CLIMATE CHANGE CLASSIFICATION METHODOLOGY

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Introduction

The purpose of this document is to provide detailed guidance on classifying PIDG funded projects in terms of their climate change mitigation and adaptation benefits. The classification system sets out a typology of activities across the nine sectors PIDG is typically involved in that are deemed to have a climate change mitigation co-benefit and a list of projects that may qualify as climate change adaptation. This will enable The PIDG and its members to monitor and demonstrate the climate change impact of their investments and help promote climate business through its private sector mandate.

Monitoring, tracking and reporting financial flows that support climate change mitigation and adaptation has become increasingly important due to the pledge by industrialised countries to scale up climate finance to 100 billion a year by 2020.[1] However, at present there is no internationally agreed method or consensus on how to best do this. This is due to the complexity of tracking climate finance with multiple types of financial flows, distributed via multiple channels, in a variety of countries and serving multiple aims.[2] In this complex landscape, keeping track of financial support for adaptation and mitigation is challenging.

This guidance document and the accompanying classification system is a transparent system for recording the climate impact of the PIDG's funding streams. At present it is based on a qualitative assessment of a projects impact but in the future could be adapted to reflect a quantitative account of green house gas (GHG) emission savings.

This guidance document is structured as follows:

1) **Section 1** provides a background to the ongoing development of classification systems to monitor climate change finance;
2) **Section 2** sets out the approach to classifying PIDG funded projects and describes a decision tree to help staff determine how to classify climate-related activity;
3) **Section 3** contains the detailed classification table of projects that are deemed to have a positive impact on climate change mitigation or adaptation. The table is organised by sector and provides examples of qualifying projects and conditions that should be met in order to support the classification process; and
4) **Annex 1** provides a description and explanation of different types of measures to reduce GHG emissions from the nine sectors PIDG is involved in. The aim of this is to provide context and support in correctly classifying projects.

[1] Rafo (2012) Defining "Mobilized" Climate Finance: Solving a Fractal Conundrum [online] available at: http://www.oecd.org/environment/climatechange/50034085.pdf

[2] World Bank (2012) Joint MDB Report on Mitigation Finance [online] available at: http://climatechange.worldbank.org/sites/default/files/MMF_2011_version_21.pdf

1 Section 1: Background to Tracking Climate Finance

1.1 Broadly speaking there have been two approaches to developing systems for tracking the flow of climate finance; the Rio Markers developed by the OECD and independent classification systems developed by Multilateral Development Banks (MDB). These two approaches vary significantly and are discussed in turn below.

1.1 Multilateral Development Banks

1.1.1 MDBs are a large source of development assistance with significant climate benefits, and they are engaged in sectors that are critical for climate action. Drawing on their experience in providing economy-wide support for sustainable development and emerging climate finance instruments, they have started to develop systems for recording the impact of their investments. It is estimated that over 2006–07 MDBs invested about $4.2 billion annually in low-carbon activities, with an approximate leverage factor of 3.8—that is, activity volumes that compare with bilateral Overseas Development Aid (ODA).[3]

1.1.2 MDBs do not, however, report their activities in a consistent manner across institutions, and information on adaptation is often scarce. Discrepancies relate to the classification of sectors and sub-sectors. In addition, there is no indication of a specific share of an MDB's resources (be it ODA or not) that is dedicated to climate action. MDBs are actively improving their monitoring systems in this respect, in particular with regard to consistency across agencies.[4]

1.1.3 In order to support progress in this direction, in early 2011, the Vice Presidents of the MDBs – the African Development Bank (AfDB), the Asian Development Bank (ADB), the European Investment Bank (EIB), the Inter-American Development Bank (IDB), the European Bank for Reconstruction and Development (EBRD) and the World Bank Group (which includes the International Bank for Reconstruction and Development, IBRD, and the International Finance Corporation, IFC) – agreed to undertake joint efforts leading towards developing **common approaches for tracking climate change mitigation and adaptation finance**, with the IDB coordinating efforts on mitigation and the AfDB coordinating efforts on adaptation. [5]

1.1.4 MDBs have produced a joint approach, which includes a positive list of activities which lead (according to the available evidence) to GHG emission reductions as compared to other available options (regardless of whether the decision-maker makes their decision based on the development or the climate benefits of the activity). The MDBs are now preparing a joint report on climate mitigation finance based on this approach.[6]

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[3] The World Bank (2010) Monitoring Climate Finance and ODA [online] available at: http://climatechange.worldbank.org/climatechange/sites/default/files/documents/DCFIB%20%231-web.pdf

[4] ibid

[5] Climate Investment Funds (2012) Additionality of CIF to existing MDB Portfolios – Submission by CIG MDBs [online] available at: http://www.climateinvestmentfunds.org/cif/sites/climateinvestmentfunds.org/files/CTF_SCF_11_Additionality_of_CIF_to_Existing_MDB_Portfolios.pdf

[6] ibid

1.1.5 In the adaptation domain, where more uncertainties remain, MDBs have initiated a discussion process to identify the main issues at stake, and expect to produce a similar common approach and adaptation finance report by the end of 2012. [7]

1.2 OECD DAC and the "Rio Markers"

1.2.1 It is recognised that as well as funds from MDBs, the disbursement of conventional ODA can have significant mitigation and adaptation co-benefits. Tracking these contributions to climate action in full is difficult, with the exception of targeted funds and initiatives (such as the Climate Investment Funds), but progress has been made in understanding what proportion of these funds have climate change mitigation as a 'principal' or 'significant' policy objective.

1.2.2 OECD DAC introduced a system of monitoring aid that targets the objectives of the Rio Conventions (the so-called **Rio Markers**) in 2008 for mitigation and in 2010 for adaptation. The Rio Markers system is perhaps the most advanced initiative to monitor, report, and verify financial and investment flows across a range of countries and sectors. They are relatively simple and transparent to apply, and it has recently become mandatory for all donor countries to classify the funds they distribute according to the "Rio Markers".

1.2.3 As they report their aid activities to the OECD Creditor Reporting System database, DAC members indicate the policy objective of aid activities (against the UNFCCC, UNCCD & CBD) and score its relevance with one of three values: "0–not targeted," "1–significant objective," or "2–principal objective." The full value of projects whose principal objective is adaptation or mitigation can be reported as climate finance while only a portion of projects whose secondary objective is mitigation or adaptation can be.

1.2.4 As described below the approach developed for assessing the impact of PIDG projects incorporates elements of both of these approaches.

[7] ibid

2 Section 2: Approach to Classifying PIDG Projects

2.1 The difficulty with applying the Rio Markers to the classification of PIDG projects is that rarely will the projects have climate change mitigation or adaptation as a primary or even secondary policy objective. Given the pro-poor focus of the PIDG, the principal objective of the funds is to aid development and economic growth in developing countries. PIDG projects, like those funded by other MDB "*remain first and foremost developmental, and climate objectives are generally only secondary considerations*".[8] However, while the projects may not explicitly set out to reduce emissions or help communities adapt to climate variability or extremes, they will often have significant and intermediate climate change impacts. Restricting the definition to those used under the Rio Markers would miss out a range of projects that can legitimately be claimed to have significant and intermediate climate change co-benefits.

2.2 It is necessary however to treat climate change mitigation and adaptation differently. This is because of the acknowledged overlap between ODA and finance for adaptation and the concern amongst developing countries that the US$100 billion a year pledged by industrialised countries will lead to a redirection and/or reduction in ODA. There is a need to ensure that the development-focussed PIDG funds are not relabelled as climate change adaptation funds. The classification of projects in terms of adaptation takes this into consideration. In line with the definition used for the Rio Markers, only projects whose ***principal objective*** is climate change adaptation can be assigned to tier 1. Examples of tier 1 projects include the construction of sea defences to protect against rising sea levels and climate-proofing infrastructure. Given the focus of PIDG, it is not expected that many, if any, projects will be assigned to tier 1. In line with the Rio Markers, projects whose ***secondary objective*** is climate change adaptation are assigned to tier 2.

2.3 However, as stated, even if the objective of the PIDG-funded projects is not adaptation, they may nevertheless have significant climate change adaptation co-benefits. These types of projects include:

- the construction of silos to protect wheat crops from existing weather;
- the construction of access routes to communities that will help speed up evacuation procedures during weather disasters;
- installation of micro-generation and community scale energy systems to promote energy security in remote communities; and
- promotion of water efficiency and grey-water recycling to reduce pressure on freshwater resources.

[8] OECD and IEA (2011) Expert Workshop on Tracking Long-Term Climate Finance from the Private Sector and the Multilateral Development Banks – Chair's Summary [online] available at: http://www.oecd.org/dataoecd/5/50/49107336.pdf?bcsi_scan_AB11CAA0E2721250=0&bcsi_scan_filename=49107336.pdf

2.4 To provide the PIDG with a better understanding of the proportion of their projects that have significant climate change adaptation co-benefits, these types of projects have been classified as tier 2.

2.5 Based on the comparison of existing classification systems the approach developed here entails:

1) Recording the climate change impact of projects across the following nine sectors: Energy, Transport, Housing, Information & Communication Technologies, Water & Sanitation, Waste, Agriculture & Forestry, Mining & Industry and Capital Markets Development;

2) Assessing projects in terms of both their contribution to climate change mitigation and climate change adaptation.

3) Classifying projects based both on their **objective** and their likely **impact** on climate change mitigation and adaptation; and

4) Development of a three tiered approach to distinguish between those projects whose **principal objective** relates to climate change and/or whose actions can be considered a **'step-change'** in terms of reducing GHG emissions to those projects where climate change forms **an important part of the project scope and/or where GHG emission reductions are incremental** and cannot be considered a 'step change' (see box 1). For adaptation the tiered approach differentiates between projects whose **principal objective** is climate change adaptation from those projects whose **secondary objective** is adaptation, or that are likely to lead to **significant adaptation co-benefits** (see box 2).

1.1 Definitions of climate change mitigation and adaptation

Climate change mitigation and adaptation can be defined as follows[9]:

Mitigation implies either reduction in emissions of GHG into the atmosphere or absorption of them from the atmosphere.

2.1.1 A range of activities and projects can support climate change mitigation. For the purposes of classifying PIDG projects, activities should be classified as 'mitigation' if they:

a) lead to the expansion of renewable energy technologies;
b) increase energy efficiency and/or reduce energy intensity;
c) improve or expand the capacity of carbon sinks to absorb carbon dioxide from the atmosphere;
d) lead to energy conservation through reducing the need to use energy; or
e) promote demand-side energy management and efficiencies.[10]

2.1.2 At this stage there is insufficient information about the GHG emissions profile of PIDG-funded projects and their GHG savings relative to a Business as Usual (BAU) baseline to undertake a quantitative assessment. PIDG projects should be classified based on a qualitative assessment of their contribution to climate change mitigation and adaptation and assigned to one of the three tiers defined in boxes 1 and 2.

Adaptation implies reduction in the vulnerability of human or natural systems to the impacts of climate change and climate variability related risks by maintaining or increasing adaptive capacity and resilience.

2.1.3 For the purposes of classifying PIDG projects, activities should be classified as 'adaptation' if their objective is to:

a) reduce the risk, exposure or sensitivity of human or natural systems to climate change and climate variability;
b) increase climate resilience (i.e. the ability of a system to adapt to effects and impact of climate change);

2.1.4 As stated above, it is apparent from the definition of adaptation that conventional development assistance will contribute to adaptation. Therefore to avoid labelling development as adaptation, projects should only be classified as tier 1 if they explicitly include

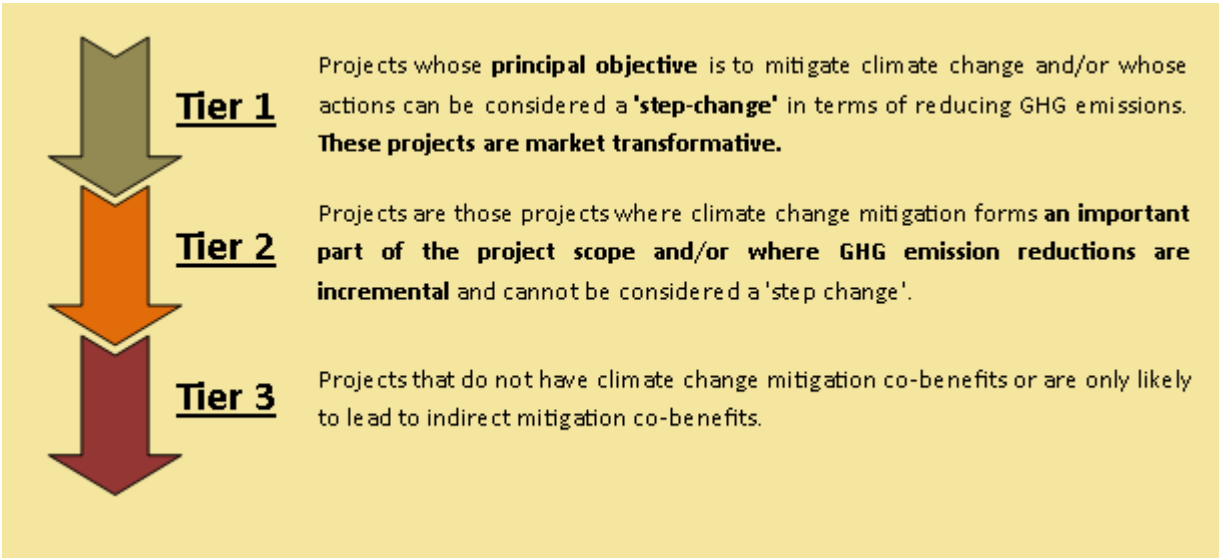
[9] IFC (2011) Climate-Related and "Green" Activities Definitions and Guidance Note [online] available at: http://www1.ifc.org/wps/wcm/connect/534495804a803b32b266fb551f5e606b/Climate+coding+Definitions+guidance+note.pdf?MOD=AJPERES

[10] ibid

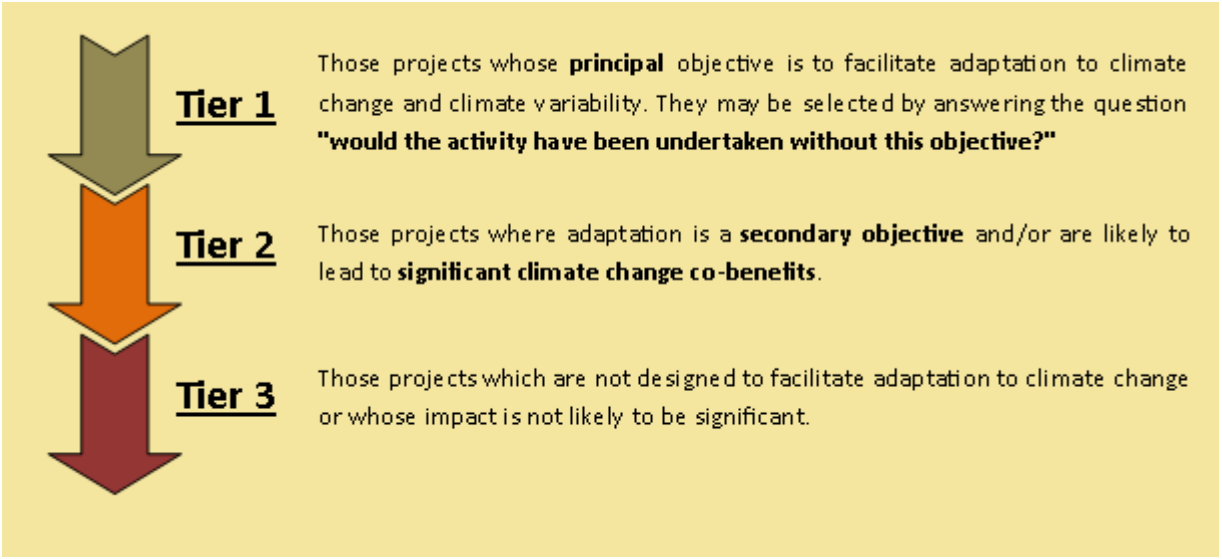
climate adaptation reasoning and directly address vulnerability to climate change. [11] Those projects that are likely to have significant adaptation co-benefits are assigned to tier 2 (see box 2).

2.1.5 Given the qualitative assessment of climate change impacts, it is necessary to distinguish between projects that have a significant as opposed to an incremental impact. The following definition of different tiers should be used to help classify different projects:

Box 1: Definition of climate change mitigation tiers



Box 2: Definition of climate change adaptation tiers



[11] This approach has also been adopted by the IFC. See http://www1.ifc.org/wps/wcm/connect/534495804a803b32b266fb551f5e606b/Climate+coding+Definitions+guidance+note.pdf?MOD=AJPERES

To aid classification of PIDG funded projects the following decision trees should be followed:

Figure 1: ***Climate change mitigation decision tree***

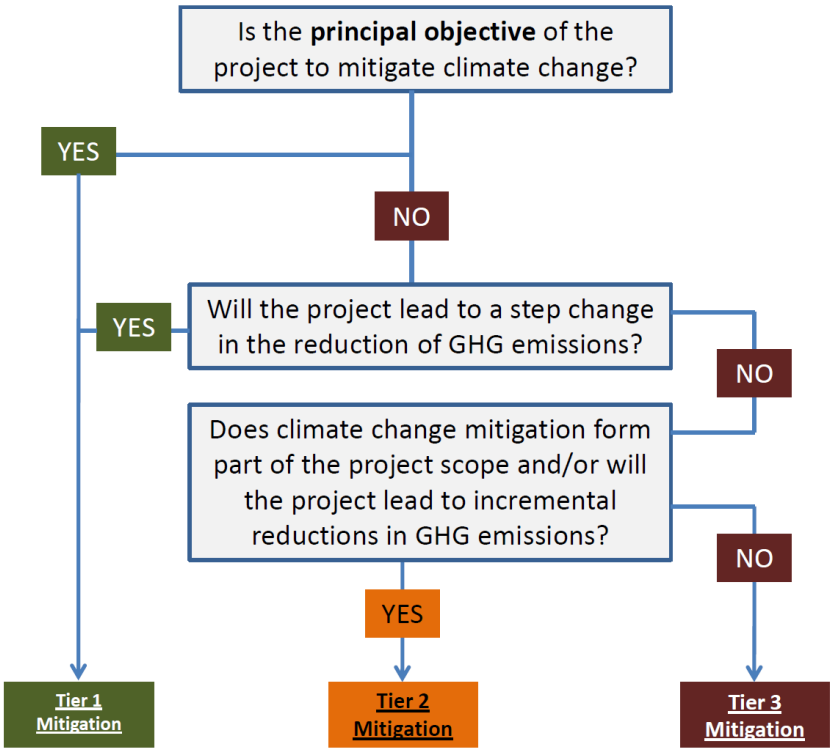
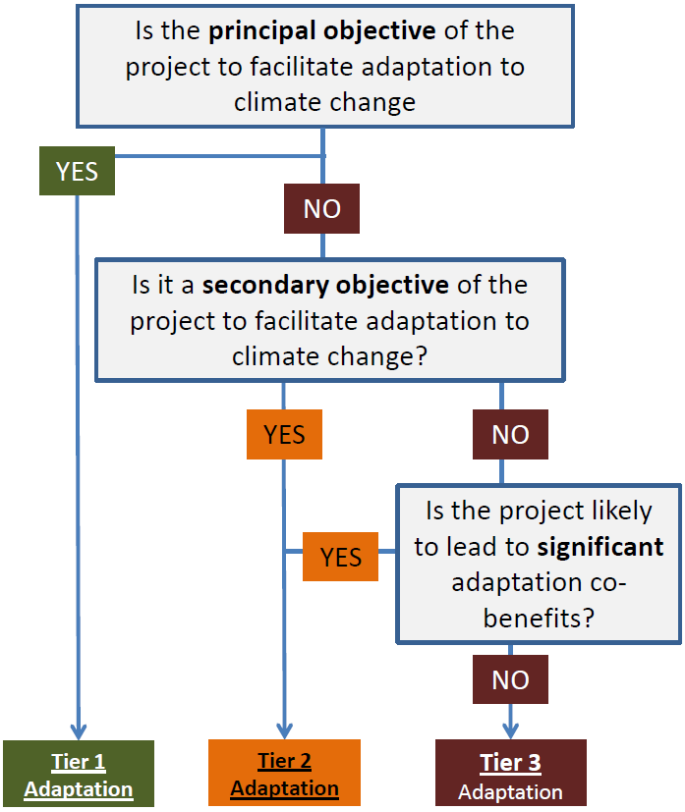


Figure 2: ***Climate change adaptation decision tree***



3 Section 3: Climate Change Mitigation and Adaptation Classification Tables

3.1 The following tables set out a typology of projects for different sectors that contribute towards climate change mitigation and adaptation. They are organised by the following nine sectors:

- Energy
- Transport
- Housing
- Information & Communication Technologies
- Water & Sanitation
- Waste
- Agriculture & Forestry
- Mining & Industry
- Capital Markets Development

3.2 The sectors are further broken down into sub-sectors. For example the energy sector is broken down into renewable energy, energy efficiency, demand side management, more efficient power generation, and conventional energy and power. Within each subsector there are a list of qualifying projects, any conditions that should be met for that type of project and, where applicable, an illustrative example.

3.1 Instructions for classifying projects

3.1.1 The following steps should be taken to classify a PIDG-funded project:

1) The decision trees should be used for both climate change mitigation and adaptation to give an indication of which mitigation and adaptation tier the project should be assigned to;

2) For mitigation refer to the sector-specific classification table and assign the project to a sub-sector and type of project within the correct tier. Take note of any conditions that should be met in the 'qualification' column and the example given. Where there is no relevant sub-sector or type assign the project to 'other' and explain and justify the classification.

3) For adaptation refer to the adaptation table that applies to all sectors and as above assign the project to a sub-sector and type.

4) For both mitigation and adaptation provide a justification for assigning the project to the tier level and the sub-sector. For tier 1 and 2 projects this justification should be robust, transparent and defensible.

Energy

Tier 1

Sub-sector	Type of qualifying projects	Qualification	Example
Renewable Energy	Wind Power	-	-
	Biofuels/biomass	If the Biomass/bio-energy used is from non-sustainable sources and might contribute to increased levels of deforestation and degradation, then assign to Tier 3. To assign to Tier 1 requires very strong evidence base.	Production of secondary or tertiary biofuels for power generation.
	Geothermal	-	-
	Solar PV/Solar thermal	-	-
	Hydro with storage	If the size and depths of the hydropower storage is likely to lead to methane emissions this project should be assigned to Tier 2.	
	Hydro run of the river	-	-
	Tidal/ Wave power	-	-
	Waste to energy	n/a	Methane power generation; incineration
Energy Efficiency	Energy efficiency projects	Projects must lead to a significant improvement in energy efficiency over a significant scale.	City-wide improvements to street lighting efficiency.
	CHP, CCHP and Waste Heat Recovery	Project must lead to significant rather than incremental reductions in GHG emissions.	CHP plant that provides district heating to domestic houses
	Power station upgrade	Project must lead to significant rather than incremental reductions in GHG emissions.	Rehabilitate an existing power plant to decrease emissions
	Rehabilitate transmission and distribution systems to reduce technical losses	Project must lead to significant rather than incremental reductions in GHG emissions. Do not include new or expansion of capacity in transmission and distribution systems.	Network wide improvements to reduce transmission losses
Carbon Capture and Storage	Carbon Capture and Storage (CCS) projects	-	-
Demand side energy management	Smart grids	-	-
Other Tier 1 Energy	Please state and justify	-	-

Tier 2

Sub-sector	Type of qualifying projects	Qualification	Example
More efficient power generation	More efficient generation but using the same fuel	-	Installation of more efficient combustors or power generators
	Fuel switch	-	Gas fired power station in place of a coal or heavy fuel oil

			power plant
	Grid extension to displace Kerosene burning	-	Displace the use of individual kerosene burners or diesel generators in remote areas with a less carbon intensive option.
Energy Efficiency	Energy efficiency projects	Incremental improvements to GHG reductions	-
	CHP, CCHP and Waste Heat Recovery	Incremental improvements to GHG reductions	-
	Power station upgrade	Incremental improvements to GHG reductions	Rehabilitate an existing power plant to decrease emissions
	Rehabilitate transmission and distribution systems to reduce technical losses	Incremental improvements to GHG reductions	-
Other Tier 2 Energy	Please state and justify	n/a	-
Tier 3			
Sub-sector	**Type of qualifying projects**	**Qualification**	**Example**
Conventional Energy and Power	Grid Extension (both gas and electricity)	-	-
	Oil/coal fired power station	-	-
Other Tier 3 Energy	Please state and justify		

Transport

Tier 1

Sub-sector	Type of qualifying projects	Qualification	Example
Roads & Highways	A 'step change' to lower carbon modes of road and highway transport	Incremental improvements to vehicle emissions are not sufficient, nor are a switch from, for example, petrol to CNG/LPG unless it is part of preparing and implementing a national policy.	Projects that support a shift from petrol to hydrogen vehicles
	Improve vehicle emission and/or fuel efficiency standards.	Need to be market transformatory	Introduction of vehicle emission and/or fuel efficiency standards where none existed before or significant tightening of existing standards
	Enhanced traffic management, reduced congestion or improved traffic flow.	Need to be market transformatory. If the project is likely to lead to additional usage of road infrastructure then assign to tier 3. Strong evidence base is necessary.	Redesign road network with the primary purpose of reducing congestion and therefore emissions
	Bus network	-	Introduce a bus network to reduce the use of the car
Ports, waterways and shipping	Transfer of bulk transport from roads and railways to ships as justified by reducing the carbon footprint per ton of cargo transported	Project must result in significant reductions in GHG emissions	Increase capacity of a port with the objective of enabling greater transport of freight by sea rather than by air.
Railways Railways	Build new or improve and expand rail networks	Project must result in significant reductions in GHG emissions	Introduction and expansion of high speed trains
	Fuel switch from conventional diesel or coal railcars to electric railcars	If electric railcars run off a carbon-intensive grid, then this type of project does not qualify.	-
Cycle and pedestrian	Creation of cycle and pedestrian infrastructure/routes that will displace existing or potential travel by conventional modes of transport	-	-
All Tier 1 Transport	Biodeisel for transport	If it is replacing a more GHG intensive fuel and if the bio-diesel is from a sustainable source. To assign to Tier 1 requires a strong evidence base.	Replacing petrol with sustainably sourced bio-ethanol
	Projects whose explicit aim is to avoid the necessity for people to travel altogether.	Very strong evidence base required and it must be the principal objective	ICT infrastructure provided to avoid the need for business travel
Other Tier 1 Energy	Please state and justify	-	-

Tier 2

Sub-sector	Type of qualifying projects	Qualification	Example
Roads & Highways	Shift to lower-carbon modes of road and highway transport	Incremental improvements	A shift from petrol to CNG/LPG
	Improve vehicle emission standards and/or fuel efficiency standards	Incremental improvements	Gradually replacing an old taxi fleet with a new, and more fuel efficient taxi fleet
	Enhanced traffic management, reduced congestion or improved traffic flow.	Incremental improvements	Traffic management to reduce GHG emissions per unit transported (e.g speed limits, high occupancy vehicles)
Ports, waterways and shipping	Improve the fuel efficiency of ships and port facilities	-	-
Aviation	Improve the fuel efficiency of planes and use lower carbon fuels	-	-
Railways	Improve and expand rail networks e.g. introduction and expansion of high speed trains	In contrast to tier 1 projects these projects involve more moderate extension projects and improvements.	-
	Regenerative breaking	-	-
Public Transport Systems	Promoting greater use of public transport	-	Awareness raising campaign
Cycle and pedestrian	Promoting greater uptake of walking and cycling	-	Awareness raising campaign
Other Tier 2 Transport	Please state and justify	-	-
Tier 3			
Sub-sector	**Type of qualifying projects**	**Qualification**	**Example**
All Tier 3 Transport	Projects that are not likely to have mitigation co-benefits or whose impact will be indirect	-	-

Housing			
Tier 1			
Sub-sector	**Type of qualifying projects**	**Qualification**	**Example**
Renewable energy and energy efficiency for buildings	Install new heating and cooling systems in houses using renewable energy	The must lead to significant GHG emission savings rather than incremental improvements	Policy mandating that all new builds incorporate renewable energy into the development.
	Green building design (LEED or BREEAM certified buildings)	The principal objective of the project must be to reduce emissions from new builds. Level will vary depending on the country context - in some cases a basic LEED/BREEAM rating could be sufficient.	Policy mandating that all houses should be designed to an appropriate BREEM/LEED level.
	Retrofit old buildings to provide energy savings	Needs to demonstrate significant improvements relative to the baseline, not just incremental improvements	City wide programme to retrofit houses to increase their energy efficiency. Individual projects will not qualify.
	Installation of cookers using renewable energy (solar/ bio-energy)	Bio-energy must be from non sustainable sources (if the sustainability of bio-energy cannot be proven then assign project to Tier 3)	
Transport/access	New Housing or refurbished housing includes multimodal interchange and/or is car free/near city centre	Needs to demonstrate significant improvements relative to the baseline, not just incremental improvements	New development is cited specifically to reduce car usage
Other Tier 1 Housing	please state and justify		
Tier 2			
Sub-sector	**Type of qualifying projects**	**Qualification**	**Example**
Fuel switch	Switching from a more emission-intensive energy supply to a less emission-intensive energy supply (e.g. oil to gas)	Not applicable if part of a wider national change in energy supply. Must be a project-level (e.g. group of houses) initiative	Change a towns fuel supply from oil to gas.
Energy efficiency	Incremental energy efficiency improvements to building fabric or appliances	Project level (i.e. group of houses) initiative	Upgrading to energy efficient light bulbs in houses
Behavioural change	Encourage behavioural change in relation to energy use within buildings	n/a	Awareness raising campaign around energy efficiency in the home.
Other Tier 2 Housing	please state and justify		
Tier 3			
Sub-sector	**Type of qualifying projects**	**Qualification**	**Example**
All Tier 3 Housing	Projects that are not likely to have mitigation co-benefits or		slum redevelopment,

	whose impact will be indirect		finance to home-owners

ICT			
Tier 1			
Sub-sector	**Type of qualifying projects**	**Qualification**	**Example**
Energy Efficiency	Improve energy efficiency in information technologies	A step change in GHG emission reduction	Significant energy efficiency improvements to data servers
	Improve energy efficiency in telecommunications systems	A step change in GHG emission reduction	Designing low energy base station sites and ones that run off renewable energy
Tier 1 ICT	Please state and justify		
Sub-sector	**Type of qualifying projects**	**Qualification**	
Energy efficiency	Improve energy efficiency in information technologies	Incremental GHG savings	Incremental energy efficiency improvements to data servers
	Improve energy efficiency in telecommunications systems	Incremental GHG savings	Implementing infrastructure optimisation and sharing
Other Tier 2 ICT	please state and justify		
Tier 3			
Sub-sector	**Type of qualifying projects**	**Qualification**	**Example**
All Tier 3 ICT	please state and justify		

Water & Sanitation

Tier 1

Sub-sector	Type of qualifying projects	Qualification	Example
Water & Wastewater	Reduce or capture methane emissions from wastewater treatment and distribution	n/a	-
	Energy generation from wastewater	n/a	Sludge incineration; production of biogas; hydrogen from wastewater
	Energy efficiency improvements to water and wastewater infrastructure	Project must result in significant reduction in GHG emissions and not just incremental improvements	Significant improvements to pumping efficiency across the network
	Incorporation of renewable energy into water and wastewater infrastructure	Project must result in significant reduction in GHG emissions and not just incremental improvements	-
	Reduce energy consumption during wastewater treatment	Project must result in significant reduction in GHG emissions and not just incremental improvements	-
Other Tier 1 Water and Sanitation	Please state and justify	-	-

Tier 2

Sub-sector	Type of qualifying projects	Qualification	Example
Water & Wastewater	Reduce or capture methane emissions from wastewater treatment and distribution	In contrast to Tier 1 projects, these projects result in incremental rather than significant reduction in GHG emissions.	-
	Energy generation from wastewater	In contrast to Tier 1 projects, these projects result in incremental rather than significant reduction in GHG emissions.	-
	Energy efficiency improvements to water and wastewater infrastructure	In contrast to Tier 1 projects, these projects result in incremental rather than significant reduction in GHG emissions.	-
	Incorporation of renewable energy into water and wastewater infrastructure	In contrast to Tier 1 projects, these projects result in incremental rather than significant reduction in GHG emissions.	-
	Reduce energy consumption during wastewater treatment	Incremental improvements rather than a step change in energy conservation and efficiency	-
	Reduce per capita water consumption using demand side measures	n/a	Installation of water efficient appliances
Other Tier 2 Water & Sanitation	Please state and justify	-	-

Tier 3

Sub-sector	Type of qualifying projects	Qualification	Example
All Tier 3 Water & Sanitation	please state and justify		

Waste

Tier 1

Sub-sector	Type of qualifying projects	Qualification	Example
Waste Prevention	Avoiding the use of primary materials for manufacturing through waste avoidance and material recovery (i.e. the GHG emissions associated with the use of primary materials – mostly energy-related – are avoided)	Projects can only be classified here if their principal objective is to mitigate climate change. Requires strong justification.	Significant increase in reuse/ recycling of materials (e.g. steel) which leads to a reduction in primary extraction.
Waste to Energy	Waste incineration with electricity generation and/or excess heat used to implement a district heating system	Project must lead to a step change in terms of reducing GHG emissions and not simply lead to incremental change.	Gasification or Pyrolysis plant
Landfill gas capture	Capture methane and/or use it for energy generation	Project must lead to a step change in terms of reducing GHG emissions and not simply lead to incremental change.	Installation of a landfill gas capture system
Composting	Aerobic processing to avoid methane emissions	Project must lead to a step change in terms of reducing GHG emissions and not simply lead to incremental change.	-
Other Tier 1 Waste	please state and justify	-	-

Tier 2

Sub-sector	Type of qualifying projects	Qualification	Example
All	Incremental improvements to reducing GHG emission from the waste sector	In contrast to Tier 1 projects, these projects result in incremental rather than significant reduction in GHG emissions.	-
	Encourage/legislate for increased recycling/re-use	n/a	Stipulate material re-use rates for construction projects
Household waste	Encourage recycling	n/a	Awareness raising campaign
Other Tier 2 Waste	please state and justify	-	-

Tier 3

Sub-sector	Type of qualifying projects	Qualification	Example
All Tier 3 Waste Projects	Please state	-	-

Forestry, Agriculture and Land Use Change			
Tier 1			
Sub-sector	**Type of qualifying projects**	**Qualification**	**Example**
Forestry	Sustainable forestry management to improve the carbon sink of forests or to avoid deforestation and degradation	-	Certifying a forest to a relevant standards (FSC, PEFC, FLEGT, Lacey Act)
	Afforestation and reforestation projects	Provided they do not lead to disturbance of carbon in carbon rich soils (e.g. afforestation projects on peatlands would not qualify)	-
	Sustainable peatland/wetland/ forestry management and protection	-	Rewetting peatlands to prevent desiccation and carbon emissions
	Support countries in accessing finance through REDD+	-	-
	Manage or rehabilitate the condition of mangroves	-	-
Agriculture	Soil management practices that reduce GHG emissions or increase the potential of soils to act as a carbon sink	-	Conservation tillage systems
	Sustainable grassland management	-	limiting the timing and number of grazing animals on degraded pastures; restoration of severely degraded lands by replanting with perennial grasses
	Reduce methane emissions from rice production	-	Mid season drainage of paddy fields to reduce methane emissions
	Manure management to reduce GHG emissions	-	Airing manure to promote aerobic decomposition
	Bio-energy from crops	But not if it leads to leakage. It must be demonstrated that over the life cycle of the project the GHG emissions saved are significant	Use Miscanthus as a source of sustainable biomass for bioenergy and biofuels
Wetlands	Manage or rehabilitate wetlands to increase carbon sequestration/decrease GHG emissions	-	Rehabilitating a wetland
Other Tier 1 Agriculture and Forestry	Please state and justify		

Tier 2			
Sub-sector	Type of qualifying projects	Qualification	**Example**
All	Incremental improvements to reducing GHG emission from forestry, agriculture and land use	In contrast to Tier 1 projects, these projects result in incremental rather than significant reduction in GHG emissions.	-
Forestry	Energy efficiency improvements to timber harvesting/forest management processes	-	-
Agriculture	Irrigation pumping using renewable energy	-	-
	Switch to less water intensive crops	-	-
	Energy efficiency improvements to agricultural processes	-	-
Other tier 2 Agriculture & Forestry	please state and justify		
Tier 3			
Sub-sector	**Type of qualifying projects**	**Qualification**	**Example**
All Tier 3 Agriculture & Forestry	Please state		

Industry

Tier 1

Sub-sector	Type of qualifying projects	Qualification	Example
Primary (extractive)	A step change in industry practice to reduce GHG emissions	-	-
Secondary (manufacturing)	Development of new green industries (e.g. construction of renewable energy technologies)	-	Support for the renewable energy sector
	A step change in industry practice to reduce GHG emissions	-	Project converting scrap metal to steel bars
Tertiary (services)	Services to support new green industries	-	-
	A step change in industry practice to reduce GHG emissions	-	-
Quaternary	A step change in industry practice to reduce GHG emissions	-	-
Other Tier 1 Industry	Please state and justify		

Tier 2

Sub-sector	Type of qualifying projects	Qualification	Example
Primary (extractive)	Substitute inputs to reduce GHG emission in existing coal mining operations	-	Switch to renewable or low carbon energy to power operations
	Change operational procedures or techniques, or retrofit technologies to reduce GHG emissions in existing operations	-	More energy efficient extraction techniques
	Methane capture	-	-
	Improve water use efficiency	-	-
	Reduce gas flaring	-	-
Secondary (manufacturing)	Improve energy efficiency in existing production units	-	-
	Decarbonise the supply chain	-	-
	Green procurement	-	-
	Industrial symbiosis (e.g. fly ash reuse)	-	-
Tertiary (services)	Incremental improvements to the sectors GHG performance	-	-
Quaternary	Incremental improvements to the sectors GHG performance	-	-
Other Tier 2 Industry	Please state and justify		

Tier 3-

Sub-sector	Type of qualifying projects	Qualification	Example
All Tier 3, Industry	Please state and justify		

Capital Markets Development			
Tier 1			
Sub-sector	**Type of qualifying projects**	**Qualification**	**Example**
All Tier 1, Capital Markets Development	Please state and justify		
Tier 2			
Sub-sector	**Type of qualifying projects**	**Qualification**	**Example**
All Tier 2, Capital Markets Development	Please state and justify		
Tier 3			
Sub-sector	**Type of qualifying projects**	**Qualification**	**Example**
All Tier 3, Capital Markets Development	Please state and justify		

Climate Change Adaptation	
Tier 1	
Sub-sector	**Type of qualifying projects**
Energy	Projects that increase the resilience of energy infrastructure and distribution systems to the predicted impacts of climate change.
	The development of projects and plans that seek to put in place an appropriate mix of energy sources to increase the resilience of the energy sector and the population it serves.
	Support for micro-generation and community scale energy generation in order to reduce vulnerability to climate change.
Other Tier 1 Energy	Please state and justify
Transport	Increase access of communities to services (e.g. health services) for the purpose of increasing their resilience to the predicted impacts of climate change.
	Ensure populations are able to reach safe areas, which are protected from the impacts of climate variability and extremes (e.g. higher land during flood events)
Other Tier 1 Transport	Please state and justify
Housing	Retrofit houses to increase their resilience to the predicted impacts of climate change
	Re-settle people from an area of high climate change risk to an area of low climate change risk.
Other Tier 1 housing	Please state and justify
ICT	Please state and justify
Water & Sanitation	Projects to increase the resilience of the water & sanitation sectors to the predicted impacts of climate change.
Other Tier 1 Water & Sanitation	Please state and justify
Waste	Projects to increase the resilience of the waste sectors to the predicted impacts of climate change.
Other Tier 1 waste	Please state and justify
Agriculture	Increase resilience of agricultural sector to the changing distribution of pests and diseases.
	Promoting diversified agricultural production to reduce climate risk (e.g. growing a mix of different crops and different varieties of each crop).
	Supporting the development of genetically modified crops, which remain productive despite climate change (e.g. drought, heat and salt tolerant species varieties)
	Implementing water conservation and efficiency measures to reduce vulnerability to changes in precipitation patterns.
	Recover degraded agricultural areas for crop production
	Reduce vulnerability of crops, storage areas and supply chains to the predicted impacts of climate change and climate variability.
Other Tier 1 Agriculture	Please state and justify
Forestry	Restoration of former forest areas in order to reduce vulnerability to the impacts of climate change.
	Increasing the connectivity of forests to help them adapt to the impacts of climate change.
	Promoting sustainable forest management that reduce soil erosion and exposure to wildfires
	Select tree species that are resilient to the predicted changes in climate
Other Tier 1 Forestry	Please state and justify
Fisheries	Research on the impacts of climate change on fisheries and the development of solutions.
Other Tier 1 Fisheries	Please state and justify
Industry	Projects to increase the resilience of industry processes and supply chains to the predicted impacts of climate change.
Other Tier 1 Industry	Please state and justify
Early Warning Systems and disaster response	Development of early warning systems to help populations respond effectively to extreme weather events.
Other Tier 1 Adaptation Projects	Please state and justify
Tier 2	
Sub-sector	**Type of qualifying projects**

Energy	As for tier 1, but adaptation is either only a secondary objective of the project or is a significant co-benefit of the project.
Transport	As for tier 1, but adaptation is either only a secondary objective of the project or is a significant co-benefit of the project.
Housing	As for tier 1, but adaptation is either only a secondary objective of the project or is a significant co-benefit of the project.
ICT	As for tier 1, but adaptation is either only a secondary objective of the project or is a significant co-benefit of the project.
Water & Sanitation	As for tier 1, but adaptation is either only a secondary objective of the project or is a significant co-benefit of the project.
Waste	As for tier 1, but adaptation is either only a secondary objective of the project or is a significant co-benefit of the project.
Agriculture	As for tier 1, but adaptation is either only a secondary objective of the project or is a significant co-benefit of the project.
Forestry	As for tier 1, but adaptation is either only a secondary objective of the project or is a significant co-benefit of the project.
Fisheries	As for tier 1, but adaptation is either only a secondary objective of the project or is a significant co-benefit of the project.
Industry	As for tier 1, but adaptation is either only a secondary objective of the project or is a significant co-benefit of the project.
Early Warning Systems and disaster response	As for tier 1, but adaptation is either only a secondary objective of the project or is a significant co-benefit of the project.
Other Tier 2 Adaptation	As for tier 1, but adaptation is either only a secondary objective of the project or is a significant co-benefit of the project.
Tier 3	
Sub-sector	**Type of qualifying projects**
Tier 3 Adaptation Projects	Please state

Annex 1: Description of different mitigation projects

This annex provides some additional explanation of what constitutes a legitimate project under each category. Whilst some categories are straight forward, others are less so, with potentially unintended consequences, such as an eventual increase in green house gas (ghg) emissions if the project is not carefully structured and implemented.

Energy

The scope for mitigation of GHG emissions in the Energy sector arises principally from more efficient generation and use of electricity and from a shift from fossil fuelled to renewable generation. However, where renewable generation options are unavailable or prohibitively expensive, there is scope in some cases for mitigation through cleaner combustion of fossil fuels or a switch to a cleaner fossil fuel option (for example coal to gas).

Renewable Energy Generation

- **Hydro run of river** – Energy is generated through water diverted from a river at high elevation, passed through a turbine and then returned to the river downstream. The potential energy available as a result of the level difference is converted to kinetic energy which is extracted by the turbine and used to drive an electricity generator. The power station needs to be situated on a river with a fairly steep gradient. It may also mean that power output fluctuates with seasonal rainfall or melting as there is no potential to store water and thus energy.
- **Hydro with storage** – Electrical energy cannot easily be stored, but water can. Water from a river is stored in a reservoir which may be a natural lake but is more often created by a dam. Water is released from the dam at a controlled rate to generate electricity from turbines in the same way as in a run of river scheme. The reservoir can lead to large areas of land being submerged and can disrupt river flows. However it does allow the production of energy to be regulated according to need. There is also some potential for methane to be created in larger reservoirs
- **Wind power** – Conversion of wind energy into electricity by wind turbines. Wind turbines can be situated both on land and offshore. The latter being significantly more expensive to build and operate. The unpredictability of the wind means that the amount of energy generation is also difficult to forecast at any one time. Consequently wind usually needs to be included as one of a range of energy sources especially ones that can be more readily controlled such as thermal or hydro with storage.
- **Biofuels/ Biomass** – fuels derived from biomass can be used in thermal power stations to generate electricity much like any hydrocarbon fuel. Biofuels can be in the form of gasses (biogas), liquids (biodiesel or ethanol) or solid (Biomass). There is some controversy around the growth in production of some bio fuels. In particular first generation biofuel sources such as palm oil, sugar cane and soy need large areas of land created to grow and either through direct or indirect land use change (Indirect = displaced agricultural crops) the frontier of agriculture is expanded leading to increased GHG emissions. Second generation (waste biomass products from agriculture & cellulosic ethanol) and third generation (e.g. growing algae) may offer greater potential.
- **Geothermal power –** at present generally restricted to areas of high tectonic activity (at plate boundaries) but new technology is expanding its potential to other areas where hot rocks occur

naturally at depth. Ground source heating, which extracts low grade heat from shallow depths, is a growing small scale application

- **Solar PV/Solar Thermal –** the generation of heat or electricity from sunlight. There are two main approaches, solar thermal and photovoltaic's. Solar thermal involves using sunlight to heat water or another liquid. These can range from a small unit designed for a house to large concentrated solar thermal power stations which use mirrors or lenses and solar tracking devices to provide steam for turbines. Photovoltaics use light to create an eclectic current directly and again can range from the size of a house roof to large Solar farms. Photovoltaic technology uses light to create an electric current directly and again applications can range from the size of a house roof to large solar farms. Photovoltaics are currently an expensive way of generating electricity but costs are coming down, especially for small scale applications. .
- **Tidal / wave** – Tidal power is a form of hydropower, exploiting water level differences created by the tidal cycle. One technology creates a tidal lagoon by keeping the high tide back in a lagoon and then releasing it at the maximum head during low tide. Another uses very large underwater turbines to harness the kinetic energy of tidal currents. Wave machines seek to harness the energy of ocean surface waves. There are various ingenious devices under development, often using articulated floating structures that pump oil or air to drive turbines. None of these has yet reached the stage of commercial operation.
- **Waste to Energy** - Treatment of waste to produce electricity and or heat is a form of energy recovery. Waste can either be thermally treated (e.g. by incineration, pyrolysis, gasification) directly to produce electricity or digested anaerobically to produce biogas which is in turn burnt to produce electricity. Waste to energy could also utilise a combined heat and power system to maximise the energy efficiency potential (see CHP explanation below).

Energy efficiency and more energy efficient power generation

- **Grid extension to displace Kerosene burning -** The extension of transmission or distribution systems to supply remote areas from the national grid can in some cases displace the use of many small individual kerosene burners or diesel generators and hence achieve significant GHG reductions. Alternatively an isolated mini grid system supplied by a generation fuel source which is less carbon intensive than kerosene might be used. Both of these alternatives can be expensive.
- **Reduced losses in transmission or distribution -** National grid systems in developing countries have often developed over the years by progressively linking together smaller local grids to provide a national transmission system. In such cases significant savings in transmission losses can be made by optimising the design and operation of the grid as a fully integrated national system. This could involve the re-routing or upgrading of existing transmission lines and related equipment or construction of new lines.
- **Street lighting –** Electrification of the street lighting system
- **CHP, CCHP and waste heat recovery** – Combined Heat and Power (CHP) is the simultaneous generation of power (usually electricity) and usable heat in a single process. Hot water produces as a by-product of thermal power generation is generally cooled before it is put back into a natural water source. In a CHP system this hot water is instead used to provide heat for an industrial process or pumped into a district heating system which provides hot water for heating and or bathing, to houses and offices in the surrounding area thus reducing their own

heat energy needs.

- **Fuel Switch** – where a lower carbon fuel source is substituted for the existing higher carbon fuel source. For example an existing coal fired plant is replaced by a less carbon intensive natural gas fired power station. Burning natural gas produces approximately 1/3 less carbon dioxide per unit of power produced than coal does.
- **Higher efficiency new plant –** The replacement of older thermal power generating technology with newer more efficient technology but still using the same fuel. For example the replacement of older coal power technology with more efficient coal technology. However, it is important understand that in this example PIDG would be involved in locking in the higher carbon intensity of, for example, coal generation for the life time of the project rather than promoting a lower intensity fuel such as gas, or a renewable fuel source. Furthermore in this case it would require that the IFC prove that without their intervention the project would have been built with less efficient older coal technology. Ultimately, this example is not as desirable as others as it does not represent a step change in driving the low carbon agenda.
- **Micro generation –** Transmission of electricity in developed countries results in approximately 3-5% of the electricity generated being lost during its travel from the power station to its point of use (the figure is usually a lot higher in developing countries which tend to have less efficient transmission and distribution networks and can exceed 20%). Micro or mini generation supplying a nearby load centre and avoiding transmission over a long distance can result in less transmission loss but still enable some economies of scale in that one small scale electricity generator can be used to supply power to several users in the local area. This assumes that the fuel source is at least equivalent if not better in terms of Carbon dioxide saved than the average fuel source on the grid.
- **Carbon capture and storage –** CCS is a geo engineering technique which captures carbon dioxide from a point source such as a thermal power station and then sequesters it through either geological, deep ocean or mineral storage. The capturing and storage process require significant amounts of energy. The different forms of storage each have strengths and weaknesses generally around the amount of energy required and the potential for leakage.

Demand side energy management

- **Smart Grids -** A smart grid is an electrical grid that uses information and communications technology to gather and act on information, such as information about the behaviors of suppliers and consumers, in an automated fashion to improve the efficiency, reliability, economics, and sustainability of the production and distribution of electricity. Their full implementation are not likely in the short term but projects that seek to put the conditions in place for smart grids can be classified as having a climate change benefit.

Transport

- **Modal switch** – projects that encourage a shift from more GHG intensive to less GHG intensive modes of transport. This includes shifting the transport of freight and people away from air and road transport to rail, sea and inland water transport.
- **Vehicle emission and fuel efficiency standards** – putting in place minimum vehicle emission standards and fuel efficiency standards can drive manufacturers to improve efficiencies and therefore substantially reduce associated carbon emissions. Progressive tightening of the standards will provide a continued incentive for manufacturers to innovate.
- **Fuel switch** – Switching from petrol to lower carbon intense fuels such as LPG, electric battery, 2nd or 3rd generation biofuels and hydrogen (Depending on the grid emission factor). For example a project to switch a city bus fleet from diesel to LPG or electricity would result in less carbon dioxide emissions (see comment on biofuels sustainability above).
- **Public transport – a** project which invests in new or existing public transport schemes and which help achieve a modal shift of travellers away from the private car on to public transport, e.g. rail, light rail, tram, ferry or bus. Generally efficient high occupancy public **transport produces less carbon dioxide per passenger km travelled than a low occupancy car.**
- **Cycle and pedestrian –** Projects that encourage pedestrian and cycle transport and reduce the use of other modes of transport for short journeys clearly have a climate change mitigation benefit.
- **Traffic management, reduced congestion or improved traffic flow -** Better and more integrated traffic management and the use of intelligent transport systems resulting in: variable speed limits to reduce congestion; congestion/use charges to reduce the use of certain fuel inefficient vehicles; road space re/allocated to higher occupancy, bus or vehicles with higher loading rates, and removal of town centre parking spaces to out of town park and ride. All these measures would help improve fuel efficiency of cars on the road as well as helping to improve the attractiveness of public transport compared to private car use.
- **Multi modal interchange –** a location where a passenger is able to change to a number of different modes of transport. Efficient multimodal interchanges make public transport more efficient and thus more competitive compared to the private car. For example a typical multimodal interchange may be based around a railway station, bus station, tram and car parking.
- **Road design -** a shorter flatter road will reduce the amount of miles driven and petrol used on the journey thus reducing the amount of carbon dioxide emitted. However it still encourages growth in car use and a shorter road may even make the road more competitive vis a vis rail. This is a complex category and similarly to the energy category “higher efficiency new plant “it should be treated with caution. Ideally it should only count in terms of carbon reduction if there is no viable public transport option, the country clearly has an underdeveloped road network and that the potential for demand management is explored to avoid future competition with public transport.

Housing

- **Green building design –** Designing building to be more energy efficient and to incorporate renewable energy into the design of the building. Good thermal insulation, orientation of the building and use of glass can reduce the building heating requirement and good shading and use of ventilation can reduce the need for air conditioning. More efficient boilers and use of renewable fuels can reduce the carbon intensity of the energy use. Finally, careful selection of building materials to reduce embodied energy, particularly the use of recycled aggregates can help reduce the life cycle energy costs of a building. Certification systems such as BREEAM and LEED can help evaluate the performance of buildings in term of energy efficiency (amongst other things). As well as designing low carbon new buildings there are a range of measures that can be undertaken to reduce emissions from the old housing stock. Old houses can be retrofitted to improve their insulation and air tightness and reduce the need for mechanical heating and cooling. Furthermore less efficient appliances can be replaced with more energy efficient appliances and renewable energy systems can be added.

Information & Communication Technologies

- **Energy efficiency in information technologies –** Projects that seek to reduce the energy intensity of the information technologies sector can help reduce carbon emissions. For example, projects that focus on optimising equipment energy use in servers and networking devices as well as projects that minimise power losses and heat generation along server based ICT systems can have beneficial climate change mitigation impacts.
- **Energy efficiency in telecommunication systems –** Projects that reduce the carbon intensity of the telecommunication network through improving the performance of base stations, improving efficiency of user devices and optimising infrastructure and sharing with competitors can have climate change mitigation benefits.

Water & Sanitation

- **Reduce or capture methane emissions from wastewater treatment and distribution –** without proper collection and treatment wastewater can produce significant levels of methane and nitrous oxide; both of which are potent greenhouse gasses. This happens if wastewater is treated or subject to anaerobic conditions. Projects that treat waste so that methane is captured and burned, converting it to the less potent greenhouse gas carbon dioxide before it is emitted to the atmosphere should have a beneficial climate change mitigation benefit.
- **Energy efficiency and renewable energy** – Increasing pumping efficiencies and energy consumption during treatment processes can also reduce emissions, as can souring energy from renewable energy installations.

Waste

- **Increased reuse and recycling -** Reduces the need for extracting virgin materials to produce goods and commodities. It may also reduce the need for manufacturing and remanufacturing and thus reduces the use of energy particularly in the case of reuse. For example steel girders in a building that are bolted together and not welded may simply be able to be reused when that building is demolished. Also may result in reduction of emissions associated with disposal (i.e. avoiding degradation processes in landfill, or emissions from combustion).
- **Improved solid waste handling –** efficient centralised collection and controlled disposal of waste so as to prevent uncontrolled anaerobic degradation during collection and storage. Anaerobic decomposition produces methane while regular collection and disposal in a controlled landfill with a methane capture scheme, composting or incineration can reduce emissions.
- **Waste to energy –** Treatment of waste to produce electricity and or heat is a form of energy recovery. Waste can either be thermally treated (e.g. by incineration, pyrolysis, gasification) directly to produce electricity or digested anaerobically to produce biogas which is in turn burnt to produce electricity. Waste to energy could also utilise a combined heat and power system to maximise the energy efficiency potential (see CHP explanation above).
- **Composting –** Involves the controlled aerobic decomposition of waste. Keeping the waste aerated minimises the production of methane during breakdown and can also produces a valuable compost product
- **Landfill gas capture –** Involves the insertion of pipe work into an active or recently closed landfill to collect the methane being produced by the anaerobic conditions in the landfill. This gas can either be flared (breaking down methane in to the less climate potent carbon dioxide) or if there is sufficient quantity and quality it can be burnt and used to generate electricity.

Agriculture & Forestry

- **Sustainable forest management and certification -** SFM aims to ensure that the goods and services derived from the forest meet present-day needs while at the same time securing their continued availability and contribution to long-term development. In its broadest sense, forest management encompasses the administrative, legal, technical, economic, social and environmental aspects of the conservation and use of forests
- **Afforestation and reforestation –** afforestation and reforestation projects on suitable land acts as a carbon sink through sequestering atmospheric carbon dioxide.
- **Sustainable peatland management –** peatlands store a large volume of carbon. Maintaining that pool of carbon and preventing it from being released into the atmosphere is therefore important.
- **Sustainable grassland management -** Implementing grassland management practices that increase carbon uptake by increasing productivity or reducing carbon losses (e.g. through high rates of offtake) can lead to net accumulation of carbon in grassland soils. Because practices that sequester carbon in grasslands often enhance productivity, policies designed to encourage carbon sequestering grassland management practices could lead to near-term dividends in greater forage production and enhanced producer income. Improved grazing management

(management that increases production) leads to an increase of soil carbon stocks by an average of 0.35 Mg C per hectare per year.

- **Avoiding land use change –** Land use change and especially deforestation can result in large emissions. Disturbance of the soil and also allowing cleared vegetation to rot releases both carbon dioxide and methane. First generation biofules (e.g. oil from palm and soy) can result in the expansion of the frontier of agriculture into areas of forest and savannah. Land use change occurs either directly. Through for example felling virgin rain forest or by indirect land use change, whereby existing crops are displaced by biofuels which in turn lead to land use change so they can continue growing.
- **Silos –** Help in the efficient storage of agricultural seed which can either perish, spoil or be eaten by pests. Thus reducing the land, and input requirements for producing a target amount of a certain crop.

Mining & Industry

- **Primary and Extractive (agricultural, logging, oil, mining) –** The Primary sector involves the development of raw materials. Industries which grow fibres, such as wood, cotton, could prioritise those which fulfil demand and yet have higher carbon-locking ratio and lower environmental impact (less pesticide demanding, higher yields and more frequent harvest, biodegradable and renewable sources). In the timber industry, logging can reduce the extent of carbon sinks and destroy ecosystems which provide GHG emission reduction services. Sustainable land management with for instance a "tree felling-replacement planted" policy can have a significant impact. In the oil industry, drilling muds and fluids, produced waters, spills and management of drill cuttings are challenges which affect the environment and GHG emissions. Best practice (spill prevention, new techniques to estimate and manage GHG emissions) and technology (better subsurface imaging and interpretation using gravity and 4-D seismic data thereby reducing unsuccessful wells and gas escape/environmental intrusiveness; less harmful muds and fluids) have an important role to play in GHG reduction. Mining causes natural gases such as methane trapped in lower soils to escape into the atmosphere. Gas capture for on site energy production or flaring could reduce the GHG emissions.
- **Secondary (manufacturing) –** The secondary sector creates products from raw materials. Better energy efficiency throughout the manufacturing line can have a drastic impact at reducing GHG emissions, as wells as on-site material recycling which directly feeds back into the manufacturing line. Using less convoluted pipes to reduce water friction when being pumped can also save energy. Furthermore, designing products which use the least possible amount of materials, are recyclable and sourced sustainably play an integral role in GHG reductions.
- **Tertiary (services) –** Businesses in the tertiary sector provide a service, such as retailing, banking or transportation. In retail, local sourcing reduces distance travel and therefore GHG emissions. Retail centres where all demand can be met in a single location also reduce client travel to meet their shopping needs. Energy efficiency technologies can further improve environmental footprints. Providing internet banking services encourages less distance travelled by customers and therefore less GHG emissions. At ATMs, offering on screen balances and printed receipt choices, lessens paper and ink used amounts. Providing credit cards and cheque books created with recycled and recyclable materials further reduces bank's environmental

impacts. On top of this, banks play an important role in environmental project funding and wealth managers can invest in sustainable ventures such as renewable energy for instance.

- **Quaternary –** The quaternary sector gathers together knowledge-based businesses such as media, research and development, and education. Media could use energy efficient servers and sustainable web-providers, and in terms of printed output, use recycled paper, natural oil-based inks and improved efficiency printers. News articles could dedicate a line at the end of the article exploring the GHG impact of the news being related above: it would increase environmental awareness of the reader and potentially promote behavioural change. Pharmaceutical research and development could reduce test-runs or adopt methodologies which require less chemical input at each research stage. Technology research and development could plan for the next generation of sustainable equipments and bio-organisms which absorb GHG. In education, sustainably designed school infrastructure and GHG footprint in relation to every topic of the teaching curriculum could ensure the next generation is environmentally aware.

Capital Markets Development

- Projects that seek to introduce regulations, programs or financial instruments (e.g. Feed in Tariffs) to support GHG reducing activities qualify as mitigation. Other initiatives such as providing credit or green bonds to companies engaged in reducing emissions also qualify.