



FINAL REPORT FROM THE UNFCCC – GFOI WORKSHOP

**The challenge of estimating carbon
emissions and removals in the land sector:
A focus on new and fully integrated systems**

**Songdo, Republic of Korea
10 - 11 September 2016**

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I. Summary

Many countries are collecting remote sensing and ground data to help estimate land sector greenhouse gas emissions and removals. One of the key challenges for countries is how to integrate these data to produce policy-relevant information. To help progress this issue, the United Nations Framework Convention on Climate Change (UNFCCC) Secretariat and the Global Forest Observations Initiative (GFOI) Office brought together seven countries (Republic of Korea (host nation), Democratic Republic of Congo, Ecuador, Indonesia, Paraguay, Papua New Guinea and South Africa) to discuss how new open source tools, in particular the Full Lands Integration Tool (FLINT), being developed by moja global could help them to meet their policy and reporting needs under the Paris Agreement. The workshop was supported by staff from moja global and the Governments of Australia and Canada. A representative from the US SilvaCarbon Programme also participated.

The moja global team delivered detailed presentations on the importance of integration, the design and use of FLINT, and the role of moja global in managing open source software that supports land sector reporting. Key features of the FLINT, including its ability to allow for continuous improvement from Tiers 1 to 3 and Approaches 1 to 3. The FLINT allows for the systematic integration of large and diverse datasets to produce more detailed and policy relevant information. In doing so, the FLINT allows users to extract greater value from their existing or new datasets.

Participants presented their country circumstances and needs. While circumstances were different, the needs for improved information were similar:

- Support reporting to the UNFCCC;
- Allow for projections to develop and monitor NDCs, REDD+ and other policies;
- Provide a basis for performance-based payments;
- Allow countries to continuously improve their systems and data;
- Support reporting and analysis of co-benefits, such as water and economics;
- Easy to use systems while meeting multiple needs; and
- Assurances that the system will be sustained.

The FLINT is able to support these needs. As the FLINT remains under rapid development, participants were also asked to identify key needs to allow them to use the tool and to provide their contributions to its continued development. These were: suitable training, good documentation and user interfaces.

Overall feedback from workshop participants was very positive. Participants committed to reporting back to their departments and to subsequently informing the UNFCCC Secretariat whether their country would like to test FLINT. Participants were also asked to consider becoming involved in the moja global initiative to help guide ongoing development of the organisation and software. The UNFCCC Secretariat and GFOI Office noted their interest in supporting countries to implement more advanced systems and will look for ways to collaborate on these issues in the future.

II. Background

A. Emissions estimation, integration, the FLINT and moja global

The land sector is highly complex with various sinks and emission sources. The impact of human activity combined with the variability of climate over time, and the scale and complexity of systems, poses significant challenges for inventing more robust and user-friendly tools to assist in the measurement and reporting of GHG emissions.

Fully integrated systems for estimating emissions in the land sector have been in operation for some time. Over this period, fully integrated systems have been shown to provide increased accuracy over simpler methods, more detailed results and hence proven to be highly effective for supporting policy development and tracking of mitigation efforts. The current generation of integration tools are now nearly 20 years old. While advanced, these tools have several limitations because they are not able to use state-of-the-art computing resources and are limited in the amount of remote sensing products that they can process.

To allow countries to take advantage of the foreseen ‘data availability boom’ over the coming decades, particularly from remote sensing earth observation systems, along with new scientific models and advances in computer science, the moja global team has developed a new, second generation integrating tool: the Full Lands Integration Tool (FLINT). The FLINT is considerably more flexible than previous tools, and allows countries to more easily develop country-specific implementations and make use of new data streams. The tool can be configured to implement simple or more complex representation of processes (Tier 1 to 3) and spatial data (Approach 1 to 3), allowing countries to use a single tool for the entire land sector and continuously improve the estimates without needing to move to completely new frameworks. The FLINT is also modular, allowing countries to attach any variety of existing modules or to build country-specific implementations of their own modules to represent plant growth, decomposition of organic matter, disturbances, or specific management activities. FLINT is not locked to any particular satellite sensor or processing method, allowing countries to use their own data and mapping products as available or required.

Through the FLINT, moja global aims to place easy to implement and operate, advanced, systems in the hands of all countries. It is a generic platform that provides a framework for data collation, analysis and continuous improvement. It also supports routine tasks, such as generating part of reports to meet climate change commitments, and therefore has the potential to support enhanced reporting from non-Annex I Parties through high quality national GHG inventories in the land sector; helping to overcome one of the biggest challenges faced by those Parties. The methods implemented by FLINT are fully consistent with the 2006 IPCC guidelines for national GHG inventories.

Simply having a tool is not enough. The FLINT needs to be supported and managed at a level that gives governments and other users confidence that it will be sustained in the long-term. Moja global aims to provide this confidence by treating FLINT as a piece of professional-grade software, managed under the Linux Foundation. Although initially focusing on support for the FLINT, moja global could also be used to house other software required by governments for emissions reporting or other purposes, such as remote sensing processing methods, databases and GIS processing tools.

B. Background to the workshop

The UNFCCC secretariat, GFOI Office and the moja global team recognise the value in supporting countries to develop capacity in systematic data integration to produce more detailed and policy-relevant results. The FLINT is being developed as an internationally generic tool to meet these needs and hence the workshop partners decided to host a preliminary workshop to present the concepts of FLINT and the supporting organization moja global to select countries and seek their input to its ongoing development.

The UNFCCC provides technical assistance for developing GHG inventories and mitigation options. It runs regional capacity building initiatives and has previously tested tools such as ALU and Collect Earth in Southeast Asia and Africa. The UNFCCC applies a pragmatic approach to testing tools: if tools work and countries want them, then UNFCCC will support dissemination and training.

The GFOI is a forum for coordination between international partners who are supporting the development of forest monitoring and MRV systems for REDD+. Under GFOI, partners are consolidating their considerable global resources to provide a more holistic and specialized package of support for REDD+ countries than they would be able to provide alone. A core component of GFOI is the Methods and Guidance Document (MGD) and its online portal in REDDcompass. The MGD provides a systematic workflow approach to guide countries through the complex process of developing forest monitoring and MRV systems. It provides direct links between UNFCCC reporting requirements and the relevant sections within the IPCC Good Practice Guidance. Additionally, GFOI partners are already providing open source tools to assist countries in the collation of large datasets but don't yet have a strong focus on integration tools that can allow countries to extract additional value from these datasets in support of reporting and in particular projection and analysis needs.

The group decided that the best way to test the ideas behind the FLINT and moja global and determine their relevance for the common interests of the UNFCCC Secretariat and the GFOI was to hold a workshop with countries representing key regions and a range of circumstances. The UNFCCC secretariat organised the workshop with co-funding from the GFOI office.

The workshop was conducted over two days (September 10 – 11, 2016) in Songdo, Republic of South Korea, and brought together experts from several non-Annex I Parties to discuss their needs and how these new systems can help them address the challenges they

face in developing land sector emissions estimates. The workshop aimed to provide participants with an:

- Understanding of why integration is important and how it can help in developing sustainable, useful GHG reporting systems;
- Understanding of tools for integrating remote sensing and ground data;
- Demonstration of functional examples of integrated systems including Australia, Canada, Kenya and Indonesia; and
- Providing a background about moja global as a shared platform for managing and using new integration tools.

This workshop represented the first time the UNFCCC and GFOI have formally collaborated to bring together experts to discuss MRV system development.

III. Participants

The detailed designation and contact details of the participants have been distributed in a separate document.

<i>Organisation</i>	<i>Attendees</i>
UNFCCC	Mr. William AGYEMANG-BONSU Mr. Dominique REVET
GFOI	Mr. Thomas HARVEY Ms. Nikki FITZGERALD
moja global	Mr. Robert WATERWORTH Mr. Guy JANSSEN Mr. Werner KURZ
Rep. of Korea (Host Country)	Mr. Jong-Su YIM Ms. EunJung CHOI Ms. Sunjeoung LEE Mr. DongKyun PARK*** Ms. Sohyang LEE
Democratic Rep. of the Congo	Ruffin NSIELOLO KITOKO
Ecuador	Mr. Santiago GONZALEZ Ms. Ximena Maria HERRERA JIRON
Indonesia	Ms. Belinda MARGONO Mr. Agus FAHMUDDIN
Papua New Guinea	Mr. Larsen DABOYAN Mr. Morgan KAI
Paraguay	Mr. Gustavo GONZÁLEZ Ms. Gabriela HUTTEMANN ARZA
South Africa	Mr. Andile Churchill MKWALO Mr. Matiga MOTSEPE
SilvaCarbon Initiative	Mr. Leandro BUENDIA

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*** In a personal capacity, not representing the Government of the Rep. of Korea

IV. Summary of presentations

C. FLINT and integration: background, current examples and operation

The moja global team delivered a number of presentations on integration and integration tools.

History of integration

While there are many efforts to collect and analyse remote sensing and ground data, there has been little effort on how to integrate these data to produce useful information.

It is generally recognised that no one technology or approach can provide all required information for greenhouse gas estimation: Remote sensing, forest inventories, research sites, soils maps, climate information and other data sources each provide valuable data that need to be used. Quality integration is therefore key to producing good results.

Integration can best be described as “a systematic approach that uses the best available data from multiple sources to provide the best possible estimates in support of policy and science.” It is not merely the product of activity data and emission factors ($AD \times EF$) and also does not lead to competition between different measurement techniques and data streams. Integration can help:

- Arrive at credible estimates;
- Reduce costs;
- Improve accuracy;
- Ensure consistency;
- Manage huge data volumes;
- Support policy and science (scenarios);
- Provide a framework for development and improvement.

There are presently no guidelines for how ground observations should be linked to remotely sensed data. However, approaches should meet requirements described in the IPCC 2003 Good Practice Guidance (GPG) and 2006 Guidelines. Nevertheless, there are operational examples that can be used as a starting point, as described in the next presentation.

Existing integration systems, including some examples

This presentation described the two key examples of operational integration systems (Australia and Canada) and two systems under development (Kenya) or as prototypes (Indonesia).

The key points are:

- Integration systems have been running for over 15 years and are used every year for reporting to the UNFCCC, including under the Kyoto Protocol;
- The tools continue to support policy development and implementation, and have been highly successful at doing this.
- While FullCAM and the CBM-CFS3 were both developed to meet country requirements, they are examples of integrating frameworks implemented with country-specific data from input databases:
 - This has allowed them to be successfully applied in many other countries which use their own country-specific data;
- The development of Kenya's SLEEK program led to the realisation that the current tools, while powerful, would not meet all the needs of other countries in the future:
 - This is largely due to the needs to add new models, such as crop growth models, and also take advantage of new computing technology;
- The experience of the prototype INCAS program in Indonesia highlighted several issues with the use of FullCAM, primarily:
 - Inability to add new models for organic soils;
 - Lack of control of development of the tool in the future.

D. Design and development of the FLINT

This presentation introduced the FLINT and why the moja global team are developing it. The presentation highlighted that, while remaining the most advanced integration tools available, both FullCAM and the CBM-CFS3 are products of their time. Key limitations include:

- Lack of modularity, making it difficult to create country-specific versions of the tools and to update them based on new science;
- Unable to take full advantage of new computer technologies, in particular distributed and cloud computing systems;
- Limited ability to use the volume and range of remote sensing data coming on-line to map landscapes and changes over time.

With the development of the SLEEK system it was realised that a new tool was needed that built on the strengths of both FullCAM and the CBM-CFS3 while also addressing the above issues. From this point the FLINT was born. The idea was to develop a completely generic integration framework that could be used by multiple countries, hence greatly reducing development and transaction costs while also creating a far more powerful system.

Since development started the FLINT has moved from proof-of-concept versions, through to test versions and now a version that, while still under development, has been shown to be capable of being used operationally. Key to this has been the testing of the FLINT in Canada. By rewriting the core science models of the CBM into FLINT modules, it has been possible to test the new Generic Carbon Budget Model (GCBM) against two systems. The results are in very close agreement.

Development is continuing, and the first planned full landscape run in Kenya is expected to occur before the end of 2017.

E. Process for using the FLINT

This section was divided into two components

1. a group session to guide countries through their current circumstances and what data and systems they need to run the FLINT; and,
2. A seven step guide to using the FLINT system, both in its current state and planned future state.

In the group session participants were provided with a simple flow diagram to guide them through the process of developing a system based on existing global and country-specific data and plan for future improvements. This allowed participants to map out how the FLINT could be implemented in their own country now and in the future. For many participants the existing data were limited and it was suggested that they would look to start with mainly Tier 1 implementations of the FLINT with activity data derived from global data sets. Several participants noted their countries already had at least some country-specific data, allowing them to report at least some carbon pools and lands at Tier 2.

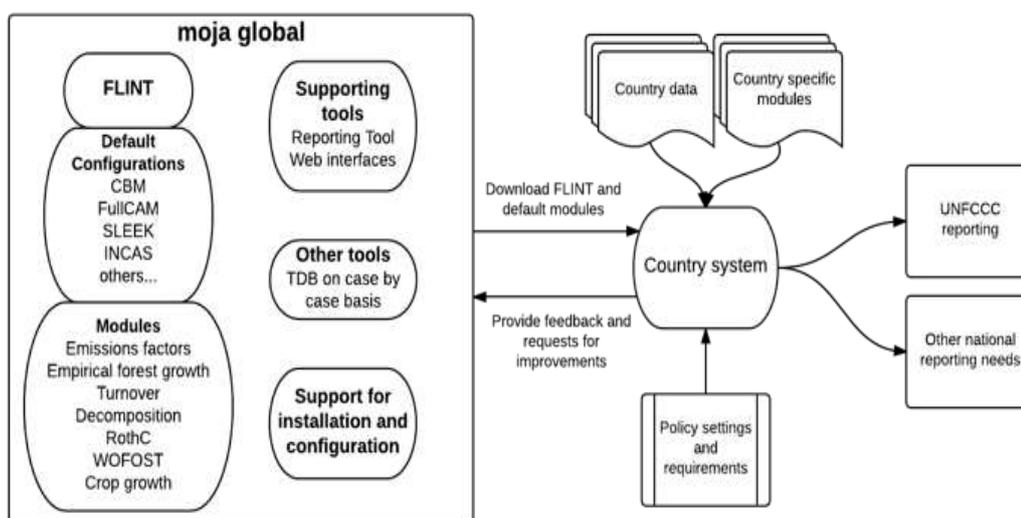
Subsequently, participants identified key areas for improvement, including the data that could be collected in the next 2 to 4 years to improve the system. In this scenario many countries suggested they would want to move towards Tier 3 reporting for at least aboveground biomass. Some countries highlighted the need for the development of new, country-specific modules, in particular for peatlands, wetlands, moorlands and fire. Nearly all countries suggested they would be using country-specific activity data by this stage.

The seven step guide aimed to show the high-level process for running the FLINT:

1. Assess country needs, and decide if the FLINT is the tool best suited to meet these needs;
2. Download the FLINT:
 - a. Currently this process is not simple, but the moja global team is working to make the system much more easily accessible;

3. Choose an existing configuration or a series of suitable modules:
 - a. Existing configurations and modules should meet the majority of needs, especially in the early stages including Tier 1 implementations;
 - b. Some countries will need to develop their own modules in the future, or customise existing modules to better meet their needs.
4. Compile and link the required spatial data to the system, including:
 - a. Activity data (global or national);
 - b. Stratification data to inform the modules which data to use;
 - c. Reporting categories, such as political, administrative or ecological boundaries.
5. Add data inputs required by the modules:
 - a. This is managed through a data base system and includes model parameters (including emissions factors in the case of Tier 1 or 2 implementations).
6. Set the configuration and run the system:
 - a. This includes the years to run, modules to use, carbon pools, which inputs to use (databases and spatial data) and policy settings to apply;
 - b. This allows for reporting and the generation of multiple scenarios as required;
 - c. Run the system;
 - d. Currently this is command line driven: there are no user interfaces.
7. Analyse the outputs:
 - a. The FLINT will produce a large amount of data that can be analysed through web-based systems (such as the SLEEK reporting tool), custom database queries or through the use of new business intelligence tools.

The overarching concept as outlined in these steps is shown in the diagram below. The FLINT, configurations, modules and data pre-processing tools are all available through moja global (see description below). Countries can select which of these to implement in their country-specific configuration on the FLINT platform. All data collection, input generation, selection of policy settings, definition of scenarios to analyse (e.g. through different rates of future deforestation, reforestation or other management-related activity data), management of output and reporting remain the responsibility of the country.



The final step is to plan how the system can be improved before the next report that needs to be produced. The FLINT provides a clear framework for identifying the priorities for improvements, i.e. the changes that will have the biggest impact on the quality of the results can be quantified through sensitive analyses using the framework. This will help prioritize resource allocation to the most sensitive components of the MRV systems.

F. Introduction to moja global: “Every tool needs a home”

The presentation explained that tools like the FLINT need to be professionally managed so users are confident that the software is robust, reliable and will be maintained in the long term with support for the users.

Moja global was established as a non-profit entity to develop and manage FLINT and other open-source tools that support management of the land sector.

To ensure quality of its tools, moja global is not only complying with IPCC guidance and UNFCCC reporting requirements, but it also follows the relevant sections of the GFOI methods and guidance document.

The tools available through moja global are open source so anybody can study, change and distribute the tools for free. The open-source licence requires users to share with other users any improvements that they make to the software. This speeds up innovation. The presentation touched on other advantages of open source software. The ability for countries to develop a version of the tools in their own language and with their own logo were particularly appreciated. Several participants noted that open source is likely the future, but that Governments need to understand the advantages and process better.

The “cost” of a successful open-source library of code is that a management team needs to ensure that code returned to the library for use by others meets certain quality standards. moja global will therefore develop and maintain tests and systems that will ensure that code provided by the user community does meet quality standards, including meta data and documentation.

Countries that develop modules for their own system based on new code that they plan to link to the FLINT platform will be able to do so, whether such country-specific code will be maintained by the country and not shared with others, or returned to the library as open-source code for use by others is a decision of the organisation that developed such code. Modules provided by countries for use by others will have to meet the same quality standards and once accepted will be supported by moja global.

The Linux Foundation is the leading non-profit specialist in open-source software and will support moja global by providing expertise.

Finally, the management structure of moja global was presented to show that the organisation will be controlled by the countries that develop and use the FLINT and other tools, the donors and the institutions providing guidelines like IPCC, UNFCCC and GFOI. The structure also allows anybody to contribute to the tools by submitting their proposed changes to the Technical Steering Committee.

V. Additional presentations and information

G. GFOI and FAO documents and tools

The activities of the GFOI were presented, specifically the Methods and Guidance Documentation (MGD). Australia leads the MGD Component of GFOI. Version 1 was published in January 2014 in English, French and Spanish, Version 2 is available online since August 2016. It is targeted at technical audiences responsible for implementation and aims to complement the high-level IPCC Guidance and UNFCCC decisions. MGD provides design choices for all three Tiers and provides very practical information to build national forest monitoring systems.

The MGD forms the basis for REDDcompass, a new online portal (launched April 2016) that better links to MGD and other key documents. Online tools allow for the planning of training and research needs by the users.

FAO's OpenForis initiative provides a free set of open-source forest monitoring tools that facilitate flexible and efficient data collection, analysis and processing. It consists of five primary tools in *Collect*, *Collect Mobile*, *Collect Earth*, *Calc* and the *Geospatial Toolkit*. *Collect* is an online professional grade database that countries can use to enter their field data. *Collect Mobile* allows inventory teams to enter data directly into *Collect* via smartphones. *Collect Earth* facilitates the assessment of deforestation and other forms of land-use change. It uses Google Earth's interface and the satellite imagery hosted within it to view plots of lands. It pulls a HTML form into Google Earth, which allows users to enter and save their visual observations of the land use designation of each plot. *Calc* provides an easy and systematic way to collect, organize, analyse and report results for sample-based assessments. The *Geospatial Toolkit* is a collection of command-line utilities for processing of geographical data. It aims to simplify the complex process of transforming raw satellite imagery for automatic image processing to produce valuable information. There is also SEPAL - the System for Earth Observation Data Access, Processing and Analysis for Land Monitoring. SEPAL is a cloud computing platform for geographical data processing. It enables users to quickly process large amounts of data without high network bandwidth requirements or need to invest in high-performance computing infrastructure.

Data issues

Numerous issues were raised during the discussions, including how to use remote sensing products, uses of ground data and interpretation and use of the IPCC 2006 Guidelines. Although many of these were not a specific focus of the workshop, they are issues that arise from the need for more comprehensive analysis.

Issues in the use of remote sensing data

Many countries are rapidly moving towards development of remote sensing based MRV systems. The moja global team discussed several high-level issues with participants, including:

- Length and temporal density of the time-series and its effect on the accuracy of emissions estimates through time, in particular the difference between detecting net versus gross changes;
- The differences between land cover and land use, including:
 - The importance of attribution of change to a cause;
 - The need for a time series of data to inform the pattern of change through time; and,
 - The inability of remote sensing maps to be used to map the IPCC classes without additional inputs.
- The importance of analysing the time-series of cover and use change rather using map differencing and LUC matrix methods:
 - Simpler methods can lead to double counting of lands, misallocation of emissions and bias in emissions estimates.

The presenters distributed some key scientific papers covering these issues.

Uses of ground data

It was noted that there are many different types of ground data, not just National Forest Inventories (NFIs), and all of these data can be used to help improve emissions estimates. It

was also noted that the data required to produce Tier 2 emissions factors are often the same, or very similar to, those required to develop Tier 3 models, such as empirical growth models.

VI. Issues raised by countries

Countries were very engaged in the discussions. During the sessions and group discussions, several issues continued to be raised. These can be grouped under three broad categories: the system requirements, data and institutional arrangements

H. System

- The need for a system that can be easily adapted to country-specific circumstances:
 - This flexibility is particularly important where there are unique circumstances, such as peatlands, organic soils, wetlands, moor lands, fire, complex dead organic matter (DOM) and soil pools and differing management regimes;
 - In addition to regular carbon and non CO₂ emissions estimates participants would like to have a water module and a system to support land-use planning.
- A simple system that meets the needs:
 - One important intervention was that the system needs to be sufficiently simple, while still meeting their needs. It was noted that the needs were increasing, especially with generating projections to develop NDCs and the need for mitigation planning. The differentiation between simple and sufficiently simple was noted as very important, and that making the system too simple can mean it does not meet the needs, and as such is not useful;
 - Participants prefer to avoid the use of spreadsheet-based tools. If there is a need for lots of data entry, complex process entry, or too much pre-processing, the process is not only work intensive but also prone to human errors. Ideally, systems could automate many of the tedious processes using scripts and other methods that can be quality controlled, are repeatable, and much faster once the systems are developed. This is one important reason why a shared platform with common tools for generic data processing are in such demand;
 - Participants expressed an interest in an existing system that can run on the data that are currently available, but a system that can be further improved without the requirement to migrate to a new system;
 - Many indicated systems need the flexibility to use different data inputs, especially activity data. For example, it would be nice if systems can accommodate sample-based statistics e.g. from Collect Earth as well as use fully spatial data, e.g. from SEPAL. Ideally, a system should develop the ability to pull the data from the databases of the tools that are currently being used. Or at least that the existing data can easily be transformed into formats that the new system can use. For example, the Canadian GCBM implementation on the FLINT platform is able to use the input data that were developed for Canada's National Forest Carbon Monitoring, Accounting and Reporting System;
 - Countries have the aspiration to progress to Tier 3 and want to know how they can reach that level. There is a recognition this was an end goal, but that at the moment there is not a clear pathway for them to reach this. Developing pilot projects through which the steps involved in such a progression from Tier 1 to higher Tiers can be

demonstrated is an important next steps towards greater understanding of the power of the FLINT-based approach;

- Several countries have recently prepared or are currently preparing inventory estimates for Biannual Update Reports (BURs), National Communications or REDD+ Forest Reference Emission Level (FREL) submissions.

- Selection of the right tool. The number of tools that are now available is leading to confusion. It is not clear how the systems overlap, what their capabilities and limitations are, and which system might best meet national requirements now and in the future.

I. Data:

- A lack of data:

- Some countries indicated that they still need to start the data collection process. Countries therefore need to be able to start very simple and implement initial systems that can provide results early and provide a clear framework for continuous improvement;

- The use and collection of the right data:

- A consistent framework to guide data collection and process can greatly increase efficiency of data collection processes by identifying clearly which data are required to answer specific questions, and by allowing sensitivity analysis of the impacts of data uncertainties on estimates of GHG emissions and removals;

- Countries noted they have a range of maps and remote sensing products available. The issue is how to choose which to apply and how to apply them.

J. Institutions:

- The need to, but also the difficulty in managing data and systems across multiple agencies in their countries;

- The use of consultants to develop inventory estimates:

- Not building capacity as part of a government process has held many countries back as the data and expertise from consultants are often lost or unavailable to the country once the contract is completed. This has resulted to inconsistency in estimates of successive reports, because each cycle starts with new data;

- There was a strong desire from participants to break this cycle;

- The speed of implementation:

- Moving forward in many areas is a considerable challenge, and it will be years until many of the possible or planned improvements can be implemented;

- Building capacity within countries requires stability in human resources to ensure that those who have learned to use reporting systems continue to remain on the job.

The moja global team responded to each of these concerns and explained that FLINT is very flexible and can thus respond to many of these needs. It is essential to carefully evaluate the country needs, the requirements for reporting and to support policy development through analysis of mitigation options (projections of future emissions as affected by changes in activities). Matching available tools to these needs is the basis for selecting and designing the most appropriate system. The FLINT could be considered if the needs correspond with FLINT's strengths. The FLINT has been developed with the following strengths as priorities:

- To comply with IPCC guidance, GFOI MGD and producing results in line with the UNFCCC reporting requirements;
- To allow for a review of the process through which the reports were calculated, including an estimate of the uncertainty of the results;
- To generate projections that allow for the development of NDCs, planning implementation of activities and estimation of potential results;
- To adapt to data available in the user country. Once in place FLINT provides a clear framework for continuous improvement and the identification of priorities for data collection based on an assessment of the contribution of uncertainties in specific data to the uncertainties of the reported estimates;
- Through the modular open-source approach and the design of the FLINT platform, it will be much more efficient and easier to develop and implement country-specific MRV systems;
- Because of commonalities in the software components, reviewers familiar with one FLINT-based system will more readily understand and accept other systems based on the same platform. This will enable more comparable and transparent reporting;
- Greater understanding of and comfort in the quality of reported estimates will enhance the credibility of reported estimates and facilitate the access to results-based payments;
- To use the system in the future as a platform to build applications that can be used to generate co-benefits.

VII. Outcomes

The expected outcomes from the workshop were that participants:

- Obtain a clear understanding of the policy and reporting needs of non-Annex I Parties and the potential need for more advanced systems;
- Learn about the advantages of the FLINT, and what is needed to implement it;
- Obtain the necessary information about the role and structure of moja global so that they are able to make an informed decision on its applicability to their context and whether they should progress with it or not;
- Contribute to a summary document that highlights the workshop outcomes, including:
 - Proposed next steps for engagement and support;
 - Issues raised by the participants will also be able to give the

developers of the new system with valuable feedback and consider further interaction through a new open source software management platform, moja global (<http://moja.global>).

Overall the workshop met its objectives. Feedback forms completed by the participants indicated that they had understood the FLINT and moja global. The discussions with

participants provided valuable feedback to the moja global team on what they need to see in tools such as the FLINT to progress.

This was the first time this workshop has been run. There were several key lessons the moja global team took from the experience, including the need to reduce the number of presentations, increasing time for group work and facilitating more discussions between countries and the experts.

VIII. Next steps

The final session of the workshop focused on potential next steps. All country representatives committed to return home and discuss the results of the workshop with their departments and the national UNFCCC focal points.

Several participants suggested they would like to gain further information in the coming months, in particular on greater details on how system works and how it could support other internal systems, such as data management systems. The moja global team offered to answer any specific questions through the moja global email address (info@moja.global).

Several participants expressed an interest in piloting the system in their countries, pending discussions and approvals through their respective governments. These pilot studies would need to be designed on a case-by-case basis. Key considerations would include the funding available, the current data availability, size of the pilot area, and the desired outputs (using existing configurations or developing new configurations). The UNFCCC and GFOI expressed an interest in helping to support these activities. Moja global is willing to assist with the implementation of pilots, if funding is available.

UNFCCC suggested it may be possible to have an inception workshop before the end of the year or early 2017 to help develop specific work plans for countries that would like to move forward with using the FLINT. GFOI will explore with all partners whether this could be supported.

Given the short time until the Marrakech COP (8-17 November 2016) the UNFCCC requested that countries to provide their feedback and any specific requests (further workshops, design and implementation of pilot studies) by the end of October. This will help with programing the coming year's work as discussion about 2017 programs has already started.

Finally, UNFCCC informed participants that they can address general questions on process to UNFCCC and specific technical and policy questions around moja global and FLINT to the moja global team at info@moja.global