



**International Partnership
on Mitigation and MRV**

Summer School 2013

Introduction to MRV standards and metrics for GHG emissions and co-benefits

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Scope of MRV systems under UNFCCC

MRV Scope

- GHG emission levels (National Inventories)
- Mitigation actions (NAMAs, NMM, FVA, CDM/JI)
 - GHG emission reductions
 - Co-benefits and negative impacts
 - Additional parameters to manage and track progress of the mitigation action
- Support measures (finance, capacity building, technology transfer; from a donor and receiver perspective)
 - Volume/level of support
 - Specific use of support
 - Effectiveness of support



MRV Design

HOW

Guiding design principles:

- Completeness
- Comparability
- Transparency
- Consistency
- Accuracy

WHY

- Facilitate decision making
- Build trust through credible and transparent information
- Track performance and effectiveness
- Support mitigation actions and feedback for policymakers
- Access international support

WHO

- NAMA implementing agency
- NAMA participants from private and/or public sector
- National/regional governments
- Verification entities
- Donors

MRV

WHAT

- MRV of NAMA actions and results
 - GHG mitigation
 - co-benefits and potential negative impacts
 - transformational changes
 - operational data
- MRV of support and financing



The M, the R and the V

Measurement

Reporting

Verification

- Indicators for GHG reduction, co-benefits/negative impacts and other relevant operational aspects
- Approaches & assumptions for calculation of indicators
- Parameters needed for calculation of indicators
- Measurement and data collection methods for identified parameters
- Frequency of measurement
- Data sources and data collection processes
- Quality assurance on data
- Roles and responsibilities of individual entities involved in the measurement process

Key considerations:

- Compatibility of targets/pledges, baseline scenarios and MRV systems
- Capacity of involved entities to carry out monitoring activities
- Complexity of system and resulting transaction costs
- Conservativeness of monitoring approach & credibility of system
- Usefulness of monitoring system for NAMA implementation entities
- Data availability and data confidentiality concerns



The M, the R and the V

Measurement

Reporting

Verification

- Whom to report to
- Level of aggregation
- Reporting content (results by indicator, raw data?, calculation assumptions?, quality assurance information?)
- Reporting format
- Reporting period and frequency
- Reporting process
- Roles and responsibilities of individual entities for report compilation and review

Key considerations:

- Level of detail and transparency of reporting
- Publication of report
- Data confidentiality
- Verifiability of the report



The M, the R and the V

Measurement

Reporting

Verification

- Which information to verify
- Verification approach (1st, 2nd or 3rd party verification)
- Verification process and frequency
- Verification findings and recommendations for next MRV cycle

Key considerations:

- Purpose and need for verification
- Independency, credibility and transparency of verification approach
- Level of influence of verification system
- Qualification requirements for verifiers
- Structure for assessment and coordination of verifiers (accreditation system to ensure robustness of system)?
- Transaction costs of verification



Overview of MRV standards

GHG Standards

- IPCC
- CDM/JI
- GHG Protocol
- ISO 14064/14065
- EU ETS
- Verified Carbon Standard (VCS)
- Climate Action Reserve (CAR)
- Carbon Farming Initiative (CFI)

Co-benefits Standards

- Gold Standard
- Social Carbon
- Climate, Community & Biodiversity
- Women's Carbon Standard
- GRI

Broader M&E Standards

- GEF
- GIZ BOW
- OECD DAC
- ISAE 3000



Financial Metrics

Technical Metrics

Process Metrics

**Quantitative
Metrics**

**Qualitative
Metrics**



Simple MRV “cooking recipe” for GHG quantification

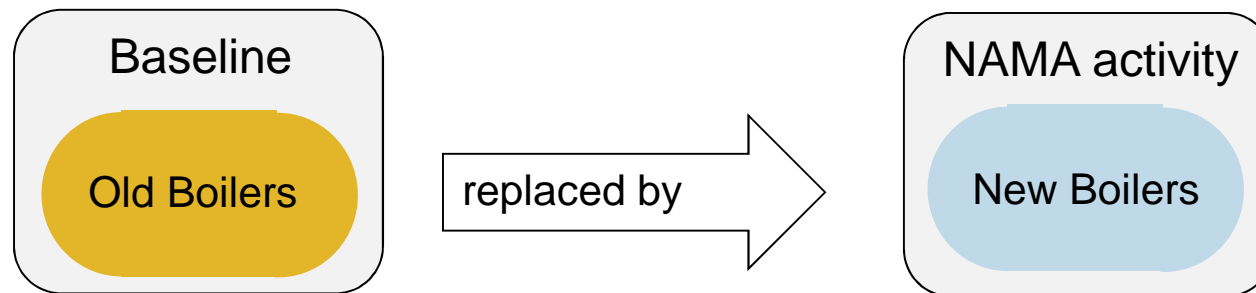
Step 1	Define NAMA boundary
Step 2	Determine baseline approach and metrics for calculation of baseline (BE) and activity emissions (AE)
Step 3	Assess risk of leakage effects and determine metrics for calculation of leakage emissions (LE) (if applicable)
Step 4	Based on Step 2 and 3, define monitoring parameters for calculation of baseline and project emissions (+ leakage leakage emissions if applicable)
Step 5	Collect data for all monitoring parameters, determine (and report) GHG emission reductions (ER) $ER = BE - AE - (LE)$

Examples of MRV parameters and metrics for GHG based on fictitious NAMA



NAMA idea:

- Replacement of existing boilers in SMEs for thermal energy generation



Relevant monitoring parameters for GHG quantification

- Number of boilers installed/replaced

- Type of fuel
- Fuel emission factor
- Efficiency of boiler

- Residual life time
- Scrapping of replaced boilers

- Type of fuel
- Fuel emission factor
- Efficiency of boiler

- Life time
- Activity level (hours of operation & load)



Option 1 – NAMA focuses on actual implementation

NAMA concept 1:

- NAMA establishes a subsidy program for replacement of old boilers by new ones
- GHG reductions are caused **directly** by the NAMA

ER calculation example*
$$ER = EG_{thermal} \cdot \left(\frac{EF_{BL}}{\eta_{BL}} - \frac{EF_A}{\eta_A} \right)$$

Parameter	Description	Measurement options
$EG_{thermal}$	Quantity of net thermal energy supplied by the NAMA activity	<ul style="list-style-type: none">• Direct measurement• Estimation
$\eta_{BL/A}$	Thermal efficiency of boiler used in the baseline (BL) or in the NAMA activity (A)	<ul style="list-style-type: none">• Technical specifications• Measurement campaign
$EF_{BL/A}$	Emission factor of fuel used in the baseline (BL) or in the NAMA activity (A)	<ul style="list-style-type: none">• IPCC default factor• Default factor based

* Based on simplification of CDM methodology



Option 2 – NAMA focuses on enabling framework

NAMA concept 2:

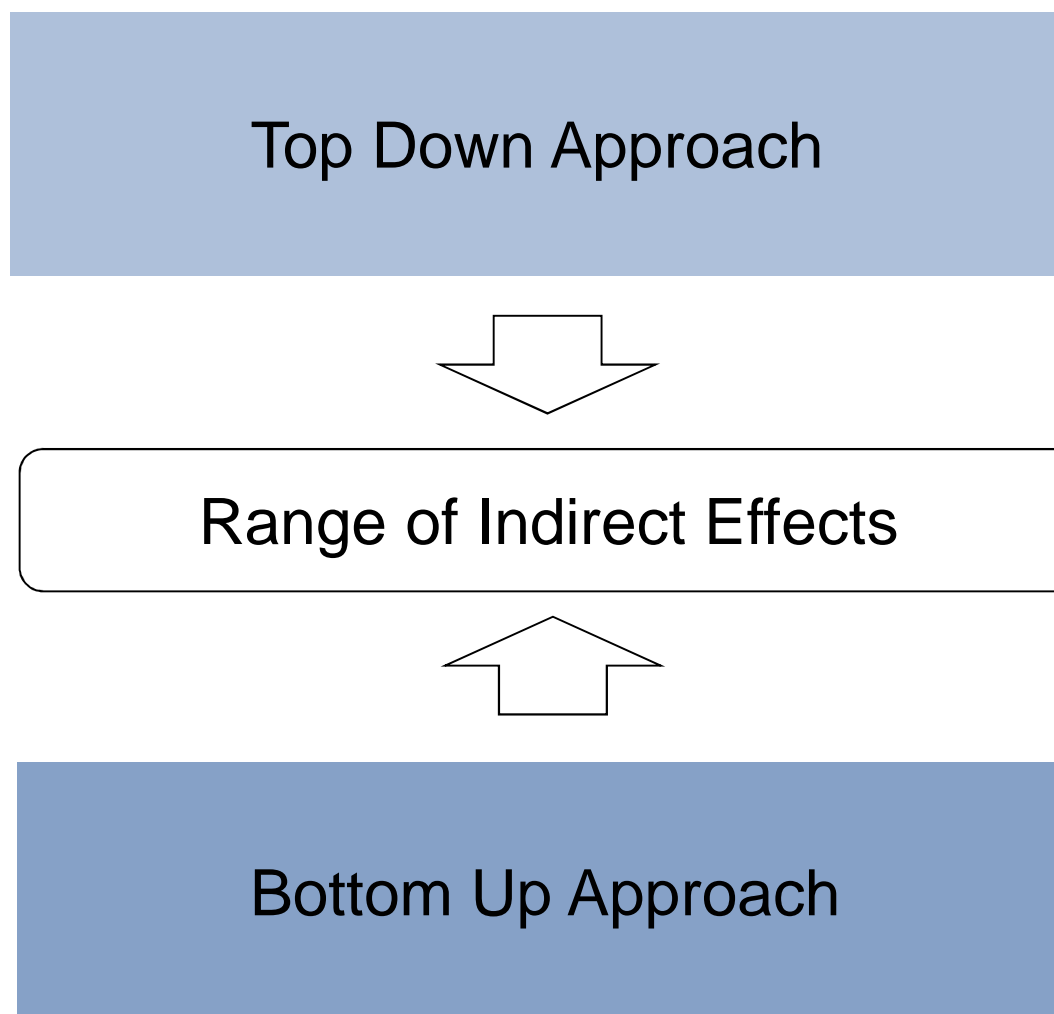
- NAMA focuses on barrier removal by establishing a policy framework to support Energy Service Companies (ESCOs)
- Emission reductions are caused **indirectly** by NAMA * Based on GEF quantification method

ER calculation example* $ER_{top\ down} = P10 \cdot CF \Leftrightarrow ER_{bottom\ up} = GHG_{direct} \cdot RF$

Parameter	Description	Measurement options
$P10$	Technical/economic potential for GHG savings within 10 years	<ul style="list-style-type: none">• Ex-post verification of assumptions
CF	causality factor – shows to what extent NAMA can claim causality for the reduction (% value)	<ul style="list-style-type: none">• Ex-post assessment of causality factor (surveys and market analysis)
GHG_{direct}	Eestimate for direct and direct post-NAMA emission reductions	<ul style="list-style-type: none">• Measurement campaign / sampling
RF	Replication factor, how often investments triggered by the NAMA 10 years after implementation	<ul style="list-style-type: none">• Ex-post assessment (surveys and market analysis)



Approach for quantification of indirect impacts



MRV parameters and metrics for co-benefits and negative impacts – the Gold Standard



Main features:



1. Identification of **potential negative impacts** through **safeguarding principles** related to human rights, labour standards, environmental protection and anti-corruption
2. Assessment of co-benefits and potential negative impacts based on **sustainable development matrix** based on 12 indicators
3. **Extensive stakeholder consultation** process prior to implementation of the activity (can influence final outcomes of 1. and 2. above)
4. Monitoring of **most critical indicators** (highest positive and negative scores) based on ex-ante assessment of **sustainable development matrix**



The Gold Standard “Sustainability Development Matrix”

Indicator	Mitigation Measure	Relevance to achieving MDG	Chosen Parameter and Explanation	Preliminary Score
12 Indicators (environmental, social and economic)	Mitigation measure to neutralise identified negative impacts in	Assessment of indicator vs. local MDG goals	Defined by project developer	Qualitative scores (- / 0 / +)

Indicators:

1. Air quality
2. Water quality and quantity
3. Soil condition
4. Other pollutants
5. Biodiversity
6. Quality of employment
7. Livelihood of the poor
8. Access to affordable & clean energy services
9. Human and Institutional capacity
10. Quantitative employment and income generation
11. Access to investment
12. Technology transfer and technological self-reliance

MRV parameters and metrics for co-benefits and negative impacts – the Social Carbon Standard



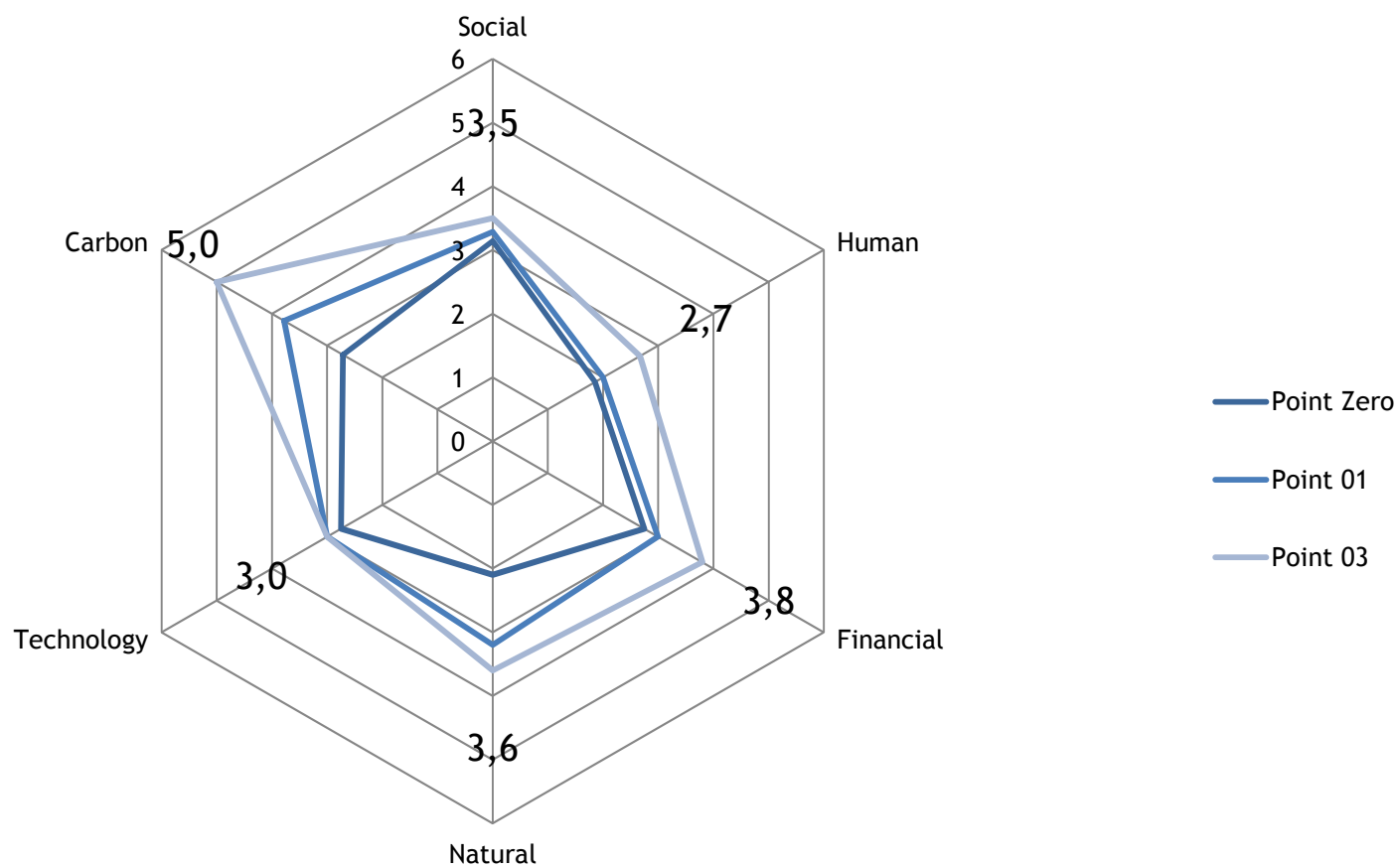
Main features:



1. Use of six basic resources: **Social, Human, Financial, Natural, Biodiversity and Carbon**
2. The indicators have a **score** beginning at the most precarious **scenario (level 1) and ending at the ideal situation (sustainable use of resource – level 6)**
1. All the data is collected through **participative methods** (interviews, questionnaires and meetings with stakeholders)
2. The **average score by the indicators is plotted in a hexagon**



The Social Carbon Standard's "Spider Diagram"





Overview of MRV Standards

Concrete information on how Social Carbon and Gold Standard work

GHG reporting under the GEF and Example



MRV standards (GHG)

Standard	Type	Aggregation levels	Sector coverage	Links
IPCC Guidelines for National GHG Inventories	GHG emission levels	National GHG inventories	Energy, Industrial Processes and Product Use, Agriculture, Forestry and Other Land Use, Waste	http://www.ipcc-nggip.iges.or.jp/public/2006gl/index.html
Clean Development Mechanism Standards and Methodologies	GHG emission reductions	Project and program level	Energy industries (renewable - / non-renewable sources), Energy distribution, Energy demand, Manufacturing industries, Chemical industry, Construction, Transport, Mining/Mineral production, Metal production, Fugitive emissions from fuels (solid, oil and gas), Fugitive emissions from production and consumption of halocarbons and sulphur hexafluoride, Solvents use, Waste handling and disposal, Afforestation and reforestation, Agriculture	http://cdm.unfccc.int/methodologies/index.html
Joint Implementation Standards and Methodologies	GHG emission reductions	Project and program level	Same as CDM	http://ji.unfccc.int/CritBasMon/index.html
WRI/WBCSD GHG Protocol: Policy and Action Accounting and Reporting Standard	GHG emission reductions	Policies and mitigation actions	Policies and actions in any sector (e.g., in the energy supply, residential and commercial buildings, industry, transportation, waste, and AFOLU (agriculture, forestry, and other land use) sectors) as well as cross-sector policy instruments (e.g., emissions trading programs, carbon taxes)	http://www.ghgprotocol.org/files/ghgp/GHG%20Protocol%20Policy%20and%20Action%20Standard%20-%20Second%20Draft%20for%20Pilot%20Testing.pdf



MRV standards (GHG)

Standard	Type	Aggregation levels	Sector coverage	Links
WRI/WBCSD GHG Protocol: Mitigation Goals Accounting and Reporting Standard	GHG emission reductions	GHG targets / pledges	Economy-wide mitigation goals or sectoral goals (in any sector)	http://www.ghgprotocol.org/files/ghgp/GHG%20Protocol%20Mitigation%20Goals%20Standard%20-%20Second%20Draft%20for%20Pilot%20Testing.pdf
WRI/WBCSD GHG Protocol: Corporate Accounting and Reporting Standard	GHG emission level	Corporate level	Most of sectors are covered	http://www.ghgprotocol.org/files/ghgp/public/ghg-protocol-revised.pdf
WRI/WBCSD GHG Protocol: Project Accounting Protocol and Guidelines	GHG emission reductions	Project level	<p>Most sectors are covered</p> <p>Cross-sector tools include: stationary combustion, mobile combustion, Measurement and estimation of uncertainty, Use of hydrofluorocarbons (HFCs) in refrigeration and air-conditioning equipment</p> <p>Sector-specific tools include: Aluminium, Iron and steel, Nitric acid, Ammonia, Adipic acid, Cement , Lime, Office-based organisations, Pulp and paper mills, HFC-23 from HCFC-22 production, Semi-conductors, Wood product manufacturing</p>	http://www.ghgprotocol.org/files/ghgp/ghg_project_protocol.pdf



MRV standards (GHG)

Standard	Type	Aggregation levels	Sector coverage	Links
WRI/WBCSD GHG Protocol: Corporate Value Chain (Scope 3) Accounting and Reporting Standard	GHG emission levels	Corporate value chain level	Most sectors are covered	http://www.ghgprotocol.org/files/ghgp/public/Corporate-Value-Chain-Accounting-Reporting-Standard_041613.pdf
WRI/WBCSD GHG Protocol: Product Life Cycle Accounting and Reporting Standard	GHG emission levels	Product level	Most sectors are covered	http://www.ghgprotocol.org/files/ghgp/public/Product-Life-Cycle-Accounting-Reporting-Standard_041613.pdf
ISO-14064 International Standard for GHG Emissions Inventories and Verification	GHG emission levels and reductions	Project and organization or entity - level. Includes standard for validation and verification	Most sectors are covered	https://www.iso.org/obp/ui/#iso:std:iso:14064:-1:ed-1:v1:en
ISO-14065 Requirements for greenhouse gas validation and verification bodies for use in accreditation or other forms of recognition	GHG emission levels and reductions	Accreditation Standard	Most of the sectors are covered	https://www.iso.org/obp/ui/#iso:std:iso:14065:en



MRV standards (GHG)

Standard	Type	Aggregation levels	Sector coverage	Links
The European Union Emissions Trading System (EU-ETS)	GHG emission levels	Specific installations within EU (as per EU directive) and aircraft operators	High-emitting installations in the power and heat generation industry and in selected energy-intensive industrial sectors: combustion plants, oil refineries, coke ovens, iron and steel plants and factories making cement, glass, lime, bricks, ceramics, pulp and paper and production of nitric acid.	http://ec.europa.eu/clima/publications/docs/ets_en.pdf http://ec.europa.eu/clima/policies/ets/documentation_en.htm#Main legislation
Verified Carbon Standard (VCS)	GHG emission reductions	Project and program level	Same than CDM	http://v-credits.org/methodologies/find
Climate Action Reserve	GHG emission reductions	Project level	Coal Mine Methane, Forest and Landfill	http://www.climateactionreserve.org/how/protocols/
Carbon Farming Initiative	GHG emission reductions	Project level	Agriculture (livestock, soil carbon, fertilisers, feral animals), vegetation (regrowth, reforestation, avoided clearing and avoided harvest) and landfill and alternative waste treatment (AWT)	http://www.climatechange.gov.au/reducing-carbon/carbon-farming-initiative/methodologies



MRV standards (co-benefits)

Standard	Type	Aggregation levels	Sector coverage	Links
Gold Standard (GS)	GHG emission reductions and co-benefits	Project and program level	All CDM sectors including AFOLU	http://www.cdmgoldstandard.org/project-certification/gs-methodologies
Social Carbon Standard	Co-benefits	Project and program level	Approved indicators exist to the following sectors: ceramic, forest, landfill, hydropower plants, micro and small scale hydropower, efficient lighting, fuel switching and methane avoidance	http://www.socialcarbon.org/wp-content/uploads/2012/11/SOCIALCARBON_STANDARD_v-5-.00.pdf
Community, Climate and Biodiversity Standards (CCBS)	Co-benefits	Project level	Forestry and Agriculture	https://s3.amazonaws.com/CBA/Upload/ccb_standards_second_edition_december_2008+(1).pdf
The Women's Carbon Standard (WCS)	Co-benefits	Project level	Applies to most sectors	http://www.womenscarbon.org/sites/default/files/womens-carbon-standard.pdf
Global Reporting Initiative (GRI) – G4: Sustainability Reporting Guidelines	GHG emission levels and co-benefits	Organization or entity level	Applies to most sectors	https://www.globalreporting.org/resource/library/GRIG4-Part1-Reporting-Principles-and-Standard-Disclosures.pdf



MRV standards (others)

Standard	Type	Aggregation levels	Sector coverage	Links
GEF- Monitoring and Evaluation Policy	GHG emission levels (and co-benefits)	Project design, application of M&E and project evaluation	Applies to GEF projects	http://www.thegef.org/gef/sites/thegef.org/files/documents/ME_Policy_2010.pdf
GIZ Barriers-to-objective weighting method (BOW)	GHG emission levels and reductions	Climate-related projects of which the focus is on enabling a country to reduce GHG emissions independently	Forest, climate change protection and climate change adaptation	http://star-www.giz.de/starweb/giz/pub/servelet.starweb?path=giz/pub/pfm.web&r=33799&STAR_AppLanguage=0
Principles for Evaluation of Development Assistance (DAC / OECD)	Monitoring & Evaluation	Development aid interventions	Aid projects and programmes	http://www.oecd.org/dac/evaluation/50584880.pdf
International Standard on Assurance Engagements (ISAE) 3000	Monitoring	Assurance Engagement (other than audits) or Reviews of Historical Financial Information	Applies to most sectors	http://www.ifac.org/sites/default/files/publications/exposure-drafts/IAASB_ISAE_3000_ED.pdf
ISAE 3410: Assurance Engagements on Greenhouse Gas Statements	GHG reporting	Assurance Engagement (other than audits) or Reviews of Historical Financial Information	Applies to most sectors	http://www.ifac.org/sites/default/files/publications/files/B010%202012%20IAASB%20Handbook%20ISAE%203410%20Final%20(revised%20IFAC%20logo%20placement).pdf
UNDG - Results Based Management Handbook	Accountability of UN Agencies	Project and program level	Applies to most sectors	http://www.un.org/files/UNDG%20RBM%20Handbook.pdf



THANK YOU

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More concrete info on how SOCIALCARBON works:

- Tracks IMPROVEMENT over an initial baseline (main advantage over STATIC standards such as GS which sets a high barrier initially; makes a huge difference for implementers!)
- In the context of 494 Grouped Hydro:
 - explain project setup, scope, special characteristics (bundle, sampling for verifications in sampling groups across regions, installed capacity)
 - Targeted SC interventions
 - First, baseline assessment (during validation)
 - Then partner with a local NGO to assess specific needs in a specific geographic location, design an intervention.
 - **Use carbon revenue** to finance interventions in proportion to sales (phrase nicely or omit).
 - Perform intervention; implementer and ideally 3rd party present during intervention
 - Document intervention, assess results during next SC verification cycle
 - Should have an impact on SC indicators and move spider diagram outwards over the course of the project



GHG reporting under the GEF – part 1

Reporting of GHG emission reductions due to GEF intervention is different from other commonly used standards which focus only at project or facility level.

Common methodologies (such as IPCC, CDM, GHG protocol)	GEF reporting
Activities under project-based approaches are clearly defined and have a clear life time. Focuses on annual monitoring, reporting and verification.	GEF projects have often a long-term strategic market development approach. Projects look at the overall state of the market in a country or a region.
Projects implement specific technologies with a clear focus on concrete outputs and cost-benefit expectations	Typical GEF supported projects are demonstration projects, direct investments, financing mechanisms, capacity building, technical assistance and policy development.
Projects focus on direct GHG impacts due to the technology used.	Many projects do not have direct GHG impacts. Indirect impacts may result due to enabling environment created by GEF interventions in the long-term.
Due to the clearly defined nature of projects and their direct GHG reduction impact, uncertainties in GHG quantification are limited.	GEF projects are uncertain and their outcomes may vary both between and within projects. GHG estimations therefore has a large uncertainty.



GHG reporting under the GEF – part 2

Direct GHG impacts	Direct post-project GHG impacts	Indirect GHG impacts
Renewable energy or energy efficiency are parts of the project's output and lead directly to reduction of GHG emissions.	GEF projects put in place mechanism that remain operational after the project ends, such as credit guarantee facilities, risk mitigation facilities, or revolving funds.	GEF projects emphasize capacity development, improve enabling environment and replication on long-term basis.
Direct emissions are calculated by assessing fuel/energy savings during implementation period.	Such mechanisms yield further investments which result in GHG emission reductions and these can be quantified using the same methodology as direct impacts but using conservative assumptions.	Such emission reductions are referred to as indirect GHG savings.
The savings are projected over the respective lifetime both during and post implementation.		Indirect impacts rely heavily on assumptions and expert judgment. Two approaches are used – “bottom- up” and “top-down”



Example for renewable energy GEF – Direct impacts

- Direct emission reductions due to specific investments in comparison to a baseline scenario. Such emission reductions can be calculated using methodologies used under CDM or voluntary carbon markets.
- All investments are evaluated in terms of energy produced/fossil fuels avoided over the lifetime of the investment.

Direct impacts of GEF projects	Direct Post-project impacts of GEF projects
$\text{CO}_2_{\text{direct}} = E * c = e * I * c$ <p>$\text{CO}_2_{\text{direct}}$ = direct GHG emissions (tonnes) E = cumulative energy saved (e.g. MWh) c = CO₂ intensity of technology (tCO₂/MWh) e = annual energy replaced (e.g. MWh/year) I = average useful lifetime in years</p>	$\text{CO}_2_{\text{DPP}} = \text{CO}_2_{\text{direct}} * \text{tf}$ <p>CO_2_{DPP} = emissions saved with investment after the project implementation due to post-project financial mechanisms $\text{CO}_2_{\text{direct}}$ = direct emissions savings to the degree that they are supported through post-project mechanism tf = turnover factor, determined for each facility based on assumptions on fund leakage and financial situation in the project country. It is equal to the number of times that the whole fund volume is expected to be invested and reinvested after the project.</p>



Example for renewable energy GEF – Indirect impacts

GEF's approach emphasizes strategic interventions and long-term impacts. Barrier removal activities sponsored by GEF promote development of markets in a country or region and thus should lead to large GHG abatement in future. It is however difficult to assess after-implementation impacts of market facilitation and barrier removal which lead to large uncertainties.

Top-down methodology	Bottom-up methodology
<p>This approach starts from the whole economic potential for the GHG abatement of a given intervention in a country or region based on expert estimates and assumption with underlying uncertainties.</p> $CO_2 \text{ indirect TD} = P10 * CF$ <p>$CO_2 \text{ indirect TD}$ = Emission savings using top-down approach (tCO2) P10 = technical and economic potential GHG savings within 10 years after the project CF = GEF causality factor – this shows to what extent the GEF intervention can claim causality for the reduction (range 5 (100%) to 1 (20%))</p>	<p>This approach starts from direct effects of the investment and assumes that a multiple of these effects is going to be achieved by replicating the project's investments.</p> $CO_2 \text{ indirect BU} = CO_2 \text{ direct} * RF$ <p>$CO_2 \text{ indirect BU}$ = emissions saved using bottom-up approach (tCO2) RF = replication factor, how often the project's investment will be repeated during 10 years after project implementation – there is no empirical assessment of this factor currently $CO_2 \text{ direct}$ = estimate for direct and direct post-project emission reductions (tCO2)</p>