyx. Two of the three suggested sites will have electricity production that qualifies for ROCs. Only flaring is considered to be an option at the third site as there is no opportunity for the utilisation of the gas for heat. This means that the three projects can be accounted for in terms of flaring but not electricity production. The three have been bundled together to improve project economics.

In the following sections we discuss in turn the issues relating to the assessment of projects under a scheme compatible with the international mechanisms under the Kyoto Protocol. We start firstly with the question of policy additionality as this is an aspect that affects the whole of the carbon accounting process.

3 Policy Additionality

The first chapter of the Technical document addresses the requirements specified by the government on the issue of Policy additionality.

The specific questions addressed are[1]

- the possible menu of approaches to address additionality
- a possible decision tree for developers for policy additionality

It is important that we define what we mean by policy additionality from the start.

3.1.1 Definitions for Policy additionality and overall additionality

Policy additionality refers to the additionality of the project with respect to official government policies. Where a project is responding to a mandatory requirement in existing, or soon to be enacted legislation, then the project cannot be considered additional as it would have happened anyway. For example, if a landfill operator is required by the IPPC Directive to capture methane emissions, there are no grounds for awarding the project carbon credits as it would have gone ahead anyway.

In practice, the policy situation is usually more ambiguous than this. Policy instruments rarely *require* a particular project, but frequently *fund, support or encourage* the project in a variety of ways and to varying extents. As such, a range of policy influences may make it more likely that a project would be included in a counterfactual baseline, but do not guarantee this.

As a consequence, there is no strict boundary between policy additionality and more general criteria for determining additionality. Similarly, there is no strict boundary between policy additionality and the procedures for estimating emission baselines. The interpretations used in this study are as follows:

Policy additionality: This is interpreted in the *strict* sense. A project may be said to be policy additional if there are no policies that *require* it to go ahead. Similarly, if a *portion* of a project is required under existing policies, only a portion of the project may be said to be policy additional.

Additionality: A project is additional if it would not have taken place in the absence of the crediting scheme. The existence of policies which create *incentives* for the project to go ahead may still be a relevant factor in: a) making an overall decision on the additionality of the project; b) determining a counterfactual emissions baseline; and/or c) choosing the crediting lifetime. The relative importance of different policies in determining

[1] Listed in Box E of the document "Phase 2 Research Specifications" prepared by HMG, May 2002.

additionality, baselines or crediting lifetimes will depend upon the methodology that is used.

It is this interdependence that we try to explore using the case studies to find out what can happen in practice.

3.1.2 Summary of Results

The analysis of the policies applying to the selected case studies has shown that there is in each case a range of policies that relate to the project type in the sector. The presence or absence of mandatory policies means that an assessment of the policy additionality has been relatively clear-cut in each case.

For the project types studied the results are summarised in Table 3-1.

Table 3-1 Summary of policy additionality for the case study projects

Project type	Policy Additionality
Travel plan	• YES if company is in an existing building and there is no change of use and no planning permission required • YES for company in a new building or change of use if there is no planning requirement • NO for part of a project required under planning conditions • NO for the whole project if required under planning conditions
FEAP	• YES for all projects as there are no mandatory policies
New and refurbished office buildings	• YES if it exceeds the building regulations • NO for part of a project, if it is a renewables installation generating ROCs
CMM gas collection and electricity generation	• YES for all projects as there are no mandatory requirements
Landfill gas collection and flaring or heat supply	• YES for all projects from landfills that closed before 1993 • YES for projects from landfills that closed between 1993 and 2001 and which were not subject to flaring requirements • NO for projects on new landfill sites or sites operating in 2001

The judgement of policy additionality in the strict mandatory sense can therefore be relatively straightforward for these project types. The analysis also highlighted all the other policies relevant to the projects which though not mandatory would have an influence on the project.

Table 3-2 summarises the relevance of other policies to the case study projects and gives a preliminary recommendation on their impact on the overall additionality of the project. The detailed assessment behind the table is in chapter 1 of the Technical Document.

Table 3-2 Summary of policies relevant to overall additionality for the case study projects

Project	Relevance of other policies	Preliminary recommendations
Travel plans	• Substantial government support and encouragement of travel plans in all sectors. Adds to the incentives for travel plans that are internal to individual organisations, such as environmental policies. • Government has a target for all government buildings and government agency buildings to adopt travel plans. • Enormous range of transport policy measures may influence workplace travel patterns and hence influence the additionality of the changes encouraged by the travel plan.	• Government may wish to make travel plans at government and government agency buildings non-additional. • Private organisations with environmental policies should not be penalised by suggesting that their travel plan would not be additional. • Should not attempt to allow for the influence of other transport policy measures, since this adds to transaction costs and may discourage action.
FEAP	• FEAP and other information programmes raises awareness of cost effective projects. • Fuel duty improves economics of projects. • ECAs may improve accounting treatment of some IT measures.	• Limited take-up of these projects, despite apparent cost effectiveness, suggests presence of barriers. • Projects should be considered additional
Built Environment	• ECAs improve the tax treatment of energy efficiency investment • Voluntary targets in a range of sectors. Of greatest significance in the public sector, and in particular in the government estate where there is an aggregate target for energy efficiency improvement. • CCL exemptions improve economics of CHP investment. • Renewables encouraged through Renewables Obligation and R&D support. • Building regulations expected to be tightened, including incorporation of EU Directive	• Projects in government and public sector buildings may either be considered non- additional, or have a baseline which exceeds building regulations. Appropriate interpretation will depend upon sector • Anticipated tightening of building regulations best address through baselines or crediting lifetime.
CMM	• Electricity generation eligible for CCL exemption (but not ROCs). • IPPC only an issue for very large projects • Larger CMM projects may be eligible for inclusion in EU ETS.	• Policy influences should have little effect on overall additionality. • Decision on additionality will need to take into account project economics (currently poor due to low wholesale electricity prices).
Landfill gas collection and flaring	• Eligible projects confined to those on 'old' sites or on small number of recently closed sites where there are no legislative requirements. • Project that produce electricity eligible for ROCs/CCL exemptions and hence not candidates for crediting. • No other policies relevant.	• Planning permission may be barrier. • Should be considered additional

3.1.3 Taking account of the relevant non mandatory policies

There were no case studies where the relevant (but non mandatory policies) were considered sufficient to cause the projects to be non-additional in the sense that they would have been carried out anyway.

This conclusion is based on an assessment of the types of policies involved and on the detailed assessment of the project themselves. In the following discussion we try move the discussion from the individual project case to a generic level by examining how the policies can affect the projects and whether it is possible to have some sort of aggregate weight of policies which could be said to be sufficient to make projects non-additional. Our approach is to first of all examine the types of policies involved.

In chapter 1 of the Technical Document we grouped the policies under four general categories:

- education, information and moral persuasion;
- voluntary approaches;
- economic instruments; and
- command and control.

These are broad categories, and there may be considerable variation in the stringency of instruments within each category. For example, voluntary approaches are defined here to include both relatively tough measures with economic sanctions, such as the Climate Change Levy Agreements, and relatively soft measures such as the Making a Corporate Commitment Campaign.

From the analysis it is clear that policy instruments within the *education & information* category provide relatively ‘soft’ encouragement that is unlikely in itself to produce a BAU project. Also, the influence of these policies on a particular decision is very hard to determine. We recommend that, for the purposes of determining overall additionality, these policies are ignored

Many of the policy instruments within the *command & control* category are relevant to the yes/no decision on policy additionality. Examples of these were found in the case study projects.

It is the projects in the remaining categories, *economic instruments* and *voluntary approaches,* that create difficulties. One or a combination of these policies could make a major contribution to the overall additionality of a project (e.g. CCL exemptions). In other cases (e.g. ECAs), the influence may be relatively small. In only a few cases will the influence of such policies be easy to assess. This is because there is a wide range of factors that influence the decision to proceed with a particular project, of which government policies are only one element. Key factors in all cases are the economics of the project, the contribution of carbon credits to these economics and various barriers to implementation. The latter may be both diverse and project specific.

Frequently we find that highly cost effective projects do not go ahead, due to various barriers. The fuel efficiency projects encouraged by FEAP are an example. This indicates that any assessment of additionality must include knowledge of what is actually happening within a sector rather than what *should* be happening if policies were 100% effective.

3.1.4 Conclusions

We would conclude that it is not possible just to aggregate policies and assign additionality on some sliding scale of effect on the project. There is a gap between what would happen if the policy were 100% effective and the reality within the sector. In addition, decisions on project implementation are complex and there exist barriers in the sectors that will affect that decision so that caution must be used in taking account of a list of possible incentives for a project that increase the likelihood that it is BAU. This does flag up the *barriers* approach to assessing additionality as a potentially useful approach in some situations.

The contribution of these non-mandatory policies to project additionality could be dealt with in two main ways.

1. The non-mandatory policies can be included in the assessment test for the additionality of the project. The options available are described in Annex 2. In practice, only a subset of these options (e.g. Combined Barrier analysis) can incorporate the effect of such policies. This is explored explicitly in the analysis of the additionality options in Chapter 3 of the Technical document.

2. The second option, where the policies cannot be assessed within the additionality test, is to ensure stringency in the setting of the additionality tests. This could only apply to large projects, which happen to have a range of stringent policies applying. None of the case studies were in that category.

A major factor in assessing the additionality of projects is the *judgement* on the appropriate balance between encouraging investment in projects, and discouraging free riders. This, in turn, may vary between sectors, technologies and types of project. The stringency of the different options for testing the additionality is discussed in the analysis of the case study projects in Chapter 3 of the Technical document. Two factors the government may wish to take into account here are:

the economics of the project, and the contribution of project credits to the overall rate of return; and

the anticipated emission reductions from the project, and the relative size of these compared to either the UK ETS allowance market or the sectoral emission reductions in the UKCP (this could be particularly important for coal mine methane).

3.1.5 Emission baselines and crediting lifetimes

In some cases, policy considerations may also have implications for the determination of emission baselines and crediting lifetime. For example, some sectors in the built environment (e.g. the NHS) are likely to have higher performance standards than are required by the building regulations. For projects in these subsectors, it may be appropriate to use this higher standard as the emission baseline, rather than using the building regulations. This decision may also depend upon the nature of the standard. For example, standards required in public sector buildings, which have been included in projections for the UKCP, may be argued to have a different status to voluntary standards in the private sector. However there is a danger of discouraging progressive action. Similarly, future developments in the building regulations, perhaps triggered by the EU Directive, may need to be taken into account in the choice of crediting lifetime and in the level of the projected baseline.

4 Additionality

4.1 Introduction to additionality

Although we have discussed additionality in the previous section some further background is required before proceeding to the results of the additionality analysis.

In order to be eligible for credits under the Kyoto project mechanisms a project must produce reductions in emissions that are additional to those which would have occurred in the absence of the project.

Therefore the purpose of the additionality test, however it is carried out, is to ensure that the reductions are 'real' in the sense that projects have an environmental performance which is better than that expected under business as usual (BAU). How this can be done in practice is quite problematic as many factors affect the investment in a project and the resulting reductions.

The complexity of the issue is reflected in the number of types of additionality that have been generated to try to operationalise the concept. The situations where a project would not have occurred without the financial incentive from the carbon credits is referred to as investment additionality. This tries to address directly the difference between the project and business as usual investment, by looking at the criteria businesses use to decide on investments.

Environmental additionality, which is sometimes called emissions additionality by US authors (e.g. CCAP, 1998, Carter, 1998, Baumert, 1998), is seen as the requirement on the project to produce a reduction in emissions compared to what would have happened in the absence of the project. The project is assessed against a baseline representing the usual pattern of activity or BAU in the country for that project type. As the comparison with a baseline is required to calculate the reductions then a project unable to reduce below the baseline is not additional.

Technological additionality was first introduced into discussions to avoid dumping of old technologies in developing countries under the CDM. A performance benchmark above the average for a sector was suggested to ensure that there is a move to improve standards in the sector. This concept was not adopted in the negotiating texts for the project mechanisms under the Kyoto Protocol but has remained as a possible approach to additionality and ties in with the work of Sathaye (2001) described below.

As described earlier under Policy Additionality the policies affecting the additionality of a project can have an impact on the baseline. An example is how long the project can be credited as it may be mandatory within 5 years or the baseline level may change as it is projected into the future to take account of expected policy shifts. This interdependence between the baseline, which represents what would have happened in the absence of the project, and the additionality of the project blurs the boundaries between them. Therefore the additionality of a project may not necessarily be the subject of a separate test and attempts have been made to incorporate the issues surrounding the assessment of additionality into baseline construction. Practical examples of incorporating additionality into the baseline are the Dutch ERUPT programme for JI programmes and also the World Bank Prototype Carbon Fund assesses additionality in the baseline. This is done through an examination of the incentives, barriers, market conditions and policy directions, which will affect the project, and what would have happened in the absence of the project. Furthermore, in the Marrakech Accords, the proposal for a project design document for the CDM includes additionality as one of the parameters to be assessed in the process of baseline determination. A baseline for a project can be done on a project-by-project basis or can be streamlined using a standardised baseline to be applied to many projects of the same type. An example of a standardised approach is the use of performance benchmarks.

However it is recognised that applying a standardised baseline approach to multiple projects will not take such specific considerations into account. Although such an approach reduces transaction costs if there is no other test for additionality then there is scope for non-additional projects to be credited. To counter this, suggestions have been made (Sathaye 2001, Bosi 2000), to increase the stringency of such benchmarks to be 'better than average'. The assumption is that for any given sector, business as usual projects will always be improving in performance and so a sector average would not limit BAU projects. It also depends on the project type/sector.

However the meaning of 'average' has to be clarified. As discussed in the phase 1 report, benchmarks have to be closely defined as they have many degrees of freedom. It is crucial for example what geographical area is taken for the benchmark, e.g. sub-national, national, regional, what time horizon eg last 5 years, whether at the sectoral or project technology level. These all affect the 'average' benchmark level. 'Better than the average' can also be interpreted in many ways such as in percentile terms. Which percentile is appropriate is then open to question. An investigation in the energy sector by Sathaye (2001) indicates that the conditions within the country and sector need to be closely examined before deciding on the appropriate level for the stringent benchmark baseline.

Projects, which would have been done anyway as business as usual, are called free riders. However, projects must be financially viable to deliver long-term reductions. Can viable projects be distinguished from free riders? There will be projects which are on the borderline or which are difficult to determine and there has to be a balance struck between excluding free riders with a stringent test and encouraging real projects. This is the judgement on stringency that needs to be made and was described earlier in the discussion on policy additionality.

In moving from an investment based test to an emissions based additionality focus, an attempt is made to move away from the problem of eliminating free riders on the basis of investment criteria which are notoriously easy to manipulate. The premise of using emissions based criteria is that a project that reduces more emissions than the BAU activities must incur more costs otherwise it would be a BAU activity. This is unfortunately not necessarily the case. It ignores the complexity of the decision on project implementation. Energy efficiency projects are a good example of this problem where obvious savings are not made due to other barriers to action. Barriers to action are therefore another way of investigating additionality.

From this discussion it can be seen that there is still a range of approaches to tackling the assessment of additionality to try to ensure the environmental integrity of the project reductions. Whichever method is chosen there will always be ambiguities. None can be watertight. Therefore there is still a need to consider the assessment of reductions as a whole to ensure that sufficient safeguards are in place to maintain integrity.

Different project circumstances also compound the problem.

- Some projects are cost effective but are not BAU usually due to several barriers; the project activities and carbon incentive have to overcome these barriers.
- Some projects are not cost effective and need the carbon revenues to be viable but could be BAU in the future.
- Some projects are neither cost effective, nor BAU, and need the carbon revenues to make them viable.
- Some projects are cost effective, are BAU and have high emission reduction performance in comparison to the general mix of BAU and so appear additional but are not.

The question arises as to whether all the project circumstances can be dealt with by a single additionality approach or whether additionality approaches need to be differentiated for each circumstance. This is investigated in the analysis of the case studies carried out in chapter 3 of the Technical Document.

4.2 Additionality Assessment Options

The following is a list of the options that have been considered in assessing the additionality of projects. Compared to Phase 1 options, all investment additionality tests have been excluded from further analysis by the government as they were considered to be open to gaming and required confidential data. Two new tests, EBAT and stringent benchmark, which are emission performance based tests have been added. Instead of the individual barriers tests described in Phase 1 we now have a combined barriers test. This latter option was formulated as a result of the analysis when we tried to apply the individual tests and realised that they were in fact just elements of the same test that needed to be taken together.

The additionality assessment methods analysed in Phase 2 are listed and explained below.

1. Combined Barriers:

In this test, a developer is required to list the barriers that he considers have prevented the project from being Business as Usual (BAU). The project is then assessed against the barriers. This enables the relevant barriers to be identified and gives an indication of the problems associated with the barrier. It shows what the project has done to overcome them or to what extent the carbon revenues have helped overcome the barriers.

In this method it is assumed that the list of incentives also applying to the project are taken into account at the same time and to judge if they offset the barriers.

A (standard) list of the barriers that are important in the sector and perhaps for particular project types would be useful in applying this method to projects. The difficulty of the method is in the subjectivity of the selection of relevant barriers and in gauging how serious the barriers are for the project under consideration. The developer has to be able to justify his assessment and choices.

2. 'A priori' additionality

In this test the project is deemed to be always additional by Her Majesty's Government.

This has to be based on a thorough and transparent assessment of the project type in the sector so that it is clear that the project is both policy additional and generally additional. In order to assign projects to this category they have to present a low environmental risk in terms of reductions and they have to have a high likelihood of additionality.

No further additionality test would be required, only that the project in question comes under the particular category deemed 'a priori' additional.

One of the arguments in favour of a priori additionality is that although in practice not every single project may be additional, all projects taken together sufficiently contribute to sustainable development to relieve them from additionality testing.

3. Emissions based additionality test (EBAT)

Free riders (projects which would have been done anyway) are expected to be cheaper and have less technical performance than projects that are additional to 'what have happened in the absence of the project'. By setting a performance benchmark at a stringent performance level the free riders would be reduced as only the better plant would be able to pass the test. Sathaye (2001) suggested this test in the context of the electricity and cement sectors in developing countries. It requires a set of data on the recent plant activities in a sector if the EBAT is for a new plant or on the mix of plant in the sector if it is a refurbishment.

It has to be related to the nature of the project to enable choices to be made on what aggregation level for fuel, or sector level it should be chosen. Sathaye suggested that as an additionality test 10th percentile or best practice performance levels could be suitable. It does not take account of developments over time but this could be incorporated in its formulation and future policy additionality considerations could be incorporated at that time. It would be coupled to a baseline that could be a benchmark or a scenario set at a less stringent level.

Of course as mentioned above, some efficient technologies do not necessarily incur extra costs and could be BAU projects so that the effect on reducing the likelihood of free riders is not clear. The approach assumes that such a performance benchmark is available and is appropriate to the project category. Gaming can occur in the process of setting the level of the benchmark but not in its application. An EBAT would be applied to many projects of the same type.

4. Stringent Benchmark

Where there is no separate additionality test a stringent benchmark (Sathaye et al 2001) can be used as a baseline to try to eliminate free riders. It has to be based on data about the sector and has to be appropriate to the nature of the project to enable choices to be made on what plant to include in the calculation of the benchmark baseline performance level and on what aggregation level i.e. fuel, or sector level.

The level of stringency is a subjective judgement justified by what is expected in terms of BAU and the characteristics of the sector. Examples from Sathaye show a range from ‘best plant' to 10th percentile, 25th percentile and sector wide baselines. Thus the level of stringency is usually set at a level the same, or lower, than the EBAT. If it is made too stringent then it will prevent projects being undertaken in the sector and conversely if too lenient the reductions will have low environmental integrity. In this method gaming can occur in the level at which the benchmark is set. This may be addressed by subsequent adjustment as more market information is acquired through projects. These types of baselines can be applied to many projects of the same type and can incorporate considerations of sector or plant type developments for the future as well as major policy additionality impacts.

It is difficult for the non-mandatory policy considerations to be taken into account in this type of test.

5. Conservative Scenario incorporating additionality considerations

In this case, a range of baseline scenarios are constructed on a project specific basis trying to take account of factors affecting the additionality of projects through a detailed assessment of the project circumstances and the sector activities. The most conservative baseline is identified as the one with the most stringent level taking account of the major policy influences on the project. There is still scope for gaming in this method.

4.3 Results of Initial Assessment of Additionality Options

An initial assessment of the additionality test options described above was made from the point of view of a regulator having to apply the tests. This analysis is described in chapter2 of the Technical Document. The purpose of the analysis was

- to make initial recommendations on additionality methods for use in the case study assessments, and
- to compare a separate test for additionality with a baseline incorporating additionality.

The criteria set to be used for assessment was defined by the government as the following.

- **Transparent**: are the procedures for the test clear and the route to the final result clearly auditable?
- **Objective**: as far as possible the determination of additionality should be based on an objective measure rather than on subjective judgement, which can be contested. Note that this definition is different to others who have attempted an assessment of additionality tests. For example the WRI GHG protocol initiative uses objectivity in terms of is it a fair test free from bias in the way it has been set?
- **Relevant or Applicable**: how generally applicable is such a test
- **Verifiable**: the test should be able to provide the same result across a range of different users of the test and should be able to be verified
- **Consistent**: The test enables consistent results to be obtained across projects of the same type. There should also be consistency over time.
- **Practical**: The ease with which the test may be carried out. This depends on simplicity of the process and availability of information required.
- **Cost effective**: this integrates the practicality, the transparency and applicability if taken to mean the costs in terms of time and difficulty of performing the test relative to the clarity of the outcome. It is not separately assessed as it has been disaggregated into its components.
- **Accurate**: The extent to which the test is likely to accurately gauge the additionality of the project and contribute to the environmental integrity of the reductions from the project. What is the likelihood of limiting free riders?

Accuracy was added to complete the assessment set.

The assessment methodology chosen was a multi criteria assessment (MCA) approach (DETR, 2000), which allows the assessment of options over a range of criteria. The method is grounded in decision theory and makes explicit the subjective judgements necessary to make the assessment. These criteria were then structured into a value tree to reveal the major trade offs of environmental integrity and cost efficiency. The model HIVIEW originally developed at the LSE was used to process the inputs. Normally such an analysis would involve stakeholder inputs but as this was not possible the assessments have been made based on the group's experience. The method thus makes explicit the subjective judgements involved in such assessments.

The options were scored on each of the criteria and then the criteria were weighted. The weighted scores are then summed over all the criteria to give an overall preference for the options. The results have been explored through sensitivity analysis on the scores and on the weights and an audit trail for the assessment is given in the text.

The results show that the 'a priori' test is robustly preferred and it is well balanced on integrity and cost efficiency under the assumption that to be 'a priori' a project type must be subject to a transparent process of assessment that the project types are likely to be clearly additional and pose a low risk to the environment. The 'a priori' test is also simple and effective and where it is appropriate, it should be used. However this preference does not hold if the environmental integrity of the test is compromised by using the test to export the problems with the project type out of any assessment.

The EBAT, stringent barriers, and conservative scenario form a set of options whose individual overall performance can vary slightly under different assumptions but which are all roughly equally next preferred after 'a priori'.

Exploration of the advantages and disadvantages of the options shows that EBAT and the stringent benchmark baseline have the advantage of efficiency but have less accuracy and less applicability compared to conservative scenario baselines with their in-built additionality assessment. EBAT and stringent benchmarks are not applicable in every case but are obviously very good in a streamlined situation. Combined barriers are more difficult than the others to apply. They have slightly higher integrity and applicability than the EBAT, but are less verifiable, consistent, transparent, objective and have less practicality. Where emissions benchmarks are not applicable then combined barriers could still be acceptable. For the combined barriers test a standard list of possible sector related barriers would be useful.

If the importance of practicality in terms of ease of application of the test is increased then the conservative scenario approach becomes less preferred relative to the benchmark approaches. This is on the assumption that the EBAT or stringent benchmark is given to the developer or verifier. However gathering the data to construct an EBAT or stringent benchmark, and choosing where to set the EBAT so that it can discriminate against the non additional projects but not discourage investors, is difficult and involves data collection and resources. If the practicality definition is widened to account for not only the ease of application, but also the difficulty in constructing the benchmarks, then EBAT and stringent benchmarks become much less preferred (just above combined barriers).

From the evaluation of the options using the MCA approach it was not possible to distinguish clearly between the additionality options of EBAT, stringent benchmark and conservative scenario as they have compensatory advantages and disadvantages. For completeness, we have included these options along with 'a priori' and the combined barriers test for further analysis using the case study projects (chapter 3). This will identify the issues that will discriminate between them and test if it is possible to have a 'one size fits all' test.

4.4 Results of the Analysis of the Case Study Projects

In this next section we summarise the results from the analysis.

The tests described in section 4.2 were applied in turn to each of the case study projects and an additionality assessment made as well as an assessment of how clearly and easily the test was able to be applied. The additionality methods, combined barriers, EBAT, 'a priori' are examined first and then the baseline approaches of stringent baseline and conservative scenario baselines. Project boundaries and other baselines are then discussed followed by leakage and monitoring and verification issues.

4.4.1 Built environment

Two projects were analysed in this sector. Both were new build offices.
The measures that can be taken to improve a building to surpass existing standards and reduce carbon emissions are available and can be applied to any building. They target the orientation, form and energy efficiency of the building envelope, the energy efficiency in the provision of the services to the building for heating, lighting, cooling and ventilation, the energy efficiency of the equipment used in the building and control systems, and the supply of power to the building.

Reducing the carbon emissions involves either a) reducing the amount of energy required and/or b) reducing the carbon content of the energy supplied. The main sources of carbon emissions are the consumption of fossil fuels for electricity supply and heat. Electricity consumption especially should be reduced if it is supplied from the grid, as the emission factor is almost double that for gas. Measures that focus on reducing energy consumption need to be targeted to produce maximum reductions for minimum cost. Analysis reveals that measures such as chilled beams, management of lighting load through daylighting and dimmer switches can allow some relaxation in other less critical but costly loads. Further analysis to produce guidance on carbon efficient measures would be useful.

To be successful in realising the design intentions it is also important to have a design team that can manage the project development from the design stage through to the commissioning of the building. This management needs to include participation of the tenant from the start, if this is possible, not only for the realisation of the reductions in practice, but also for the negotiation of any carbon reduction revenue. The sector is complex in that we have considered mainly the case of the owner-occupier new building whereas there are many variations on this from refurbishment of existing buildings to landlord multi-tenant occupancy.

4.4.1.1 Carbon Incentive

The analysis showed that the potential amount of reductions for a building were relatively small in the range 6% of the energy savings/y for a 20% improvement on part L2 of the current building regulations. For the satellite 3 building this amounts to 25.8kgCO_2/m^2/y, which is 180tCO_2/y for 7000m^2.

As there is a low risk to the environment with the small amount of reductions per building and the resulting incentive in this sector is correspondingly low there will not be a need for a very stringent approach to additionality for new build or refurbishment projects.

One mechanism for increasing the incentive in this sector and lowering transaction costs is to bundle a portfolio of buildings together. This will minimise costs and provide an aggregated amount of credits that is worthwhile. In this respect it is worth noting that the scope for emission and cost savings is much higher from refurbishment, especially when bundled across a property portfolio.

4.4.1.2 Additionality and Baselines

From this assessment of the built environment project it appears that the barriers test as a separate additionality test can fairly judge the barriers and incentives prevailing on the project type. 'A priori' may be justified in the sector based on the barrier analysis and the low carbon incentive.

An EBAT cannot be generated at present due to lack of data. Information to derive EBATs would be needed for all the relevant subsectors and would require significant effort and resources. In addition the EBAT runs the risk of discouraging any investment to gain carbon credits by limiting the numbers of qualifying projects. More data are needed to check the position on standards of current buildings.

There is insufficient information to construct a stringent baseline for this sector though technically it could be applied. Compared to the baseline level of 40kgC/m^2, an arbitrary decrease of 10% would give an emissions level of 36kgC/m^2/y while for the most conservative scenario the baseline is equivalent to 34kgC/m^2. Both methods can therefore decrease significantly the number of emission reductions available for credits. Their effect on limiting free riders is not clear except that more effort is required to beat the more stringent baseline level over time and the projects are likely to be additional under these circumstances. However there is a risk of stifling the market. Both stringent benchmarks and conservative scenario approaches would have a similar effect on free riders.

In the case of the conservative scenario it is possible to take more account of the non-mandatory policy incentives and their effect in the calculation of the baseline. The choice of the most conservative is clear based on the policy considerations in the sector.

The final recommendations are for an 'A priori' plus a simple benchmark baseline at the L2 level calculated using the carbon emissions method of Part L2 of the building regulations. A software programme may be used for this calculation as well as for the emissions expected from the actual building. This calculation is required under the building regulations. Though the whole building method is usually preferred, it is not suitable for this assessment.

The L2 benchmark should be updated in accordance with the change in regulations every 7 years and applied to new projects.

The choice between a separate test and a stringent baseline is not independent of the project and sector characteristics.

4.4.1.3 Project Boundaries

A project may encompass a New Building, which may involve an extension to an existing building, or a Refurbishment of an existing building.

For each of the above cases one or all of the following aspects may be involved

- Building Envelope
- Building services
- Building equipment
- Energy Supply

The building services and the equipment obviously lie within the building envelope boundary.

An extension can be treated as a new building, provided it has separate ring mains and metering for its energy supply.

The project boundary depends on the circumstances of the project but mainly comprises two components; the building itself and the energy supply to the building for the project combinations discussed above. The different options for the energy supply have been set out in section 3.5.1 of chapter 3 of the Technical Document.

4.4.1.4 Leakage

Leakage was not explored in detail in the study but normally for an energy efficiency project the common leakage mechanisms are rebound and spread. Rebound is where the occupants use more energy to become more comfortable so that the expected energy use reduction is not realised. However as in this type of project, the reductions would be based on the energy bills for the building, such rebound effects may occur but would be dealt with by the process of ex post verification and so do not pose any threat to environmental integrity. Spread, where others copy good practice, would be extremely difficult to prove or monitor in any meaningful way.

A large potential leakage is an inappropriate choice of emissions factor for the electricity grid supply. This is discussed further in section 3.5.1 in chapter 3 of the Technical Document.

4.4.1.5 Monitoring and Verification

In the built environment the carbon savings are associated with reductions in electricity and gas use and in switching to renewable energy supplies. Monitoring of the energy consumption of the building is required and this can be done through the electricity and gas bills for the building. Preferably this would be done with separate ring mains for the main service loads and for the equipment loads. For an extension this would be mandatory. Correction for degree-days should be made so that the comparison between the project and baseline is valid.

Transaction costs for verification should not be high in this sector. Depending on the guidance and options chosen for additionality and baselines we would not expect the validation or verification process to be difficult or expensive.

4.4.1.6 Further work

It is clear that in this sector more data is required on the performance of buildings for new and refurbishment projects. The work of WSP International showed that more studies on identifying cost-effective measures for reducing emissions would be useful. Incentive structures in the sector also need to be re-examined. It has also been suggested that there needs to be further work carried out in this sector to carry out demonstration projects to see how such projects could work in practice. A clearer understanding of the integrated approach is needed by engaging with developers, owners, occupiers and tenants to information on the cost-benefits for each participant leading onto transparent contractual arrangement for the sharing of any cost savings and carbon credit generation. The analysis for such project could require life cycle evaluation beyond the 'one-level upstream and down-stream' and could include embedded carbon emissions in material design as well as the other more obvious indicators. This would further incentivise the complex and wider supply chain and result in further (possibly considerable) carbon savings.

4.4.2 Fuel economy advisors programme

4.4.2.1 Carbon incentive

Assuming a price for carbon of £5/tCO_2, it can be calculated that a 5% fuel saving gives an additional £133 annual carbon credit revenue stream, or an additional 0.5% increase in profits for a small company. Per lorry this equates to about £12/year. This is only a fraction of fuel cost savings and suggests that the economic incentives for entering a project of this scale into the UKETS are minimal - the savings are likely to be swamped by the transaction costs involved.

Larger projects may be more feasible by aggregation or bundling of smaller projects. This may be possible through the large companies who subcontract to the small hauliers. Larger projects may be more feasible by aggregation or bundling of smaller projects. This may be possible through the large companies who subcontract directly or indirectly to the small hauliers. For a fleet of 500, the carbon reductions would be in the range of 1200-4800 tCO_2/y for a 5-20% reduction.

4.4.2.2 Additionality and Baselines

As with built environment projects, these projects have a poor carbon incentive unless they can be bundled. In addition, the barriers analysis shows that there is little engagement despite the cost savings that can be gained. There is therefore a case for 'a priori' additionality for any small-scale projects in this area. The introduction of the road haulage charge could significantly alter the baselines and reduce the available credits. If the projects can be bundled through a large haulage firm subcontract then the carbon incentive could be sufficient to produce change.

The EBAT and the stringent baseline both face problems in obtaining sufficient relevant information to enable them to be set and they would have to reflect the situation in the sector.

The conservative scenario approach, and to some extent the stringent baseline and EBAT, allows us to consider the policy incentives coming into play. The scenario method would lead to a strict baseline but would be inappropriate in its complexity and its strictness for this application when the environmental risk is so low with small-scale operators.

For small scale projects an 'a priori' list of additional technologies is appropriate. The baseline should be a simple benchmark for each subsector (e.g. construction) based on fuel consumption per tonne kilometre per annum for existing practice could be used to streamline the process. Though bundled projects produce larger reductions the difficulty of bundling ensures the additionality of the projects.
Again the choice of the application of a separate test for additionality or a baseline depends on the circumstances in the sector and the environmental risk.

4.4.2.3 Project Boundaries

The project boundaries for this project type are simple in that they comprise the lorry activity in terms of the load and distance travelled and the fuel consumption associated with that so that the boundary is at the lorry and its fuel supply.

4.4.2.4 Leakage

No mechanisms for leakage were identified.

4.4.2.5 Monitoring and Verification

As indicated above, monitoring of petrol consumption for each journey in terms of load and distance travelled would be required for each lorry. This could be done through receipts for fuel, through tachometer information on distance and through manifesto information on goods delivered. Verification could not be carried out for every lorry and some sort of aggregated verification process would be needed and random spot checks on a few cases carried out. One way to avoid these problems is to use telematics and a computerised data handling system.

4.4.2.6 Further work

Further work in this sector to explore the potential of these projects through the larger haulage firms subcontracting to the small hauliers should be explored. In addition a pilot study on improving utilisation of lorries e.g. for the construction sector, from 50% to possibly 65%, could provide very large carbon reductions which would be worthwhile.

4.4.3 Green Transport Plans

4.4.3.1 Carbon Incentive

The GHG emission reduction achieved through green travel plans depends on the alternative that is chosen for single occupant car commuting. If all drivers go to work on foot, by bicycle or public transport, the emission reduction will be optimised. If, instead, the driver joins car-pooling schemes, there would still be emissions from car commuting.

The emission reductions associated with a green travel plan have been estimated using a spreadsheet model developed by Napier University and commissioned by the Department of Transport. The estimate for the reduction is between .025 and .07tCO_2/y for a firm with 1000 employees.

This is a very low incentive and bundling of plans across different sites in a company may be a way forward.

4.4.3.2 Additionality and Baselines

The combined barrier assessment showed that although barriers are likely to exist for green travel plan projects, it is not easy to specifically identify them. For example, awareness of the "greenness" of green travel plans does not seem to be a problem, but awareness that these plans also reduce GHG emissions may be much smaller; availability of alternative transport will not be a real barrier, but the lack of willingness of staff to give up the flexibility of using the car could be a barrier; the costs associated with green travel plans may not be prohibitively high, but organisations might have a strong incentive to choose the cheapest plans which may effectively deal with the traffic congestion problem, but which would have lower GHG emission reduction.

Considering particular green travel plans as 'a priori' additional projects would be a feasible option for this project type, given that there will not be a large damage to the environment if there would be some free riders. The latter is explained by the fact that the size of the GHG emission reductions from the projects is relatively low and by the fact that green transport plans are generally beneficial to the environment.

The scope for applying an EBAT for green transport plans may be limited. The only reasonable option for this may be setting a stricter GHG emissions factor per Journey to Work distance value. Still, however, there may be doubts about the desirability of limiting free riders in this project category given that the benefits of such a limitation may not counterweight the disadvantage of reducing the number of green travel plans and thereby their possible contribution to environmental protection. In this context we would recommend that environmentally aware companies who institute GTPs should not be penalised for being progressive and such projects should be considered additional.

Determining a stringent benchmark without an additionality test for green travel plan projects would have the same limitations as determining an EBAT for such projects. Therefore the analysis given there mainly also applies here, with the possible exception that the GHG emissions factor per Journey-to-Work distance value could be somewhat higher than the one chosen for the EBAT.

The spreadsheet model developed by Napier University determines a baseline for green travel plans on the basis of the number of kilometres driven by employees who drive to work alone. Subsequently, in order to estimate the emission reductions, the model calculates for the same staff the number of car commuting kilometres after the green travel plan has become operational. The baseline calculation is therefore based on current emissions and does not really incorporate future changes. A more conservative baseline would incorporate these changes.

These projects are characterised by low carbon credits and correspondingly low risk to the environment. The assessment of the additionality tests indicate that this project type should be ‘a priori’ additional. The barriers test worked well but the stringency of the other measures though technically possible would not be warranted under these circumstances. The baseline would be based on the output from the Napier spreadsheet, which can be made available to all.

4.4.3.3 Project Boundaries

For green travel plans it is recommended to define the project boundaries in such a manner that it incorporates the following of the elements:

- The organisation implementing the green travel plan
- The staff workers
- The peak buses that bring workers from a central meeting point to their workplace
- The car-pooling

The reason for including these elements within the project boundaries is that the project developer (*e.g.* the organisation) can to a certain extent control the emissions related to changing behaviour of the organisation itself, staff, peak buses and car-poolers.

4.4.3.4 Leakage

Leakage occurring from green travel plans would be caused by changes of the off-site (outside project boundaries) elements. Some possible leakage paths have been identified.

- The change in domestic energy use
- Car lease company behaviour
- Public transport

Quantifying such paths for leakage will be extremely difficult for each single element outside the project boundary. Therefore, a discount factor for leakage to be subtracted from the emissions reduction resulting from the project would be the simplest recommendation. However having recognised the uncertainties surrounding the estimation of the reductions, the estimated GTP reductions are so small that we would not consider such a correction necessary.

4.4.3.5 Monitoring and Verification

Questionnaires will be required to monitor progress and spot checks for verification. This is not ideal as gaming could occur.

4.4.4 Coal Mine Methane

4.4.4.1 Carbon Incentive

For the proposed project, assuming a carbon value of £5/tCO_2, a capture of 85530 tCO_2/year for this project would give an annual revenue of £0.43 million.
This currently helps to make the project viable.

4.4.4.2 Additionality and baselines

Almost all of the barriers discussed are economic barriers to the project. Although not strictly ‘barriers’ in the normal usage of the term the current economics nevertheless prevent the implementation of projects and cannot be ignored in this project type. This project is different to those considered earlier under the Built Environment and Transport sectors as CMM projects are not viable but would occur if economic circumstances changed. The value of the credits is what makes this project possibly viable and from that point of view the project is additional. Planning permission is the only other serious barrier.

Although the projects are additional under current market conditions, an investment additionality test would be a useful tool to establish additionality under varying electricity prices, carbon prices and connection charges in the future. This approach would have to be company and site specific and confidential.

As most CMM electricity production project plans have been abandoned given the low electricity price, additionality under current electricity prices can be considered proven, except maybe for the top-end large sites.

EBAT is not possible in the sector as the reductions are mainly from methane conversion and are not suitable for a performance indicator. This also applies to Stringent Benchmark.

'A priori' is not appropriate due to the large carbon incentive and the risk of the additionality changing with market prices.

For this project type we recommend a barriers test or a financial assessment test if the electricity market changes along with the IMC model baseline. The model developed by IMC takes account of desorption from the coal seams, flood risk, and interconnected seams to estimate the expected methane emissions over time. This is a conservative scenario in the sense that though it has not taken account of additionality factors which have tightened the baseline against free riders, it takes account of the factors which can inflate the number of credits given. Compared to purely measuring the gas flow from the mine, this is a conservative scenario.

The baseline in this case represents the total release of methane expected over time and the project should not exceed this total. A suggestion is made to bank the amounts of methane captured above the baseline which occurs in the early years of the project and then allow them to be used when the project capture declines later below the baseline, always keeping the totals consistent with the expected baseline methane release. As the model uncertainty is about 25%, then measures to even out the flow of credits should only be used outside these limits.

4.4.4.3 Project Boundaries

The project boundaries are defined by the physical boundaries of the site on the surface and the mine workings below the surface. The boundary includes any flaring and electricity generation equipment and on site use of electricity. In the case of a heat supply to a factory the boundary will include the factory activities.

4.4.4.4 Leakage

Leakage is where the project may lead to increased emissions elsewhere as a result of the activities of the project. This does not apply to this project. However there may be leakage to the atmosphere from valves and other equipment though this would be expected to be very small.

4.4.4.5 Monitoring and Verification

Weekly measurements are available for % methane, Flow rate m^3/h, Exported amount of electricity kWh, Efficiency %, on-site electricity use and downtime.

These are all used for billing and so can be easily verified. The figures can be double checked for consistency as the amount of gas can be calculated from the electricity sent out and then compared to measurements. This can also show up leaks in the system.
There should be no problems with verification and monitoring.

4.4.5 Landfill Gas Flaring

4.4.5.1 Carbon Incentive

For the three sites it is estimated that over 10 years they will reduce CO_2 by 300,000 tonnes. This gives a carbon benefit of £150,000 per year in total for the three sites at £5/tCO_{2e}. The sites are 40% the size of the CMM site when bundled.

4.4.5.2 Additionality and Baselines

The barriers assessment identified mainly lack of awareness, lack of experience, problems with viability of older sites, which tend to have lower methane levels, and planning permission as the main barriers to action in this sector. At present Onyx are the only firm involved in this type of development. However the projects are viable and should encourage others to participate.

With the average tonnage from the sites 10,000 tCO_2/y, there is an environmental risk if the project is overcredited. On the other hand it can only benefit the environment and the projects are only viable because of the credits for the carbon reductions so are additional. We have recommended ‘a priori’ additionality for the project but recommend that the check on overcrediting occurs through the balancing and banking so that the total reductions do not exceed the total predicted in the baseline.

EBAT and Stringent benchmarks do not apply to this sector.

The baseline scenario is based on a model from Summerleaze. This provides a scenario of the release of methane from the landfill over time based on the topography, waste composition and other factors affecting methane production and diffusion. It takes account of specific site parameters.

This sort of model of the natural production and escape of methane is needed to take account of the accelerated capture of the methane and the oxidation of the gas as it passes through the capping material. GasSim has been developed for this purpose in the UK and is recommended by the Environment Agency for this calculation.

This model is a conservative scenario though there is no consideration of additionality. Compared to the recommended approach in other trading systems, e.g. ERUPT, where only the recorded flow rate of the methane captured is taken into account, there is increased stringency in the baseline. The approach is recommended for this project type.

For this project if it is purely flaring, the additionality is clear and ‘a priori’ could be considered with a check on the total credits made available compared to the baseline with balancing and banking where possible. If there were electricity generation at the site then a barriers test would definitely be required to show why the project is not considered BAU.

4.4.5.3 Project Boundaries

These are simply the landfill site including flaring or electricity generation equipment and on site use. Gas purification for feed to grid or heat supply is not usually an option in the UK.

4.4.5.4 Leakage

Again the concept does not apply to this type of project except in the physical sense where leakage from valves can occur but is usually very low.

4.4.5.5 Monitoring and Verification

The requirements here are almost identical to those for coal mine methane. As these would usually be unmanned sites, telemetry or site visits would be required to collect (weekly) measurements for % methane and Extraction flow rate m^3/h, electricity use on site and downtime. Onyx have developed their own M&V protocol which could be used.

4.5 Overall summary results and conclusions

Table 4-1 is a summary of the recommendations made for each project type and relates the results to the carbon incentive of the projects, which gives an idea of the relative size of the reductions. These results can be taken together with a summary of the performance of the additionality tests on the case study projects.

The following conclusions are drawn from the summary tables.

Conclusions and Recommendations on Assessment Methods

1. The combined barriers test came nearest to a 'one size fits all' test. It proved to be useful and informative in all cases and though subjective in nature gave an overall picture of the project. It could also be applied to all the projects, as could the conservative scenario approach.
2. The EBAT and stringent baseline approaches could not be applied to the project case studies because of a lack of data and because they are not appropriate for small projects with low carbon reductions. In the methane sector they did not apply.
3. The recommendations for the project types showed that for low carbon reduction projects, stringency is not required and the barriers test or an 'a priori' assignment (if justified) can be applied. When there is a high carbon reduction then stringency may be required and Combined Barriers test plus a conservative baseline, EBAT plus a baseline, the stringent benchmark or conservative scenario are most appropriate. The choice between them then depends on the availability of the test and the practicality of application.
4. Most of the baselines have required some form of exploration using a scenario approach in order to see where they may be simplified and to gauge any loss in integrity. The choice of the conservative scenario was based on consideration of policy constraints in the future leading to stringency in the scenario.
5. The project boundaries were relatively simple in most cases so that the starting point of one level upstream and one level downstream as a minimum appeared to be sufficient for these projects. It would be reasonable to apply the same process to other project types.
6. The leakage assessment for the chosen case studies showed that this was not a problem except possibly with the GTPs where some factors outside the project boundary cannot be controlled by the project developer. There was no way in the GTP case of estimating the effect and no need with such a small carbon reduction. No leakage correction factor is recommended for the case study projects. This result could not be extended to other project types, as the leakage paths are specific to the project type.

Conclusions and Recommendations on Project types/Sectors

7. By carrying out a detailed assessment of the case study projects it can be clearly seen that which projects have a low carbon incentive in terms of tonnes of carbon dioxide

reduced. The ratio of the reductions to the coal mine methane project is instructive and illustrates what is meant by low carbon incentive.

8. From the ratio figures, the Green Transport Plan appears to be the least viable of the projects in view of the very low carbon credits available compared to the other projects and with the low capacity for bundling plans in sufficient numbers.
9. Where there is a low carbon incentive, and consequently low environmental risk, *and* the projects are likely to be additional, there are good grounds for assigning the status of 'a priori' additionality. This applies in the case of the built environment, the FEAP and the GTP projects.
10. The Landfill gas flaring project is different. Though the carbon incentive is high we still recommend that it is categorised as 'a priori' additional as it would never take place without the carbon incentive and there can be only positive environmental benefits. This does not apply to landfill projects where there is electricity generation for ROCs. The projects can still be credited for their conversion of methane but their additionality needs to be checked with the barriers test. There is a danger though of creating a perverse incentive not to utilise the gas. However ROCs is sufficient to overcome this.
11. In the coal mine methane project, the problem is the current market for electricity. Though these projects are additional at present some sort of financial assessment needs to be made in the future if market conditions change to check additionality. Only the barriers test allows some assessment of the non-mandatory policies, which affect the economics of a project.
12. The balancing and banking method (Section f this report and section 5.2.6 of chapter 3 of the Technical Document) to even out the flow of credits from the methane sector projects is recommended to minimise overcrediting risks though the uncertainties in the baseline may make this difficult in practice.
13. In the built environment, the GTP, and the methane sector projects, models are required to generate the baseline level. However for simple buildings in the built environment a model would not be required. Where models are used they have to be recommended or validated by the government.
14. For the built environment, the FEAP and the CMM for electricity and heat projects, the verification of the reductions could be carried out on existing verifiable data such as energy bills. There should therefore be no reason for high transaction costs for the projects. A case could be made for including copies of the relevant bills with the application for credits. Independent verification could be limited to random spot checks for the small-scale projects.
15. For the Landfill gas flaring, an M&V protocol for the company exists and could be used to ease the verification process so that there should be limited scope for large transaction costs. For the GTPs questionnaires are required which is an expensive verification option.

Table 4-1 Summary of case study recommendations

Design Element	*Built Environment*	*Fuel Economy Advisors Programme*	*Green Transport Plan*	*Coal Mine Methane*	*Landfill Gas Flaring*
Carbon Incentive	a)180tCO_2/y for 7000m2 for Sat3 if portfolio of 10 projects b)1800tCO2/y	a) 5 lorries @ 2.4tCO_2/y/ lorry =12tCO_2/y b)bundled 1200tCO_2/y for 5% to 4800tCO_2/y for 20% reduction for a fleet of 500	0.025-0.07tCO_2/y for 1000 employees	85530tCO_2/y	a)10000tCO_2/y average Bundled for 3 sites b)30,000tCO_2/y
RATIO to Coal Mine Methane	a)2 b)20	a)0.14 b)14	2 to $8x10^{-4}$	1000	a)120 b)360
Additionality 'A priori'	Additional 'A priori' or	Additional 'A priori'	Additional 'A Priori'	Additional	Additional 'A priori' or
Combined Barriers	Barriers			Combined barriers or financial test	Combined Barriers if electricity production
EBAT					
Stringent Benchmark					
Conservative Scenario				Baseline based on IMC model plus banking to balance flow of reductions	Baseline based on GasSim model
Baseline	Part L2 benchmark baseline using carbon emissions method Possibly higher if NHS or MOD	Simple benchmark on existing practice for fuel consumption/ Tonne km/y	Baseline based on Napier Model		
Boundaries	Building and energy supply	Lorry and fuel supply	Several elements defined	Project site and electricity supply	Landfill site or landfill site but electricity system if electricity is produced
Leakage	Not expected to be a problem as monitored	No mechanisms identified	Several possible mechanisms but	Not applicable	Not applicable

	data from building		impossible to quantify and audit. No correction as already low incentive and low environmental risk		
M&V	Electricity bills for separate ring mains if possible, heat supply bills, degree days, Emissions factor for energy supply Spot check on representative building	Receipts for fuel consumption, tachometers, manifestos for goods. spot check basis for verification for one typical project	Questionnaires to monitor and spot check verification	Weekly measurements of parameters available and verifiable through billing	According to M&V protocol
Crediting lifetime	3 by 7 year periods minimum revisions	10 year fixed	10 year fixed	10 years	10years

Table 4-2: Summary of performance of additionality tests on case studies

Project /sector	***Combined Barriers***	***A priori***	***EBAT***	***Stringent Benchmark***	***Conservative Scenario***	***Carbon Incentive***
Built Environment ***BM-SR and WSP new build office***	Useful, informative, clear understanding of additionality of projects 2nd Recommend-ation	May be possible given the barrier analysis shows likely additional and low carbon incentive therefore low environmental risk 1st Recommendation	Technically possible but no data Screening criterion may be too strict for purpose	Technically possible but no data Can provide a very strict baseline for credits and free riders Too strict for purpose	Can provide a very strict baseline for credits and free riders Too strict for purpose	Very low Bundling required Strict baseline would discourage engagement while environmental risk is low Additional
Transport ***FEAP***	Useful, informative, clear understanding of additionality of projects 2nd Recommend-ation	May be possible given the barrier analysis shows likely additional and low carbon incentive therefore low environmental risk 1st Recommendation	Technically possible but no data Screening criterion may be too strict for purpose	Technically possible but no data Can provide a very strict baseline for credits and free riders Too strict for purpose	Can provide a very strict baseline for credits and free riders Too strict for purpose	Very low Bundling required Strict baseline would discourage engagement while environmental risk is low Additional

Transport GTPs	Useful, informative, clear understanding of additionality of projects	May be possible given the barrier analysis shows likely additional and low carbon incentive therefore low environmental risk 1st Recommendation	EBAT data availability in sector problematic Possible use Napier model values to derive. Too strict	Stringent Benchmark data availability in sector problematic Possible use Napier model values to derive. Too strict when low reductions	Napier model required but depends on assumptions for development in future Set conditions not to be too strict when low reductions	Very low Bundling required Likelihood of additionality high Strict baseline would discourage engagement while environmental risk is low
Methane ***Coal Mine Methane***	Mainly a financial assessment required in future if market changes Few barriers 1st Recommend-ation Barriers/ financial test if market changes plus conservative scenario	Environmental benefits but risk of overcrediting	Not applicable	Not applicable	Model required to avoid overcrediting Possible balancing/ banking to account for accelerated production 1st Recommend-ation	High carbon incentive Additionality depends on market conditions
Methane ***Landfill Gas***	Barriers are concerned mainly with the lack of experience in KP mechanisms and the economic viability Recommended for electricity projects	No environmental disbenefits, project only viable through carbon credits but risk of overcrediting 'A priori' recommended for flaring projects	Not applicable	Not applicable	Model required to avoid overcrediting Possible balancing/ banking to account for accelerated production Recommended In both cases	High carbon incentive Additional

5 Policy Implications

The conclusions and recommendations from the detailed case study analysis can now be used as a basis for more general recommendations for operationalising the design elements for project assessment, particularly additionality, and for answering the policy questions posed by the government.

5.1 Policy Additionality

The policy questions of interest for policy additionality are:

- What is the possible menu of approaches to address additionality? And
- How can a decision tree be constructed for developers?

5.1.1 Possible Approaches to Policy Additionality

From this analysis, a policy additionality test appears to be possible for the projects studied. For FEAP in the transport sector, CMM and landfill projects, no test is required as these are automatically policy additional. The travel plans have a more complex policy environment, which has to be taken into account. The built environment is relatively simple with the project having to exceed the performance standard of the building regulation or any internally set standards e.g. for NHS buildings.

Assessment of the Policy Additionality can be expressed in terms of the following steps.

STEP 1:
Is there mandatory legislation requiring the project?

There are 3 possible answers to this.

The project may be required and so it is non policy additional. It cannot then be included in the UKETS.

There are no policies in place now but it is known that there will be changes in a short time, which will apply to the project. In this case: a) the project may only be policy additional until the new legislation comes in; or b) the new legislation may affect the overall additionality, baseline or crediting lifetime. There is therefore direction for this to be input to the baseline and crediting lifetime choices for the developer and validator.

There is no mandatory legislation and the project is policy additional

STEP2:
Does the project involve several connected activities? If so, is one of those activities required in law?

- Where the total reductions from a project involve several connected activities then if one of the activities is required in law, then the reduction due to that activity cannot be counted towards the emission reductions and must be excluded in the calculation of reductions. Details of the mandated part will need to be provided, together with an indication of how the savings from this part can be subtracted from the overall savings from the project.

STEP 3:
Does the project depend on interpretation of guidance by some regulatory body, for example the planning authorities?

There are several possibilities here.

If conditions have been placed on a project, it is necessary to define what these conditions are:

If they mean that the project is required then the project is non policy additional

If they mean that part of the project is required then that part is non policy additional and cannot be included in the calculation of reductions.

If the conditions are not available at the early stage of the project then a case has to be made for appropriate interpretation of the guidance, which must be part of the validation process.

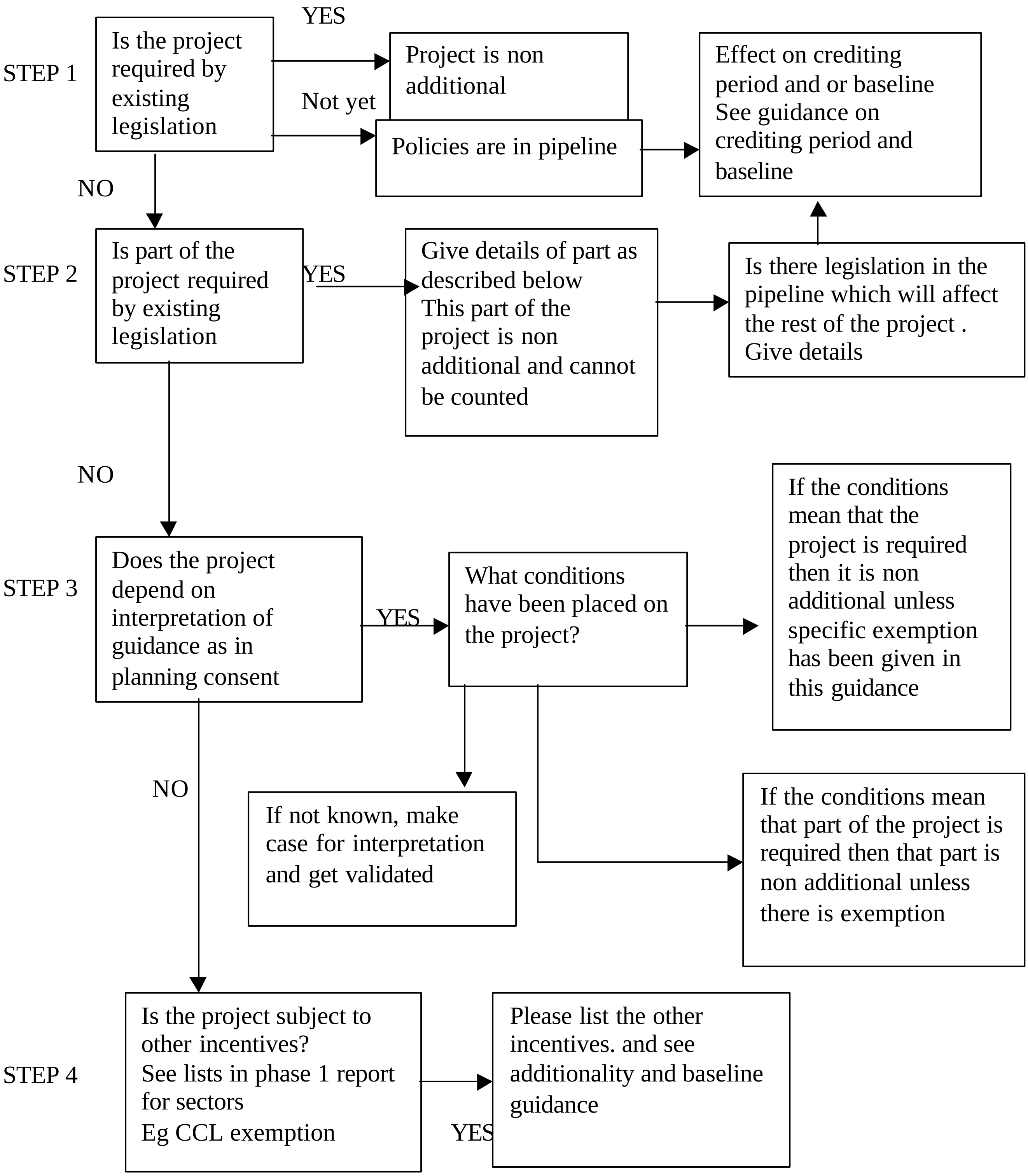
The project does not depend on such interpretation

STEP 4
Is the project supported, encouraged or funded by other government policies (in particular, economic instruments or voluntary targets/agreements)?

- Projects that reach step 4 may be considered policy additional. But is still necessary to identify those policies that may be relevant to the overall additionality of the project.

These steps in the process for policy additionality assessment are illustrated in Figure 5-1.

Figure 5-1 Decision Tree for Policy Additionality



5.1.2 Taking account of Non Mandatory policies

It has been shown in the analysis that these non-mandatory policies affect usually the economics of the project or lower barriers in some way. It is difficult to estimate their true effect as the decision to implement depends on a number of complex factors. These policies are therefore important for the general assessment of the additionality of a project, in terms of what would have happened in the absence of the project.

We suggest the following way forward.

- The lists of policies applying in the sectors from the Phase 1 document can be used as a checklist of what is actually relevant to the project.
- This list of policies relevant to the project should be fed into the additionality tests. The most suitable are
    - Any separate barriers test and /or
    - The construction of a conservative scenario baseline
    - If necessary a financial assessment of the project

If a stringent benchmark that incorporates additionality considerations is used then the list of non-mandatory policy considerations cannot be incorporated in the assessment and are not needed. This also applies to an EBAT. Similarly where an ordinary benchmark is used as a baseline and the barriers test is not used to assess additionality, there will be no opportunity to consider the contribution of these project specific elements to additionality.

We would suggest an alternative approach in the case of a project with large carbon emission reductions where there is no opportunity of examining the effect of the list of non-mandatory policies because of the use of an EBAT or Stringent Benchmark. In this case the stringency of the test can be used as a sufficient safeguard.

5.2 Additionality

In trying to assess the additionality of a project we are concerned with the environmental integrity of any reductions produced by the project so that the resulting effect on global greenhouse gas concentrations is meaningful. At the same time, if the processes by which we arrive at that judgement are too bureaucratic, the engagement of project investors will be lost and only limited reductions will occur.

To achieve the aim of a workable solution to testing for the additionality of projects this study addresses the whole process from the formulation of the test, to its practical application. By applying the available tests to a diverse range of project types and sectors we have been able to gain some insights into the key issues that have to be considered in selecting and applying an additionality test.

To create a way forward we first of all have to consider each stage of the process of an additionality assessment. These stages are

- **the formulation of the test,**
- **the application of the additionality tests from the regulators viewpoint,**
- **the suitability of the test for the sector/project type.**

5.3 Formulation of the additionality tests

We take each of the tests in turn and review their requirements for each of the project types/sectors examined.

5.3.1 Combined Barriers Test

For the Combined Barriers Test we found that a list of generic barriers to investment in GHG reducing measures, such as low carbon technologies or GTPs, known to exist in the sector was a helpful starting point. Other issues related to the project type and circumstances had then to be added to the list for a complete assessment.

The built environment is a good example of this where generic barriers are known but there are other factors to be considered as well, such as the lack of incentives for the developer.

A list of the policy incentives in the sector is also useful to balance against the barriers and these would be generated from the policy additionality assessment in the initial stage of the project cycle.

5.3.2 'A Priori'

The categories of projects which are 'a priori' additional are pre assigned before application of the test. In this respect its nature is different to the barriers test and the conservative scenario test.

In order to assign a project type to this category a thorough assessment needs to have been carried out regarding the environmental risks associated with the decision. In the analysis, using the combined barriers test was actually very helpful in this respect as well as an exploration of the scenario baselines. The main issues we took into account included the following.

- ➢ An estimation of the difficulty of carrying out the projects in the sector. The combined barriers test gave appropriate insights into this. Are the projects likely to be additional? If likely then there is low environmental risk.
- ➢ An estimation of the likely credits from a project. The baseline scenarios exploration is very useful for that assessment. If the credits are low then there is a low risk to the environment if some non-additional projects are undertaken.

- The relative expected size of the transaction costs compared to the carbon incentive, which is related to expected numbers of projects in the sector.

Any decision to have projects as 'a priori' additional must have a transparent basis for such an assignment as the projects must have a low environmental risk. Any other approach would devalue the credits produced.

5.3.3 EBAT

An EBAT has to be formulated before it can be applied and in this respect it is the same as for ' a priori' and stringent benchmarks.

The EBAT method requires data on the projects delivering the service in the sector:

- the range of projects in the sector;
- the number of projects of particular types;
- their age;
- their emissions performance in t C /activity level.

These statistics are all needed to construct the percentiles, the averages, and identify best practice levels for the emissions performance for recent plant, average mix in the sector, good and best practice for retrofit and new projects.

An EBAT not based on data would have to be based on independent expert opinion in the sector but that would be difficult to do.

The choice of performance level for the EBAT, which has to be exceeded for the project to be additional, is a difficult decision even with all the data. The EBAT is acting as a screening criterion and limits the supply of projects. There is therefore a risk of either being too strict and discouraging real projects or too lax and having many non-additional projects so that adjustments may need to be made as experience in applying the EBAT is gained.

5.3.4 Stringent benchmark

Similar to EBAT and 'A priori' tests, this test has to be formulated before it can be used.

All the EBAT data requirements apply to the stringent baseline. Again expert judgement would be needed in the absence of the data. It can, as for an EBAT take some account of sector trends and policies affecting performance levels.

The stringent baseline is testing for additionality through a baseline set at a stringent level. We have seen in the analysis that this means that if it is set at a level that is very strict, and limits free riders well, it also limits the reductions available to the developer. If it is set at a higher level, then non-additional projects can be credited but there is more incentive for developers to take action, as there are more credits available.

This fine balance has to be struck with this approach and as in the EBAT will probably have to be adjusted with time and the market conditions.

5.3.5 Conservative Scenario

The construction of the scenarios involves data requirements at the application stage. It is helpful to have a list of the policies which apply to the sector and which should be available for the policy additionality test. There can also be pre-prepared a checklist of policies applying to project types in the sectors that can be accessed easily and applied.

These considerations are summarised in the following Table 5-1.

Table 5-1: Formulation Requirements for Additionality Tests

Additionality Approach	*Formulation Requirements BEFORE Application*
Combined Barriers	• List of barriers in sector • List of incentives in sector or for project type • Other project specific barriers to be added at application These are not absolute requirements but would make assessment easier.
'A Priori'	A transparent basis for assessment as environmental risk is low.
FORMULATION before can be applied	• Are these projects policy additional • An estimation of the difficulty of carrying out the projects in the sector. Are the projects likely to be additional? • An estimation of the likely credits from a project. If the credits are low then there is a low risk to the environment if some non-additional projects are undertaken. • The relative expected size of the transaction costs compared to the carbon incentive which is related to expected numbers of projects in the sector
EBAT ***FORMULATION before can be applied***	• the range of projects in the sector; • the number of projects of particular types; • their age; • their emissions performance in t C /activity level • Choice of level as a screening criterion
Stringent Benchmark ***FORMULATION before can be applied***	• the range of projects in the sector; • the number of projects of particular types; • their age; • their emissions performance in t C /activity level • the range of projects in the sector; • the number of projects of particular types; • their age; • their emissions performance in t C /activity level • Choice of level as a baseline and additionality test
Conservative Scenario	• pre-prepared checklist of policies applying to project types in the sectors which can be accessed easily and applied. • Standardised procedure

5.4 The application of the additionality test from the regulators viewpoint

The analysis in Annex 2 examined the additionality tests on a range of criteria from the point of view of the regulator applying the test.

The simplest to apply is the ‘a priori’ test but it has to be formulated in the first place in a careful manner as described to be environmentally credible. The test cannot be applied to all projects but is restricted to those with low environmental risk and clear likelihood of additionality.

For streamlining and stringency in application EBAT and Stringent Benchmarks are good but have less accuracy and less applicability than a Conservative Scenario. They must be generated in a sector where enough projects are expected to make it worthwhile.

Conservative scenario baselines with their in-built additionality assessment perform well on al the criteria except the practicality as it takes time and data to construct for each project.

Combined barriers also are less practical and take time and effort to apply but do provide a wider picture for assessment. They have slightly higher integrity and higher applicability than the EBAT, but are less verifiable, consistent, transparent, objective and have less practicality. Where emissions benchmarks are not applicable then combined barriers could still be acceptable.

5.5 The suitability of the test for the sector/project type

What we mean by the suitability of the test concerns ***the level of stringency*** of the test. Two factors need to be considered here.

- Firstly the size of the project and the carbon incentive resulting from it are important. When the carbon credits are low then there is no need for strict testing, as this will tend to discourage action when the risk to the environment is low.
- The other main factor to be considered is whether the features of a sector lend themselves to being tested by the method chosen. For example does the sector lend itself to benchmark characterisation which allows the production of benchmark performance tests or is it really the barriers which are the problem preventing the project going ahead?

5.5.1 Choosing a suitable additionality test

The choice of which additionality test is suitable for the project being examined depends on a range of factors.

- *Is the carbon incentive high or low?*

If the carbon incentive is high then the baseline and additionality test has to be clear. The tests that can apply in that case are

1. **Barriers plus baseline**
2. **EBAT plus baseline**
3. **Stringent Benchmark**
4. **Conservative Scenario**

The separate tests are more stringent on free riders while the baseline tests are more stringent on the level of the baseline and the resulting amount of credits. The effect of the tests is hard to gauge, as it is difficult to estimate the efficiency of the tests in detecting free riders. Overall the stringency increases going down the list if the baseline for the separate tests is not set at a stringent level. Each test has its own characteristics, which are summarised below.

1. <u>Barriers plus a baseline</u>: Where there is cost effective action not occurring then barriers are the usual cause and as has been shown in the analysis they can provide a comprehensive picture to assess additionality. The test allows the inclusion of policy incentives identified in the policy additionality test and allows some assessment of economic effects. It is probably the most efficient test for additionality when done thoroughly. The baseline can be chosen to be strict or otherwise depending on what is required. With a high carbon incentive it should be strict. The main problem is that it is a subjective judgement.
2. <u>EBAT plus a baseline</u>: EBAT tends to be a strict test for additionality, which could discourage projects which are valid. The test allows some inclusion of policy incentives identified in the policy additionality test but is not good at assessing economic effects. It relies on emissions performance level to ensure additionality. It is combined with a baseline that can be set at a strict or lenient level. It is useful for streamlining the process.
3. <u>Stringent Benchmarks</u>: As they are a baseline they have to be set at a level that reflects a reasonable future scenario and so may have to compromise on the stringency for additionality. The test allows some inclusion of policy incentives identified in the policy additionality test but is not good at assessing economic effects. It can discourage projects but has high environmental integrity. It is useful for streamlining the process.
4. <u>Conservative scenario</u>: This tends to be strict in taking account of policy effects in the future and has the effect of limiting free riders as a result in a similar way to the stringent benchmark. The test allows the inclusion of policy incentives identified in the policy additionality test but is not good at assessing economic effects. It can discourage projects but has high environmental integrity.

If the carbon incentive is low then the tests that can apply without being too strict are

1. **Barriers Test plus baseline**
2. **'A priori' plus baseline**

1. Barriers test plus baseline: Barriers can give a comprehensive picture of the sector as described above. In this case the baseline can be chosen at a level that does not limit participation in the sector but also reflects the baseline activity level.

2. ‘A priori’ plus baseline: The project must be clearly additional to have been given this category. The baseline should not discourage participation but should reflect a reasonable baseline into the future.

The final choice is a judgement depending on the project and sector circumstances but should err on the side of stringency for large projects.

- *Can the test be formulated for the sector or project type?*

From the analysis we have seen that the

1. EBAT,
2. Stringent Benchmark
3. ‘A priori’ tests

cannot be generated for all the projects examined in this study.

For EBAT and Stringent Benchmarks the reasons lie in the sector characteristics. If sectors do not have the data available or they do not have emissions performance levels as in GTPs, CMM and landfill gas projects then they cannot be applied.

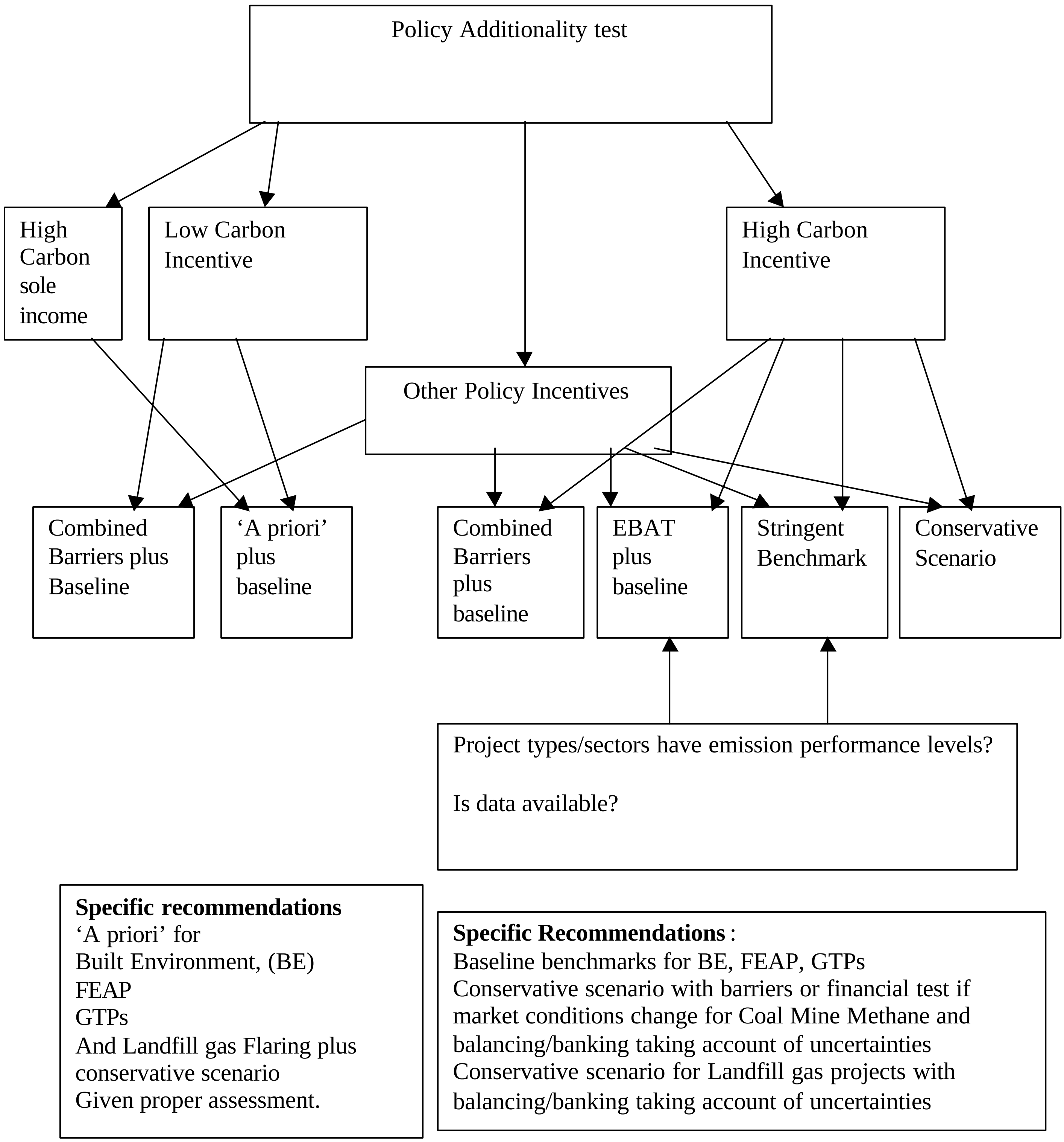
‘A priori’ decisions rely on analysis to show that the project types have low environmental risk through a combination of high likelihood of additionality and the carbon credit risk is low. This requires a judgement by the government.

Combined Barriers and Conservative Scenario can be applied in all cases.
The combined barriers test is most appropriate in sectors where activities are seemingly cost effective but action is not taken. It is efficient at detecting free riders when comprehensive but is open to gaming.

The suitability of barriers test for projects where the viability of the project depends on market prices means that an investment additionality test would be more suitable.

This analysis gives the decision tree, which is set out below in Figure 5-2.

Figure 5-2: Decision Tree for additionality tests



5.6 Policy Questions and Answers

This analysis helps to answer the policy questions that were posed at the start of the Phase 2 study. These are taken in turn.

- ***What are the pros and cons of establishing a separate test for projects vs. seeking to test for additionality solely through the construction of baselines?***

This is an issue of suitability of the test rather than generic advantages or disadvantages of separate additionality tests. Nevertheless the main advantage of a separate test is that it allows the stringency of the additionality test to be set independently of the baseline stringency.

The baseline methods incorporating additionality automatically usually have a strict baseline level that gives them high environmental integrity. However a stringent baseline is not suitable for application to small projects with low carbon incentives as the environmental risk is low with these projects and a strict baseline is unnecessary and would discourage action.

In the case of small low carbon incentive projects it is therefore better to have a separate assessment of additionality so that the baseline can be set at a level which has not be raised to account for additionality. The tests recommended are the combined barriers test or, if justified by analysis, the ‘a priori’ test.

Where the project generates a large amount of credits then environmental integrity has to be strict and the level of stringency can be provided either with a separate EBAT test or combined barriers test and a baseline, or through the stringent benchmark or conservative scenario. The choice will depend on the level of stringency required and the availability and suitability of an EBAT or stringent benchmark in the sector for the project type as discussed in section 5.5.

The final consideration in both the low and high carbon credit cases is the application of the test from the point of view of the regulator. Where a test gives the required environmental integrity and is available, the one performing well in terms of ease of use to minimise transaction costs should be preferred as outlined in chapter 2 of the technical document. For the low carbon credit projects in this analysis, bundling of the projects will be essential so that streamlined methods are important.

Thus from the decision tree we have for **low carbon incentive** projects combined barriers plus the baseline or ‘a priori’ plus the baseline. Where it can be justified ‘a priori’ is preferred. The combined barriers test would have to be streamlined through assessment of a representative project.

Additionality Tests for Low Carbon Incentive Projects

Additionality Test	*Preference in application*
'A priori'	If justified by analysis, use this approach but if not available use combined barriers. Does not require a strict baseline in this case
Combined Barriers	Use on a representative project. Does not require a strict baseline in this case.

From the decision tree we have for **high carbon incentive** projects, EBAT, Stringent Baseline, Combined Barriers and conservative scenario.

Additionality tests for high carbon incentive projects

Additionality Test	*Preference in application*
Stringent Baseline	This provides integrity and is the most streamlined approach if it is available.
EBAT	This is stringent for free riders and is streamlined.
Conservative Scenario	This is stringent but requires more work and time.
Combined Barriers	Can be stringent on additionality but subjective and will require a strict baseline in this case.

- ***If an additionality test is constructed what issues would need to be considered in determining how it would correspond to the baseline.***

This question relates back to the level of stringency required and the balance to be struck to enable projects to be carried out but maintain environmental integrity. Where there is a separate additionality test it could be a combined barriers test, an EBAT or 'a priori'. This will depend on project circumstances. The following gives an example of what may be taken into consideration.

Project circumstances: Low carbon incentive

- For 'A priori' projects where an analysis has established that the project type does not pose an environmental risk,
- For a combined barriers test where the analysis has established that the project type does not pose an environmental risk.

Then a possible approach is as follows.

Lenient approach: assumes that once free riders have been removed from the system, the baseline for the remaining projects could be formulated based on the assumption that project developers would under business-as-usual only observe mandatory policies. The baseline would then correspond with the requirements of mandatory policies or existing practice.

If the baseline is too rigorous there will be no projects carried out, as the reductions are already low.

Project circumstances: High carbon incentive

- For 'A priori' where an analysis has established that the project type does not pose an environmental risk though there is a high carbon incentive;
- For a project which has passed a Combined Barriers test and the carbon incentive is high;
- For a project which has passed an EBAT, but the carbon incentive is high and so the environmental risk could be high.

Stringent approach for 'A priori' and Combined Barriers tests: The baseline is made stringent by consideration of future changes in mandatory and non mandatory policies or trends in the sector. Consideration is also given to current and past activities in the sector. This applies to the ‘a priori’ projects, as there is a risk of overcrediting

or

Stringent approach for an EBAT: An EBAT is a strict test for additionality. The baseline should be set at an emissions level less stringent than the EBAT. However again the choice of level for the baseline is a balance between the reduction incentive and environmental integrity, based on the current and planned investments in the sector. As an EBAT is unable to account well for non mandatory policies which may stimulate project developers to go beyond the standards required by mandatory policies under business-as-usual, a possible solution for dealing with these soft regulations and incentives is to move towards stringency rather than leniency.

Project circumstances: High Uncertainty

Dealing with uncertainty: Generally, there is uncertainty related to assessing additionality and determining baselines. The uncertainty with additionality is caused by the problem that free riders cannot be easily identified so that an assessment must mainly aim at reducing the chances of free riders entering the system. With respect to baselines, the hypothetical character of the baseline scenario causes uncertainty. The choice of the baseline is an arbitrary decision which due to its hypothetical character, can never be monitored nor verified. In order to deal with this uncertainty, a conservative approach especially where the emission reductions are high, should be taken as suggested above. Another powerful safeguard to deal with uncertainty, which has been adopted in the COP negotiations on the CDM project design document and was proposed for the UK project system, is to limit the crediting period to three, 7 year periods with baseline revision or a 10 year limited crediting lifetime.

- ***If a baseline only approach was considered for additionality testing, how could we:***

    (a) ensure consistency across similar project types?

This question applies to the Stringent Benchmark and Conservative Scenario approaches.

Consistency can be achieved by standardising processes and using simple tests.

- Standardising the baseline construction by designing a guidance document, which clearly identifies baseline calculation steps and contains clear instructions for each step is recommended for the conservative scenario approach.
- For the stringent benchmark, once the level is set for the project type in the sector there will be consistency in its application.

(b) minimise gaming

- With the conservative scenario approach there is a risk of gaming. This could be minimised by a standardised approach and defining generic values where possible, which the project developers must use.
- Gaming can be minimised through validation by independent, government-based validators.
- Gaming by the developer is not possible with stringent benchmarks.

(c) maximise additional emission reductions

- Maximising additional reductions always leads to minimising available carbon credits and limiting the number of projects participating. The level at which the Stringent benchmark or the conservative scenario are set, is a fine balance between environmental integrity and discouraging participation and depends on knowledge of the activities in the sector. This may be a situation where a decision is taken on the benchmark level and may have to be reviewed and adjusted. According to the market reaction
- A benchmark-based baseline is easy to validate as the government (or an organisation acting on behalf of the government) determines the GHG emission factors per activity level.
- Validation of project-specific baselines is more complicated as project developers may have an incentive for gaming.

- ***Which design elements should be tailored to project type and sector and which apply generically to all projects?***

The design elements consist of the following aspects.

- Additionality test
- Project Boundaries
- Baseline
- Leakage
- Crediting lifetime

Additionality Test and Baseline

We have shown in the discussions above that the selection of the additionality test and the baseline to be used depends on the sector, the project type, the relevant policies and the size of the carbon reductions. Separate additionality tests and baselines can be tailored to address these issues. Additionality tests and Baselines must therefore be tailored to the project circumstances.

The suitability of Stringent benchmarks as baselines and EBATs as additionality screening tests is also an issue. Either they are not appropriate as in the case of the methane sector or for small-scale projects, or cannot be generated on available data.

In general, the availability of data to create benchmarks as baselines for project types in sectors is a major limiting factor for their use in streamlining the assessment process.

However, where an ‘a priori’ test applies this would involve a standard assessment, whereas a barriers test could be generalised by standardising the list of barriers per project type.

Project Boundaries

In the case studies investigated the approach of one level upstream and one level downstream as a minimum has been sufficient to describe the projects and seems to be generic guidance, which works in practice.

Leakage

The very brief examination of leakage pathways for the projects in this study showed that the pathways, as expected, are project type dependent. However, we found that only in the case of the GTPs did they appear to be significant and in that case study example could not have been quantified.

Our recommendation for low carbon incentive projects would be, to have no correction factor. Our original proposal to have a leakage correction factor that could be generically applied still seems reasonable for larger projects where leakage pathways can be identified.

Crediting Lifetime

Crediting lifetime remains as a powerful safeguard to be applied generically with the choice on the length of the crediting lifetime dependent on input from any future legislation or other policies and consistent with operational lifetimes.

6 Practicalities

6.1 *Ownership*

Ownership refers to the ownership of the carbon credits generated by the reduction activities. According to the Marrakech Accords for the Kyoto Mechanisms, the project boundary shall encompass all emission sources under the control of the project participants. The credits related to these sources are calculated as reductions below the baseline. Emissions due to the project from sources beyond the control of project participants are called leakage. The emission reductions within the project boundary will be adjusted for leakage, so that the eventual number of credits owned by the project participant and eligible for transfer are influenced by changes in emission sources both under control and beyond the control of the project participants. Problems may occur when the owner of the project system has to do the emission reduction investment whereas the emission sources are managed by e.g. tenants, who for themselves may not have a specific interest in reducing emissions. In these cases, the owner must establish control through contractual arrangements.

6.1.1 Built Environment

The problem of ownership of the reductions generated is important in this sector. It creates a real barrier to uptake of projects in the sector unless clear benefits or a mechanism or incentive to obtain clear benefits for the developer can be created. The developer who invests in the sustainable measures is not the person who is realising the reductions enabled by the measures. It is the tenants who are responsible for the amount of reductions actually produced. Only in the owner occupier case is there no problem but most combinations as described in the technical report chapter 3 and listed below will need to take account of the complexity of the arrangements within the sector.

- Owner/Occupier
- Owner/Tenant
- Owner/Management Company/Tenant
- Owner/M.Co./Multiple tenancy

It would be expected that there are a number of avenues that the market could explore to solve the problem.

1. Agree a share of the carbon revenues and make a contractual obligation on the tenant to maintain control systems and maintenance schedules as in the commissioning document on transfer of the building. The revenues would be shared between all interested parties.
2. Agree a one off higher price for the building and the tenant keeps any revenues and energy savings gained.
3. Agree a share of the carbon revenues plus the energy savings as in 1 above.

Problems may arise if the tenant fails to deliver the expected reductions but that may be outside his control and he should not be penalised. There are probably many more variations but some discussion on this aspect is required with sector representatives to ensure that this problem does provide a barrier to participation in the scheme.

The transfer of the building after commissioning would be a good break point to make this arrangement though it could be made from the start especially if the design team have been able to assemble all stakeholders.

Bundling is going to be required for buildings and refurbishment projects are an obvious source of reductions. In that case the owner could also be the beneficiary and there are no further complications. An example could be a chain of shops, where the energy savings accrue to the owner of the chain.

6.1.2 FEAP

With this project again the owner/drivers or small hauliers subcontracted by the large fleets are the people who would create the savings but the large company would be providing the focus and accounting framework for the drivers so that some sort of contractual sharing arrangement would again be required in this sector.

6.1.3 Other study sectors

For the Coal Mine Methane projects producing mainly electricity there is no question about control over reductions. The same applies to the Landfill Gas Flaring or electricity production. Where heat is supplied to another company then some contractual credit sharing agreement may be required. GTPs can be considered to be within the control of the company though employees must create the reductions through the reduction in car commuting.

6.2 Sector Interest

6.2.1 Built Environment

In terms of sector interest, the Built Environment sector can potentially deliver large carbon benefits but as carbon reductions per building are relatively small, bundled projects will be required. Examples given already are refurbishment lighting projects. To bundle and go through the validation and verification processes will require a high level of cooperation and incentives internally in the company responsible.

Resources to carry out a pilot scheme are needed to make sure that the barriers of ownership and bundling can be surmounted in practice as well as gain more experience at putting sustainable design into practice through an integrated approach to the building process. Analysis to identify cost effective carbon reduction design elements, which could be targeted for design, would be very useful. It is also clear that more data on building performances needs to be collected and some mechanism could be put in place in advance of the EU legislation to improve the current database and apply performance log to all buildings.

All these measures would improve the interest and participation in this sector.

6.2.2 FEAP project

Though the incentive for the small hauliers is individually very small and their engagement in the process was considered to be problematic, new information emerging in the sector suggests that there may be a possible way forward. The engagement of the small hauliers will not be easy but it appears that through the large fleets there may be a way of structuring the system and providing the framework needed to get them engaged. This really needs some resources to do a trial project. In addition further work is required on improvement of utilisation through improved logistics, which potentially could be a very useful direction to explore at the same time. Again benchmark performance levels for subsectors to streamline the process need to be generated.

Other systems to consider are telematics that will be required under the Road haulage charging system, which could enable information at the lorry level to be gathered. This is discussed in more detail in an attachment to the Technical document.

6.2.3 GTPs

The level of carbon incentive is so low that we do not consider that there will be interest in this sector as transaction costs will outweigh any carbon incentive.

6.2.4 Coal Mine Methane

There is a great deal of interest from this sector especially under current market conditions for electricity. These projects benefit the environment and should be encouraged where they are additional.

6.2.5 Landfill Gas

At present there is almost no activity in this sector but this initiative has prompted interest from one company ONYX who have some experience in preparing projects of this type. The projects they have assembled are viable with the current carbon price and should start to encourage other actors in the sector to take part to flare methane from the old landfill sites.

There is already activity in terms of electricity generation from landfill gas.

6.3 Bundling

For all projects, but especially for small-scale projects, it is essential that ways be found to streamline the process and minimise costs associates with the preparation and validation of the project design document. To do this we have tried to suggest throughout the technical document minimum data to be recorded with minimum effort and minimum requirements for verification using existing systems wherever possible.

Bundling means that similar projects can be grouped together to have a common baseline and that the additionality test applies to all. Benchmark baselines facilitate this but there are few available in the sectors studied. We have suggested that a representative project is chosen from the bundled set and used to create the baseline and to choose the appropriate additionality test and check for policy additionality. Monitoring still has to be done for individual projects but verification need only be on a spot check basis rather than every small project.

Bundling also requires an administrative structure to act as a focal point and co-ordinate the data collection and interaction with the emissions trading system. There are therefore cost savings in minimising the individual application of the tests but additional costs in this additional administration. As far as possible existing structures need to be used for that process.

Some assistance and trials of bundled projects would be useful to progress practical knowledge in this area to enable the FEAP and the built environment projects to be realised.

6.4 Transaction costs

The transaction costs for an emissions trading project relate to:

- the project design; preparation of the project design document (see Phase 1 report)
- validation
- the monitoring and verification of the project outcomes.

In the project cycle, at the project design phase, transaction costs are involved in the determination of the baseline for the project as well as the deciding on the project's additionality, as far as not already covered by the baseline. In the design phase, costs are also involved in the design of a monitoring and verification plan.

After having completed the design phase, the project design document must be validated, which involves another transaction cost. Once implemented the project's emission reduction achievements must be monitored in order to make sure that the planned reductions from the baseline are really taking place. After the project's crediting lifetime, the monitored results must be verified.

In the literature discussions on emissions trading projects (*e.g.* JI and the CDM under the Kyoto Protocol), it is generally argued that in order to enable the project mechanisms to significantly realise cost-effective emission reductions, transaction costs should not become prohibitively high. Especially from the viewpoint of potential investors there is a great interest in streamlining processes in order to keep transaction costs low. Others have argued that the level of transaction cost itself is not important, but the environmental integrity of the project. The latter viewpoint assumes that higher transaction costs represent stricter procedures leading to higher-quality carbon credits.

Directly related to the above discussion is the issue of how to deal with baselines and additionality. Detailed baseline studies and additionality assessments for a project are likely to bring more detailed information into a baseline scenario and provide a better filter to limit the number of free riders who gain emission reduction credits from project they would have carried out anyway. Such a detailed approach, however, is likely to lead to relatively high transaction costs. On the other hand, less detailed additionality and baseline approaches could lead to more free riders in the system and a higher business-as-usual emissions reference scenario. This trade-off – high environmental integrity, but high transaction costs versus low transaction costs, but lower environmental integrity – reflects the spectrum within which an balanced approach must be found that sufficiently guarantees environmental integrity and keeps transaction costs at an acceptable level.

Where this balanced approach is found depends also on the project type and size. The UK case study projects examined are all relatively small in terms of CO_2 emission reduction credits, although not in terms of the size of the investment. This implies that transaction costs could be a relatively important consideration in the decision on whether to proceed with the extra emission reduction efforts under the project. This is in line with the recommendation in chapter 3 of the technical document, that the project types studied in the case study analysis could best be considered 'a priori' additional, given that they are small and based on the assessment that their implementation would not hamper the environmental integrity of the carbon credit generation.

What the transaction costs of developing an emissions trading project are is difficult to determine. The costs for setting up the project design document of a Chile-USA AIJ project amounted to $ 1 m for a $ 21 m total investment; the transaction costs for an energy efficiency Latvia-Sweden AIJ project amounted to $11,700 for a total investment of $1m. The transaction costs of developing a large-scale energy sector AIJ project in China amounted to $0,5 m for a total investment of $ 27m. In sum, in the AIJ pilot phase transaction cost for project design and monitoring and verification varied from 2-5% for large-scale energy sector projects to 10-15% or even higher for small-scale projects (scale in terms of CO_2 reduction) in that sector. Given that UK projects will probably be a lot easier to design than several AIJ projects envisaged to be set up in regions in developing countries and in Central and Eastern Europe, the costs for UK project will have to be significantly lower.

As a rough estimate for a large project, the following might serve as an example of what the costs associated with the project cycle may look like:

Task	Days	Rate per days (£)	Costs
Project identification	2	600	1200
Data collection + interviews	3	600	1800
Additionality assessment	2	600	1200
Barriers assessment			
Baseline calculation	2	600	1200
Design m&v plan	2	600	1200
Validation	2	600	1200
Total	15		7,800

These costs are still high and would need to be significantly reduced for the small-scale projects if there is to be engagement in the sectors.

7 Guidance

In order to assist project developers in designing the project, it is recommended a project design guidance document is made available. This guidance contains a step-wise instruction for the process of calculating the GHG emission reductions that can be achieved through the project. After determining the policy additionality of the project, these steps involve: the assessment of additionality, setting the project boundaries, determining the baseline for the project system within the boundaries, identification of leakage, and the design of a monitoring and verification plan to be used during the project implementation. Once the steps have been completed this project design document will be subject for validation. The guidance document should therefore also be made available to the validators when they reassess the steps and recalculate the values found for each step.

The guidance provides ample scope for standardisation. First, standardisation is achieved by standardising the steps and by providing specific instructions of what project developers need to do in order to make the project eligible for validation. Second, standardisation can be further achieved by providing generic values for those parameters, which on the basis of case study analysis and sector analysis have been considered eligible for generalisation.

The Technical Document report of this study contains an illustrative example of what a guidance document looks like (section 9). Preferably, it consists of two volumes: one introductory, booklet-like volume which introduces the project developer into the specifics of emissions trading projects under the UK ETS and into the several issues related to designing such projects; the second volume provides specific guidance for each priority sector with, where possible, generic values for the steps to be taken in the project design phase.