

Cape Town Workshop Report

Date of workshop: 23 April 2026

Facilitators: David Lindley (lead),
Garth Barnes, Kussing Malaka &
Sarah Polonsky (DFFE)

Venue: Intaka Island Environmental
Education Centre, Century City,
Cape Town



Contents

1. Executive Summary
2. Workshop aim
3. Maximising collaborative learning during workshop
4. Workshop agenda
5. Session 1: AIP biomass data mapping presentations
Small group discussions and plenary feedback & insights
6. Session 2: Logistics & commercial efficiency & small group discussions
Small group discussions and plenary feedback & insights
7. Recommendations that emerged from the workshop
8. Attendance register

Workshop Executive Summary

- 24 participants from 18 organisations attended the workshop, held on 23 April 2023, at the Intaka Island Environmental Education Centre, Century City in Cape Town.
- Many of the participants who were on the 2 day site visit held on the 21 -22 April, attended the workshop as well.
- Workshop addressed critical data and logistics challenges in the AIP biomass economy to enhance commercial efficiency & viability.
- Small group discussions were held to answer key data & logistics questions, develop solutions & who would implement these.
- Participants identified the need for fine-scale data and effective logistics models, developed possible solutions, and recommended a Community of Practice for be established with potential national scaling, to drive implementation of solutions forward. A Cape Nature government employee who was also representing the Cape Floristic Region Partnership, offered the CFRP's Integrated Fire and Invasive Alien Plant Working Group as a secretariat.
- The original ambition of developing solutions with people who would implement them, was tempered with a list of solutions but less of who would action them. This was more realistic within the confines of the 4.5 hours allocated to the workshop.
- A significant amount of data, trust for the processes and goodwill for going forward was generated, with a group of key individuals representing a wide array of organisations on which future actions could be implemented.
- If possible, for future workshops and site visits, additional entrepreneurs should be sourced to join.

Workshop Aim: Addressing Key Data & Logistics Challenges

The workshop focus was to answer this key question:

“How can we enhance commercial opportunities and efficiency by unlocking data and logistics challenges in the AIP biomass economy?”

This was further broken down into sub-questions for resolution by the workshop:

1. What is required for entrepreneurs to access or generate fine-scale biomass data to improve efficiency?
2. What logistics models and mechanisms are necessary to increase commercial viability?



Maximising the collaborative learning amongst site visit & workshop participants

- A process was followed that enabled a collaborative learning journey between participants while fostering the development of trust and relationships between them. These 3 ingredients are critical for developing a community of practice as the NBI4BIOMASS project wants to do.
- This was be done in a way that maximised the collaborative learning opportunities between participants through a variety of interactive activities, small groups working on specific tasks, and participatory plenary feedback. This ensured the participants actively participated and developed answers to each of the workshop key questions.
- A safe space was created where were participants were able to freely express their views, discuss and debate between themselves. Importantly, facilitators in the small group discussions encouraged the quiet voices were into the discussions, where its was felt that everybody had the freedom to express themselves and tap into their collective intellectual creativity.
- This enabled participants to develop a variety of different ideas and solutions needed to answer the key questions of the workshop.
- This type of collaborative learning was aimed at beginning to lay the foundation for cultivating a community of practice in the future, where participants could continue to learn and practice together in the future.

Key question methodology:

- Key questions were used as a methodology to focus the discussions of the workshop enabling participants to answer the questions and reach tangible outputs by the end.
- These questions were developed according to what the NBI4BIOMASS project needed to achieve by the end of the site visit and workshop.

Workshop Agenda

Session	Focus & Activities
Opening & Project Overview	The workshop commenced with: • Welcome by NBI and GIZ • Attendee introductions by All • Overview of the day • Briefing on the NBI4BIOMASS project goals by Garth Barnes from NBI, establishing the context for exploring data and logistics challenges in the AIP biomass economy.
<u>Session 1:</u> AIP Biomass Data Mapping	Two presentations provided context to AIP biomass data mapping. Participants were provided with time after each presentation to ask questions for clarification. The presentations were: • An introduction: Why is a viable supply of biomass so important to entrepreneurs? (Garth Barnes, NBI) • 2023 National IAP Survey - NIAPS (Andrew Wannenburg, DFFE) • Leveraging satellite data and machine learning to map IAPs and impacts using regional scale models (Liam Cogill, Stellenbosch University)

Andrew Wannenburg (DFFE)

“2023 National IAP Survey – NIAPS”

- The 2023 National IAP Survey (NIAPS) dataset was presented with publications on methodology and changes since the first survey in 2008. Available: www.wfw.org.za
- The dataset doesn’t include volume of IAPs but includes species, area (ha) and density for each 10 x 10 m pixel from which condensed area (ha), cost to clear, value of water lost and return on investment can be derived.
- DFFE can conduct feasibility studies of biomass harvesting potential, but this has many assumptions and limitations.
- In 2026, DFFE advertised a tender for the 5-yearly repeat of NIAPS which included biomass, but this tender has been cancelled owing to lack of funding

14 widespread & abundant taxa (32 spp.)

Taxon	Growth form	Species included
Acacia cyclops	Non-sprouting tree	Acacia cyclops
Acacia spp.	Sprouting tree	Acacia dealbata, A. decurrens, A. mearnsii
Acacia saligna	Sprouting tree	Acacia saligna
Arundo donax	Grass	Arundo donax
Cactaceae	Succulent	Cereus jamacara, Cylindropuntia fulgida, C. imbricata, Opuntia ficus-indica, O. monacantha, O. stricta, Trichocereus spachianus
Chromolaena odorata	Herbaceous	Chromolaena odorata
Eucalyptus spp.	Sprouting tree	Eucalyptus camaldulensis, E. cladocalyx, E. conferrumenata, E. grandis, E. saligna
Hakea spp.	Non-sprouting tree	Hakea gibbosa, H. sericea
Lantana camara	Herbaceous	Lantana camara
Melia azederach	Sprouting tree	Melia azederach
Pinus spp.	Non-sprouting tree	Pinus halepensis, P. patula, P. pinaster, P. radiata
Populus spp.	Sprouting tree	Populus canescens, P. deltoides
Prosopis spp.	Sprouting tree	Prosopis glandulosa, P. velutina
Solanum mauritianum	Sprouting tree	Solanum mauritianum

Nel, J.L., Richardson, D.M., Rouget, M., Mgidi, T.N., Mdzeke, N., Le Maitre, D.C. et al., (2004) A proposed classification of invasive alien plant species in South Africa: Towards prioritizing species and areas for management action' South African Journal of Science 100, 53-64



“Satellite data & machine learning to map IAPs & impacts at a regional scale”

- **MapWAPS overview:** The MAPWAPS project aims to map woody invasive alien plant species and quantify their impact on water resources by combining machine learning with free satellite data.
- **Methodology & Fieldwork:** Data collected in 2023 used tools like CyberTracker and iNaturalist to identify and categorize specific invasive alien plant taxa. Data were then processed and used to train machine learning models for the generation of classification maps.
- **Water Use Evaluation:** Satellite-based evapotranspiration products were compared against field measurements. Applying an ensemble model found that invasive trees consume substantially more water than indigenous vegetation.
- **Biomass Estimation Model:** A novel machine learning approach was developed to estimate biomass (tonnes/pixel) by integrating field, airborne, and spaceborne data.
- **Predictor Variables:** The model utilizes 25m pixel data from multiple sources, including Sentinel 1 (textural), Sentinel 2 (optical), and SRTM (topographic) to provide high-resolution insights.
- **Scalability & Success:** Using a Random Forest model, the research successfully scaled local data to regional levels. The model now requires further transferability testing and validation with additional field datasets to enhance both accuracy and generalizability.

satellite-derived products and machine learning to map invasive alien trees and their impacts



Participant Reflection & Clustering

Participants were given time to reflect on the presentations and write down key thoughts from the presentations that were most impactful to them. After documenting these ideas on cards, they were shared in a plenary session and clustered into themes to identify shared priorities and concerns.

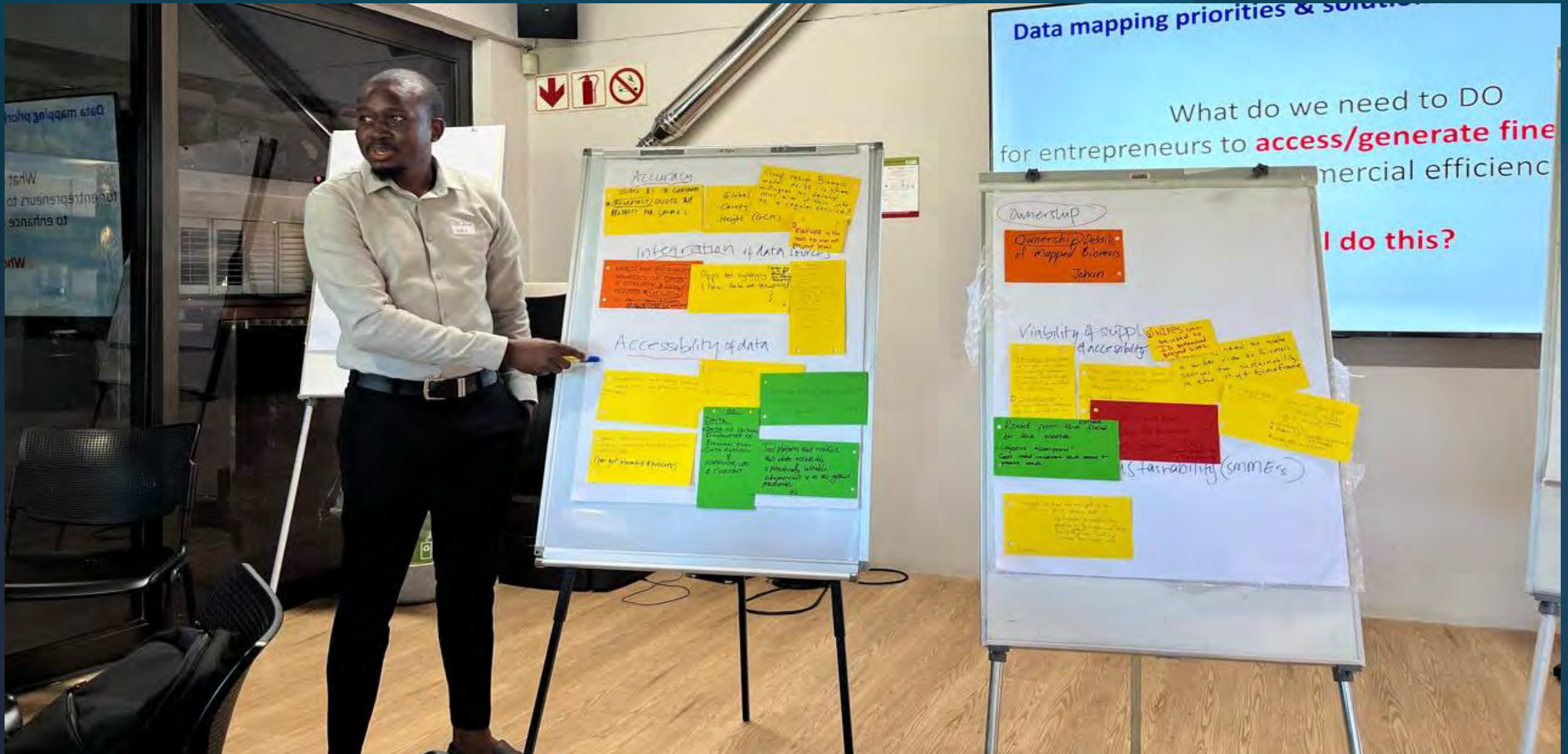
Working Group: Data Solutions

Participants divided up into 3 groups (7-8 people each), and addressed strategies for improving access of high-resolution data to those in the AIP biomass economy. They did this by answering 2 questions:

1. What do we **need to do** for entrepreneurs to access/generate fine scale biomass data to enhance their commercial efficiency?
2. **Who** will do this?

Each group selected a facilitator, and a scribe who wrote down the ideas that emerged from the discussions on a flipchart. At the end of the discussions, a plenary session was held, where either the facilitator or the scribe presented the key discussions points that emerged from answering the questions.

Participant Reflection & Clustering



Accuracy

USING AI TO GENERATE
ACCURATELY QUOTE AIR
PROTECTS FOR SMME'S.

Global
Canopy
Height (GCH)

Good enough Biomass
models exist - is there
willingness to develop
provision of this into
as a regular service?

MAPNAP is the
tool to use at
project level

Integration of data sources

- NEED FOR INTEGRATED
SOURCES OF DATA
2 COLLABORATE & ENSURE
ACCESS & UTILITY
- IE: FIELD TEAMS (CAP)
RESEARCHERS (MAPPING
ENTERPRISES)

Opps for synergies
& how these are structured?

(Change map
to the field
team's needs
(e.g. mapping
enterprises))

(GIS - ORIGIN)

Mapping data enter

2. enter at

3. enter at

4. enter at

5. enter at

6. enter at

7. enter at

8. enter at

9. enter at

10. enter at

Accessibility of data

- Operationalising these already available
models, tools in an collaborative manner
(e.g. mapping)

No cost variability

No demand data

SE

DATA

DATA: AS CRITICAL

COMPONENT OF

BIOMASS ECON

DATA AVAILABILITY

&

SHARING, UPD

& CURRENT

- Updated NAPS data
+ Access and availability of the data to unlock the
biomass system.

(for gov. planning & policies)

Areas liability & accessibility
of the data
(Current information is where)

Tool platform that makes
this data accessible
a practically useable
entrepreneurs & on the ground
practitioners.
HS

www.wfw.org.za

Impacts

- Calculation of water loss
to IAS
(or water savings
due to clearing)

3 The water use
estimates are
important for
potential water
Bonds for NBI
members



~~SUS~~ \$

Future mapping
of biomass is a critical tool
for the gov. to understand the
water savings due to clearing
and to plan for the future
of the water sector.

Ownership

Ownership Details
of mapped Biomass

Johan

Viability of supply & accessibility

1 Mapping exercise
so we can see input
our clearing operations
are having should be used
if this could be quantified
into water savings.

2 Costs that farmers
can identify themselves
and who to talk to re
the water sector.

How much is kms from
to market - link to processors
Reckhouse to market

3 No Yield tracking

4 NIAPS can
be used to
ID potential
project sites.

a wider view on Biomass
sources for sustainability
in the next timeframe

Gap/need

In
offer
to
model
the
water
sector

Road from the field
to the market

"Logistics assumptions"
Good road conditions and access to
private roads.

ESTHER

Site Conditions
where the biomass is
Slope (NGI)
(Need to be taken
into account)

is sustainability (SMME's)

"Nugget" = had we are getting to a
point where data is
up to date & usable by
people on the ground who
hand the data, and up
biomass business etc.

(lesion)



3 WORKING GROUPS ANSWERING 2 KEY QUESTIONS



1. What do we **need to do** for entrepreneurs to access/generate fine scale biomass data to enhance their commercial efficiency?
2. **Who** will do this?



**Each group presented
their results in plenary**

Group 1 & 2 results

Gareth

Group 1

- Many data tools exist (e.g. bio-energy atlas, MUCP, E2IMT etc)
 - Can these be integrated?
 - User specific; Allows for quick linkage.
 - Are often not linkable (no common theme) *Not interoperable at present.*
 - Data ownership is a concern; pay walls & other restrictions *Not freely accessible.*
 - Technologically exclusive; Not easily understood by all responsible in entrepreneurial start culture *is locked out (either knowledge or in other for contribution)*
 - Needs to be customisable so that users can make the tool relevant to them. (competitive edge & cost estimates improved).
 - Awareness of how the data was created - link between data & revenue.
 - DITA - Opportunity to share knowledge about what the data actually means.
- Who? Private sector? The data sensitivity might determine who does what?
 - Complex: Multiple players that are interrelated.
 - Who are the players?
 - Why do they need the data?
 - What is the value of the data?
 - Who is the most appropriate custodian of the data? (legality & legal standing).
 - Govt. vs. Private sector? Stronger general?
 - Source of data needs to be considered too.
 - Controlled & shared back (custodian is not owner but holder of data).
- How? Need to create accessible platforms that are user-centric.
 - Assists in standardising data collection & translation (but allow for customisation).
- Demand side must also inform products!
 - Alternative fuels (industrial players)
 - CSR & ESG (S&P500)
 - Stacking credits?
 - Regulating?
 - Tax benefits?

grp 2, SARAH

What do we need to do for data to be available? (p1)

- We need a framework/terminology ~~taxonomy~~ → standardised
- Consolidate data + info for lay person → platforms eg. Bioenergy Atlas (SAEON)
- Update data → needs to be current
- Communicate effectively - ensure people/entrepreneurs know about the tools that are available + how to use them

Group 2 & 3 results

to access/
ice comme

Who will c

grp2

(p2)

- ⑤ Set up a central info depository (DFPE?) which different parties can access
 - ⑥ NGOs + citizen scientists can serve as "translators" for people on the ground who (communities) may not have access/capacity
 - ⑦ "crowd sourcing" + gamification (eg Pokemon-go), I-Naturalist
- WHO? framework #1 + updating #2, #3, #4, #5
(Info flow) (OSI) platform/depository
NGOs, entrepreneurs
- #6 citizen scientists, drone owners
farmers, landowners
workers
- stratified payments system

N' MALAKA

GROUP 3

- ① ACCESSABLE LANGUAGE.
- ② MAP POTENTIAL BARRIERS/OPPORT
- ③ GRADING OF SMP's
- ④ FOCUS ON VIABLE AREAS, SPECIES, SPEC FOR CUSTOMERS
- ⑤ MAP LANDOWNERS
- ⑥ MAP TRANSPORT ROUTES
- ⑦ INTEGRATE & UPDATE
WHO?

MULTIPLE STAKEHOLDERS

Group 1: High level insights

- High level insights from Group 1:
 - Existing biomass datasets are available but not accessible or decision-useful to entrepreneurs
 - Data remains fragmented across platforms and institutions, limiting its practical application
 - There is a lack of standardised ground-truthing and validation, reducing trust in data
 - Entrepreneurs require simple, integrated tools rather than complex GIS-based datasets
 - There is a need for a central, trusted data custodian to integrate and maintain datasets



Group 2: High level insights

- High level insights from Group 2:
 - Biomass supply is fragmented and insufficiently aggregated, limiting economies of scale
 - Entrepreneurs struggle to assess supply reliability and match it to market demand
 - Data tools are not interoperable and require specialised expertise to use
 - There is duplication of effort due to lack of data sharing and coordination
 - Improved data systems must support logistics planning, market matching, and investment decisions



Group 3: High level insights

- High level insights Group 3:
 - Data challenges are not about absence, but about integration, accessibility, and usability
 - A key barrier is unclear roles and responsibilities for data generation and stewardship
 - Entrepreneurs require real-time or regularly updated information
 - Coordination across stakeholders is needed to align data supply with industry needs



Session 2: Logistics & Commercial Efficiency

Garth Barnes introduced the session by emphasizing how logistics infrastructure directly impacts the profitability of biomass ventures. Henry Sabata (Avo-Vision) then sharing his practical lessons from the field, with a focus on the "Hub and Spoke" logistics model.

Working Group: Logistics Models

Participants split into the same 3 groups and focused on identifying the knowledge gaps regarding transportation models and assigning accountability for developing these logistics solutions. To do this, the groups discussed 2 questions:

1. What do we **need to know** about logistics models and mechanisms to increase commercial efficiency?
2. **Who** will do this?

Each group selected a facilitator, and a scribe who wrote down the ideas that emerged from the discussions on a flipchart. A plenary session was then held, to present what emerged from the group discussions.

Henry Sebata (Avo-Vision)

‘Key challenges: Logistics in Community-Based Biomass Value Chains’

1. Early-Stage Enterprise Context
2. Dependence on Reverse Logistics
3. Logistics as a Precision Discipline
4. Cost of Operational Misalignment
5. Volume Economics and Transport Viability
6. Short-Haul Transport Realities
7. Market Integrity Risks
8. Strategic Opportunities:
Aggregation





3 WORKING GROUPS

ANSWERING 2 KEY

QUESTIONS:

1. What do we **need to know** about logistics models & mechanisms to increase commercial efficiency
2. **Who** will do this?



Each group presented their results in plenary

Group 1

- Logistics currently coordinated with service providers who restrict loads & prices.
 - Producers use their collectable bargaining strength to arrange better rates.
 - Internal; if tractor is broken, then no alternative.
 - Infrastructure limitations also escalate costs & uncertainties.
 - Hub & Spoke approach (aggregating products) but not solution @ short haul.
 - ↳ Minimum scale needed for efficiency (short & long haul)
 - ↳ And ownership of value chain.
 - Co-op production can undermine other efforts & structures prevent this.
 - Self-organising between producers NB.
 - Assurance of demand if multiple producers (harvesters).
- Aggregation centre that collects products from producers at a subsidised rate.
- Cheaper if collected from roadside. (mechanisms that can be managed by producers).
 - Packaging also NB (big bags vs. small bags).
 - Dependent on the product.
 - ↳ What elements do producers control.
 - Input costs & harvesting can be focused on to improve margins. (summer vs winter)
 - ↳ Strategy around production & harvesting.
- ~~Vertical~~ ~~Horizontal~~ & Vertical integration.

grp2) Logistics

- commodity (p1)
niche
- ① Do it in a volumen way...
or high value game
 - ② Need the infrastructure to be able to ^{diversify products + partners} deal in volumes → industrial grade investments needed (if not leads to haphazard approach)
 - ③ Best to start with material other than ^{No need of base load eg sawmill waste to harvest} AIP to get to scale (AIP is expensive!)
 - ④ Additionality of C-credits is critical ^{or add value (activation)} (group scheme) → CCS model
 - ⑤ Collective approach important but it can be in different arrangements
 - ⑥ "Right-size" operations — size of plant, radius of sourcing biomass transport-ing product etc
 - ⑦ Who?? Entrepreneurs!

LOGISTICS GROUP 3 MALAKA

- ① DETERMINING THE RADIUS OF COMMERCIAL VIABILITY
- ② WHAT ARE THE REQUIREMENTS FOR EACH MODEL FOR EACH NODE
- ③ PROCESS CLOSEST TO SOURCE
- ④ ADD VERIFICATION METHODS. E.G. PHOTOS.
- ⑤ COLLABORATE BETWEEN ROLE PLAYERS.
- ⑥ STOCKPILE PLANS TO INCLUDE VARIATIONS.
- ⑦ OPTIMAL AGGREGATION MODEL
- ⑧ INTRODUCE CO-OP MODEL. FORMALISED.

- Social Lic. to oper. (Awareness & Consult.)
- VARIABLE COMPLIANCE THRESHOLD
- VARIABLE BACK HAULING
(COORDINATED BY COOP.)
- CURB SPREAD OF ALIENS THROUGH TRANSPORT

WHO?
LOCALISED BODIES

Group 1: High level insights

- High level insights from Group 1 :
 - Transport costs often exceed biomass value, making logistics the primary cost driver
 - Biomass systems are highly sensitive to distance (radius of viability)
 - There is limited capacity for logistics planning and optimisation among entrepreneurs
 - Aggregation and coordination are required to achieve transport efficiencies
 - Reverse logistics and routing efficiency are critical levers for improving viability



Group 2: High level insights

- High level insights from Group 2:
 - Infrastructure constraints and fuel costs increase operational uncertainty
 - Scaling requires aggregation, stockpiling, and coordinated delivery systems
 - Logistics must be treated as a precision system requiring continuous optimisation



Group 3: High level insights

- High level insights from Group 3:
 - Short-haul transport is particularly costly and inefficient
 - Informal and unstructured logistics arrangements increase risk of losses and inefficiencies
 - Localised systems (e.g. hubs or nodes) can improve logistics efficiency



Closing & Synthesis

Garth Barnes (NBI) and Nikolaos Archontis (GIZ) closed the workshop with a consolidation of next steps, to resolve the identified data and logistics challenges.

Recommendations that emerged from the workshop included:

- A key recommendation that emerged at the end of the workshop was that participants unanimously recommended that a community of practice (CoP) needed grow from the site visit and workshop, with all people expressing their willingness to participate in the CoP.
- A Cape Nature government employee who was also representing the Cape Floristic Region Partnership, offered the CFRP's Integrated Fire and Invasive Alien Plant Working Group as a secretariat.
- Some participants were of the view that this CoP needed to be set up at a national level. The best way forward will become more clear at the end of the series of workshops and site visits around the country.

Closing & Synthesis

Recommendations (continued)

- Establish a centralised, trusted biomass data platform integrating existing datasets and improving accessibility
- Develop aggregation mechanisms for biomass supply to enable scale and logistics efficiency
- Support coordinated logistics systems, including routing, stockpiling, and reverse logistics
- Create formal structures for collaboration (e.g. Community of Practice, co-operatives)
- Clarify roles and responsibilities across
- Improve trust and data-sharing mechanisms between stakeholders in the ecosystem to reduce duplication and gap

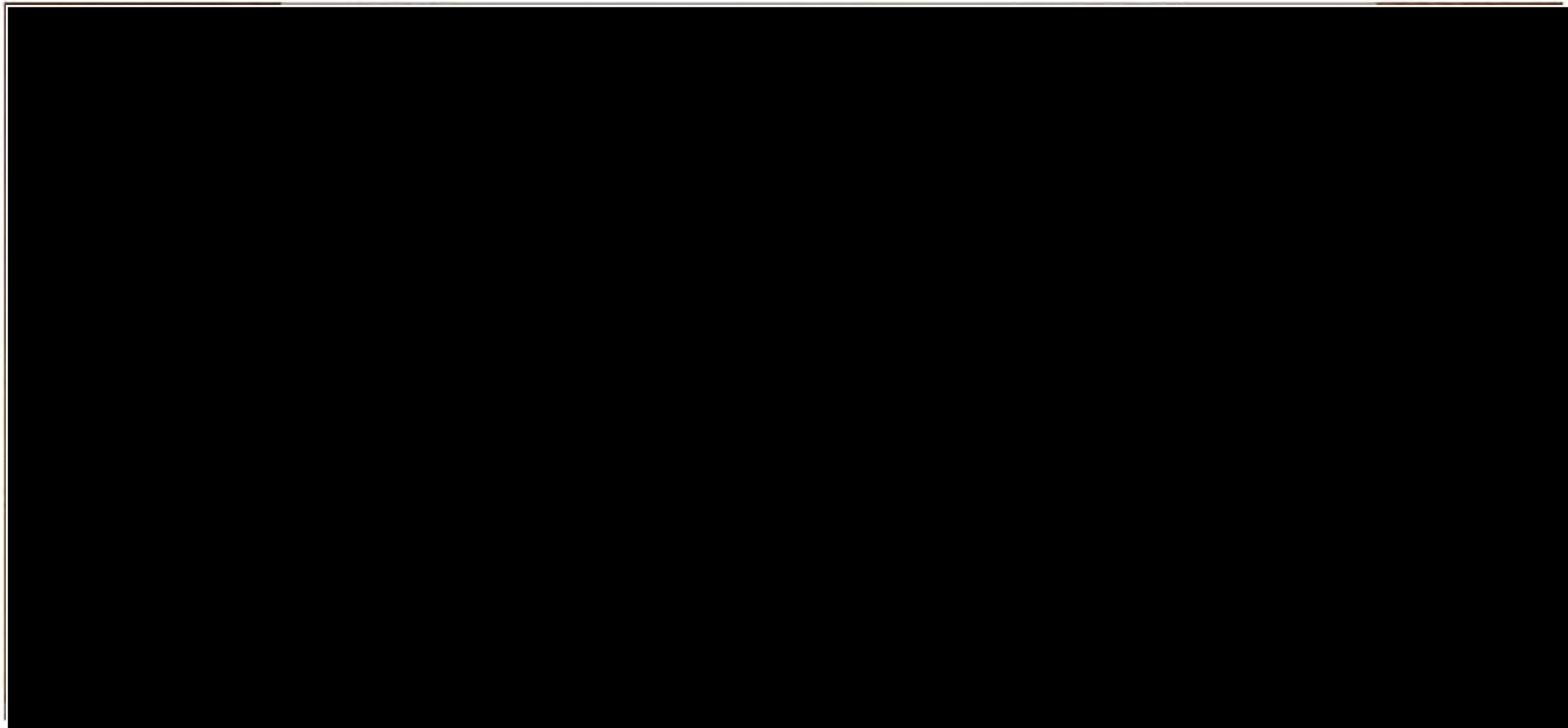


M&E Contacts list

Please provide a list of all internal (Weaver neg) and external contacts that we can connect with to conduct M&E interviews. They should all be willing to engage with us, and able to provide relevant feedback. Please ensure that you have permission from all to share personal information for this purpose (in line with the PoPI Act). The data will be shared on the secured Zulus Sharepoint for the Zulus Big Name. Please highlight internal team member(s) so we engage directly with your external contacts for data gathering/ validation purposes.

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Attendance register



Attendance register

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 Please highlight internal team membership to be passed on when we engage directly with your external contacts for data gathering/validation purposes.

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Attendance register