ICAT South Africa GPC GHG Inventory Training Workshop Report

March 2024

Date: March 11–14, 2023

Venue: Birchwood hotel & conference, Johannesburg, South Africa
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PREPARED UNDER

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Institutional strengthening support to South Africa on the Institutionalization of the Climate Change Mitigation System tools to support the implementation of its NDC.

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Global Protocol for Community-Scale Greenhouse Gas Inventory Training Workshop Report

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1. INTRODUCTION & BACKGROUND

The Climate Change Bill in South Africa is being introduced by the government as a crucial step towards a unified national response to climate change and a fair transition to a low-carbon economy. This bill includes the establishment of emission reduction targets for different sectors and sub-sectors, as well as the allocation of carbon budgets to companies engaged in specified activities that meet emission requirements. The involvement of provincial governments is highlighted in the bill to help in setting these targets to support the country in reaching the objectives outlined in the recently updated NDC. South Africa’s monitoring and evaluation system focuses on collecting data from local governments and other stakeholders to contribute to the national system. However, there are limitations in capacity at the local level.

The Department of Forestry, Fisheries and the Environment (DFFE) has received support from the United Nations Office for Project Services (UNOPS) with the Initiative for Climate Action Transparency (ICAT) supporting the implementation and training of provincial officials for maintaining their Greenhouse gas inventories. The South African ICAT project seeks to provide training to technical experts from all provinces on the Global Protocol for Community-Scale GHG Emission Inventories (GPC). A four-day training workshop starting from the 11th to the 14th of March 2024, was held by the Department of Forestry, Fisheries and the Environment in collaboration with Gondwana Environmental Solutions (GES) (Deliverable 1.1 of the ICAT SA project). The four-day course was given by GHG inventory experts Brett Cohan (Energy/IPPU/Waste expert) and Luanne Stevens (AFOLU expert).

Developing a Greenhouse Gas (GHG) emissions inventory is the first step to implementing sustainability into climate change mitigation planning and policy-making and is the basis from which to develop an emissions reduction plan strategy in a given jurisdiction. The ICAT project aims to capacitate provincial governments on target setting and the development of provincial monitoring and evaluation frameworks, which entails sub-national GHG Inventory compilation, and the institutionalization of the provincial monitoring and evaluation systems. The core project outcome will be the provincial contribution towards the achievement of the national NDC commitment.
2. OBJECTIVES OF THE TRAINING WORKSHOP

The specific objectives of the workshop were to:

1. Train provincial government on how to develop their inventories using the GPC methodologies.
2. Train participants on the emissions included under the various scopes.
3. Provide training on the CIRIS tool.
4. Provide hands-on exercises and examples to participants.
5. initiate discussions between provinces on possible data sources for the various inventory sectors.

3. WORKSHOP PROGRAMME

The workshop took place in Birchwood conference and hotel, Johannesburg over a course of 4 days, whereby the first day of the workshop involved the introductions from participants, both in person and online, who shared their experiences and challenges related to greenhouse gas emissions inventory. On Day 1, a DFFE representative delivered a welcome message, outlining the workshop's purpose as part of an initiative to address capacity building needs for municipalities and provinces in implementing climate change requirements. Day 1 also included the Energy sector and Day 4 also included the waste sector. Agriculture was also presented on one of the days. Day two and three started with an introduction presentation from the DFFE GHG inventory sector lead and involved sector specific activities and presentations which engaged the participants on the IPPU and LULUCF sectors. Day 4 included discussions and a major activity to test the knowledge of the participants on the CIRIS tool and gain their perspective of the workshop.

4. PARTICIPANTS

The target audience for the workshop were representatives of relevant government departments and national experts and representatives of project partners. The workshop was well-attended with 13 participants in-person and about 12 participants online for each of the 4 days. Figure 1 shows the in-person attendees at the end of day 4 of the training workshop. A detailed workshop attendance register has been attached as Annex 2.
5. WORKSHOP ACTIVITIES

5.1. DAY-1 ACTIVITIES (11 March 2024)

5.1.1. OPENING SESSION

The workshop was opened at 11:30 am by Brett Cohan (Energy/IPPU/Waste expert), who led the proceedings in the first phase of the engagement. The meeting began with introductions from participants, both in person and online, who shared their experiences and challenges related to greenhouse gas emissions inventory. Figure 2 shows the venue for the workshop where the in-person attendees gathered. A DFFE representative, Sindisiwe Mashele, delivered a welcome message, outlining the workshop’s purpose as part of an initiative to address capacity building needs for municipalities and provinces in implementing climate change requirements.

Sindisiwe Mashele delivered a comprehensive presentation on the guidelines for sub-national greenhouse gas emission inventories, highlighting the critical role of localized inventories in implementing climate change action at the provincial and municipal levels. She discussed the national emissions profile, targets, and the impact of COVID-19 on emissions, emphasizing the need for localized inventories to set targets and monitor climate change mitigation strategies.
Sindisiwe Mashele provided detailed guidance on the methodology for data collection and emission factor calculation for reporting emissions from the energy sector. She emphasized the importance of consistency and accuracy in reporting and provided examples of country-specific emission factors. The discussion also touched upon the concept of global warming potential (GWP) and its significance in evaluating greenhouse gas emissions.

The team deliberated on the source and guidelines for the data, ensuring a high-quality data rating and accurately specifying the year of publication. Additionally, the team underscored the significance of tracking back to the original data source to validate the accuracy of the information, ultimately aiming to minimize errors and ensure precision in the emission factors.

Brett Cohan introduced the CIRIS tool to the participants following the introductory presentations and mini discussions. He spoke on the different colour coding used on the tool and what it means and mentioned that the use of the tool is prescribed as part of the GPC protocol, and they will provide support to the participants where needed.

5.1.2. AFTERNOON SESSION PRESENTATIONS

The afternoon session was focused on the energy sector. This part was mainly presented by Brett Cohan. The meeting section covered the detailed breakdown of stationary energy into eight subsectors, including residential and commercial buildings, manufacturing industries, and energy use in agriculture, forestry, and fishing activities. Additionally, the discussion provided a comprehensive explanation of the scopes of reporting, highlighting the significance of scope one, scope two, and scope three emissions in understanding and aggregating city and province-level emissions. The meeting emphasized the importance of avoiding double counting and provided
specific examples of emissions falling under each scope, reinforcing the understanding of the framework.

The section also revolved around the application of assumptions to scale data and the need to document these assumptions for practicality and refinement. Notation keys and data quality were highlighted as essential elements, with an emphasis on prioritizing accuracy for important sectors. The discussion also touched on the use of population data for scaling national data for industrial processes, with suggestions including considering the contribution to GDP of a subsector as a scaling factor (Figure 3). Additionally, the GPC's provision for three data quality levels was mentioned as a relevant aspect to consider. The participants were provided with a practice spreadsheet and provided with a step-by-step guide on how to go about using the tool for their respective sectors.

![Figure 3: GPC GHG Inventory training participants.](image)

5.1.3. CLOSING

The participants had a chance for a Q&A at the end of the session and Brett thanked the participants for the productive and fruitful first day of the training workshop. The participants were also encouraged to have a look at the tool on their own time, attempt to do some exercises and bring questions the next day. The workshop was closed after a short discourse.

5.2. DAY 2- ACTIVITIES (12 March 2024)

5.2.1. MORNING SESSION

The second day of the workshop started by finishing up with the energy sector in the first session.
The morning session was led by Brett Cohan (Figure 4) on the energy sector and focused on activities with the participants to make use of the tool and input data. The meeting discussed the challenges of quantifying transboundary emissions and the consideration of scope one, two, and three emissions in the transport sector. The participants emphasized the sharing of the meeting exercises and the constant updating of resources available on the SharePoint folder. The conversation also touched on the challenges of relying on private fuel sales as the primary component and the difficulties in obtaining real-time monitoring data. The meeting also addressed the complexities of modeling off-road transport emissions and the limited consideration of scope 2 emissions for off-road transport vehicles.

Once the energy sector was complete discussions moved to the IPPU sector. Hendrik Louw presented on the Industrial process and production use (IPPU) greenhouse gas inventory compilation. The section focused on the IPPU sector reporting requirements, covering the regulations, greenhouse gases, calculation methodologies, and reporting process. The speaker provided specific examples for industries like cement and ferroalloy production, detailing the thresholds, methodologies, and gases relevant to each industry. The discussion also delved into the impact of industry on national emissions and the need to analyse trends to assess the effectiveness of mitigation efforts. The meeting also emphasized the significance of tier 3 reporting, which offers detailed information for better management in the industry. The presentations were then followed with a Q&A session.

Brett Cohan continued to present on the IPPU then explored the categorization and calculation of emissions for industrial processes, particularly within the minerals industry. The discussion encompassed the reporting of scope one emissions, emphasizing the exclusion of scope two emissions related to electricity. The use of generic emission factors, as well as the calculation methodologies for cement, lime, and glass production, was thoroughly explained. The section also provided a detailed list of specific chemicals and metals, stressing the significance of considering production processes and technologies for accurate emission calculations.
Brett Cohan also spoke on the complexities of calculating carbon emissions from non-energy use fuel, addressing the factors involved in the formula and the challenges associated with obtaining the necessary data. Additionally, the discussion explored the use of fluorinated compounds in the electronics industry, emphasizing the need to approach industries for data collection. It was also highlighted the limitations in obtaining specific data for every type of paraffin and lubricant, leading to the use of average values. Furthermore, it underscored the importance of engaging with the electronics industry to calculate the area of circuit boards being produced and the average capacity utilization.

The participants and the presenters engaged on a Q&A session on the IPPU and the went for lunch.

5.2.2. **AFTERNOON SESSION**

Sewela Malaka from the DFFE opened the afternoon section with a presentation on the introduction of the agriculture sector (part of the AFOLU sector). Explored the emissions generated by agricultural activities, encompassing greenhouse gas emissions such as methane (CH4) and nitrous oxide (N2O), as well as other pollutants. Introduced methodologies for calculating emissions from different agricultural practices, including direct emissions from livestock, soil management activities, and indirect emissions from fertilizer application and land use changes.

Luanne Stevens then presented on the agriculture Sector emissions in detail (Figure 5). She went through each of the agriculture subsectors and broke down how different emissions are released. Different data sources were also discussed as well as where participants could obtain the data inputs.

Luanne Stevens went on to discuss the various types of livestock and their differing contributions to emissions, emphasizing factors such as diet, physiology, and management practices. She also addressed the challenges related to data availability when quantifying emissions from livestock, acknowledging the variability in data quality and accessibility. Introduced the CIRIS tool as a resource for calculating emissions from enteric fermentation and other livestock-related sources. The session also explored the relationship between manure management practices and emissions, including methane and nitrous oxide release from storage and treatment processes. Luanne Stevens then provided an example illustrating the concept of fraction manure managed, which refers to the proportion of livestock manure subjected to controlled management practices such as composting or anaerobic digestion.
5.3. **DAY 3- ACTIVITES (13 March 2024)**

5.3.1. **MORNING SESSION**

The session was led by Luanne Stevens where she continued with the agricultural sector. She reminded the participants that the examples can be found on the shared folder. The section was more activity focused with a main example from lime where participants were given an exercise to calculate emissions for lime application. The task included adding the data into CIRIS.

The session began with a review of the previous day's content on agriculture and land management, followed by a detailed explanation of the step-by-step process for calculating nitrogen production and management in livestock and manure systems. The discussion highlighted the significance of accuracy in the calculations and the use of the CIRIS tool for entering activity data and emission factors. The meeting also explored nitrogen inputs and emissions in managed soils, emphasizing the complexities of obtaining accurate nitrogen consumption data and the interconnected nature of the calculation equations. On this session, the emissions resulting from the application of urea as a fertilizer to soil, focusing on its role in agricultural practices were also explored.

Luanne then moved on to introduce the LULUCF sector. The concept of the land representation and the land change matrix was introduced (Figure 6). An exercise on how to interpret a land change matrix was provided. It was emphasized the importance of specific values, such as the change from forest to grassland, and discussed the implications of these changes, particularly in terms of emissions and loss of woodland. The discussion also highlighted the significance of change values in the inventory. The meeting provided a detailed exploration of the critical aspects of understanding land change data, emphasizing the importance of change matrices and activity data for the land sector.
5.3.2. AFTERNOON SESSION

On the afternoon session, Luanne Stevens continued with the Land use, Land use change and Forestry (LULUCF) – land component of the AFOLU sector. There were discussions on the various carbon pools. The presentation also included:

- Estimation methodologies: How much carbon changes with land use change (need data for at least two years).
- Stock difference methodology, difference between the years. Gain-loss method, add up the gains and add up the losses then subtract the losses from the gains.
- Land classification discussion – All land area must be considered when doing an inventory.
- Discussion on land change matrix: to get the initial area add the numbers on the vertical row and final land change.
- Example of change values.

Luanne emphasized on spatial data that needs to be ground truthed as some land may change due to seasonal change as not actually be a permanent change. She also noted that area, change and carbon, are the main components for land use change emissions.

Participants were tasked to enter data into CIRIS for forest to non-forest. It is important to do verifications after loading data to CIRIS from the working spreadsheet. Luanne Stevens also uploaded Excel spreadsheets containing examples for participants to practice calculations and
input data related to biomass burning emissions (Figure 7). She also encouraged participants to engage with the spreadsheets to gain hands-on experience in performing calculations and analysing data.

Figure 7: Luanne Stevens engaging the participants.

5.3.3. CLOSING

Luanne Stevens asked for the participants input on how they would like the sessions go for the next day and it was decided that the morning activity for the last day will be the biomass example and solving issues on CIRIS. She also reminded the participants of the exercises to take place on the last day of the training. Lastly thanked the participants on the interaction and taking part during the sessions.

5.4. DAY 4- ACTIVITES (14 March 2024)

5.4.1. MORNING SESSION

The session started off focusing on biomass burning and was followed by a session on waste sector emissions. The participants discussed the calculation process for biomass burning, including factors such as burnt area, fuel availability, combustion fraction, and emission factors for methane and N2O. Brett Cohan addressed issues related to adding rows in the calculation tool and troubleshooting errors (Figure 8). The team focused into the process of entering emission factors and activity data for biomass burning, with a specific focus on gases such as methane and N2O. They also discussed the challenges involved in performing conversions between different units. Brett also emphasized on paying attention to the units when using the tool.
Once the biomass burning example was completed, the focus shifted to the waste sector. Tshamaano Khalusi from the DFFE presented on the and introduced the waste sector. He spoke about different boundaries involved in waste reporting and emissions sources: solid waste disposals (Municipal solid waste, sludge, industrial waste and other waste which includes the hazardous waste) CH4 estimates from solid waste disposal. Tshamaano also noted that the GPC recommends the 2006 IPCC waste models be used (link attached to Tshamaano’s presentation).

Brett Cohan continued the waste sector and provided detailed insights into the waste sector emissions and reporting, covering the categorization of emissions into scope one, two, and three, and the nuances of BASIC and BASIC+ reporting. The discussion highlighted the challenges in obtaining accurate activity data for waste emissions, particularly from landfill and dump sites, and emphasized the importance of historic data and the first order decay model in understanding emissions. It was also highlighted the complexities of waste management data and tools, highlighting the availability of data from municipalities and the challenges of historical data availability.

Brett Cohan also discussed the methane emissions calculation tool, biological treatment methods for solid waste, incineration, open burning, and wastewater treatment processes. The participants discussed the processes involved in each method, the importance of capturing and utilizing methane for energy recovery, and the potential environmental consequences of releasing methane into the atmosphere. They also highlighted the use of equations and tools to calculate emissions from these activities, emphasizing the need for accurate data input and understanding of the processes involved. The participants were engaged in a Q&A before going for lunch (Figure 9).
5.4.2. **AFTERNOON SESSION**

The afternoon session was mainly for the participants to practice putting data into the CIRIS tool. The session covered the course evaluation and training exercise, managing and reporting inventories at national, provincial, and municipal levels, and selecting a tool for reporting. Brett Cohan and Luanne Stevens emphasized the importance of utilizing tools like the GPC to effectively structure and aggregate results, while also acknowledging the challenges posed by varying methodologies and processes. They also discussed the significance of maintaining a consistent approach in methodology and output for reporting, with an emphasis on not being constrained by a specific tool.
5.4.3.  WAY FORWARD

Luanne Stevens shared a brief presentation on the planned activities following to the training workshop. She informed the participants about the institutional arrangements and QA/QC framework training sessions which also falls under Activity 1. She went on to explain that activities will be communicated in time so the participants can fully take part. Reminded participants to reach out to Luanne or Brett for any support needed, especially regarding different categories discussed during the meeting.

Emphasized the availability of support resources to assist participants in addressing questions or challenges related to the topics covered.

5.4.4.  CLOSING REMARKS

Luanne Stevens thanked the tremendous efforts and contributions demonstrated by the participants during the breakout sessions. She highlighted that the success of this ICAT project largely depended on stakeholder buy-in, participation and engagement. She concluded that the contributions from the stakeholders will be compiled and will assist in informing and guiding the overall execution of the project. It was also appreciated the productive deliberations that were witnessed on both days of the workshop. She thanked the participants who continue to support and provide guidance on the work which is to be implemented by the ICAT project which will strengthen the resilience of the country and the society at large to the impending climate crisis. Lastly the participants to contact the Gondwana team should they have troubles accessing the training materials.

6. OUTCOME OF THE WORKSHOP

- Provincial officials trained on the implementation of the GPC GHG Inventory methodologies for all four sectors.
- Officially introduced the CIRIS tool to the provinces.
- Provinces officially capacitated to develop and/or maintain their GHG inventories.

7. SUMMARY OF PARTICIPATION SURVEY

The participant demographics illustrate a varied age distribution, with the majority falling between 36-45 years old, comprising 50% of respondents, while only 8% were over 45. The rest of the participants were below the age of 35. Prior to training, knowledge levels varied, with 33% rating it as good, 25% as poor, 33% as average, and 9% as very poor. Post-training, 82% rated their knowledge as good, 9% as very good, and 9% as average. Key takeaways encompassed
understanding tools like the CIRIS tool, emission factors application, and data analysis. 75% of participants plan to regularly apply their newfound knowledge, while 25% anticipate a limited application. This includes updating GHG inventories, aiding, and applying knowledge to projects. However, participants felt improvements could enhance future applications, suggesting more technical examples and dedicated time for sectors like AFOLU. Despite these suggestions, overall satisfaction with the training was high, with 42% rating it as good and 58% as very good. Overall there were 5 males and 6 females that attended in person each day. Virtual attendance consisted of about 5 males and 7 females each day.
8. Annex 1 - GPC GHG Inventory Training Programme

**DAY 1: Monday 11th March**

Allow time in the morning for participants to arrive.

<table>
<thead>
<tr>
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<th>Activity</th>
<th>Responsibility</th>
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<tbody>
<tr>
<td>11:30 – 12:00</td>
<td>Registration</td>
<td>Gondwana</td>
</tr>
<tr>
<td>12:00 – 12:10</td>
<td>Introductions and welcome remarks</td>
<td>DFFE</td>
</tr>
<tr>
<td>12:10 – 12:30</td>
<td>Introduction to GHG inventories and GPC guidelines</td>
<td>Sindisiwe Mashele (DFFE)</td>
</tr>
<tr>
<td>12:30 – 13:00</td>
<td>Energy sector introduction</td>
<td>Rumbidzai Mhunduru (DFFE)</td>
</tr>
<tr>
<td>13:00 – 14:00</td>
<td>Lunch</td>
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<tr>
<td>14:00 – 15:30</td>
<td>Energy sector</td>
<td>Brett Cohen (Gondwana)</td>
</tr>
<tr>
<td>15:30 – 15:50</td>
<td>Tea/coffee</td>
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</tr>
<tr>
<td>15:50 – 17:00</td>
<td>Energy sector</td>
<td>Brett Cohen (Gondwana)</td>
</tr>
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**DAY 2: Tuesday 12th March**

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<td>Energy sector</td>
<td>Brett Cohen (Gondwana)</td>
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<tr>
<td>10:00 – 10:30</td>
<td>IPPU sector introduction</td>
<td>Hendrik Louw (DFFE)</td>
</tr>
<tr>
<td>10:30 – 11:00</td>
<td>IPPU sector</td>
<td>Brett Cohen (Gondwana)</td>
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<tr>
<td>11:00 – 11:30</td>
<td>Tea/coffee</td>
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<td>11:30 – 13:00</td>
<td>IPPU sector</td>
<td>Brett Cohen (Gondwana)</td>
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<tr>
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<td>14:00 – 15:30</td>
<td>IPPU sector</td>
<td>Brett Cohen (Gondwana)</td>
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<tr>
<td>15:30 – 15:50</td>
<td>Tea/coffee</td>
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<tr>
<td>15:50 – 16:20</td>
<td>Agriculture sector introduction</td>
<td>Sewela Malaka (DFFE)</td>
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<td>16:20 – 17:00</td>
<td>Agriculture sector</td>
<td>Luanne Stevens (Gondwana)</td>
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**DAY 3: Wednesday 13th March**

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<td>Luanne Stevens (Gondwana)</td>
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<td>11:00 – 11:30</td>
<td>Tea/coffee</td>
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<td>Agriculture sector</td>
<td>Luanne Stevens (Gondwana)</td>
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<td>12:30 – 13:00</td>
<td>LULUCF sector introduction</td>
<td>Luanne Stevens (Gondwana)</td>
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<td>Lunch</td>
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<tr>
<td>14:00 – 15:30</td>
<td>LULUCF sector</td>
<td>Luanne Stevens (Gondwana)</td>
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<tr>
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<td>Tea/coffee</td>
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<tr>
<td>15:50 – 17:00</td>
<td>LULUCF sector</td>
<td>Luanne Stevens (Gondwana)</td>
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### DAY 4: Thursday 14th March

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<td>LULUCF sector</td>
<td>Luanne Stevens (Gondwana)</td>
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<td>10:00 – 10:30</td>
<td>Waste sector introduction</td>
<td>Tshamaano Khalushi (DFFE)</td>
</tr>
<tr>
<td>10:30 – 11:00</td>
<td>Waste sector</td>
<td>Brett Cohen (Gondwana)</td>
</tr>
<tr>
<td>11:00 – 11:30</td>
<td>Tea/coffee</td>
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<tr>
<td>11:30 – 13:00</td>
<td>Waste sector</td>
<td>Brett Cohen (Gondwana)</td>
</tr>
<tr>
<td>13:00 – 14:00</td>
<td>Lunch</td>
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<tr>
<td>14:00 – 15:00</td>
<td>Waste sector</td>
<td>Brett Cohen (Gondwana)</td>
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<tr>
<td>15:00 – 15:15</td>
<td>Inventory summary analysis</td>
<td>Luanne Stevens (Gondwana)</td>
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<td>15:15 – 15:30</td>
<td>Way forward</td>
<td>Gondwana/DFFE</td>
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<td>15:30</td>
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10. Annex 2: Presentations

All GPC GHG training presentations are stored in a SharePoint folder from Gondwana which was set up for the purpose of the project. All the provincial participants and DFFE officials have access to the presentations and training materials stored on this folder. Access to the folder can be requested and a link will be shared for the SharePoint.