Towards Resilient Futures Community of Practice: Phase II

Using a Multi-Disciplinary Approach to Explore Opportunities for Economic Diversification in Mining-Intensive Jurisdictions

Anri Heyns (MLiA) ,Tapiwa Chimbganda (MtM), Shilpa Rumjeet (CeBER) and Francois Steenkamp (DPRU)

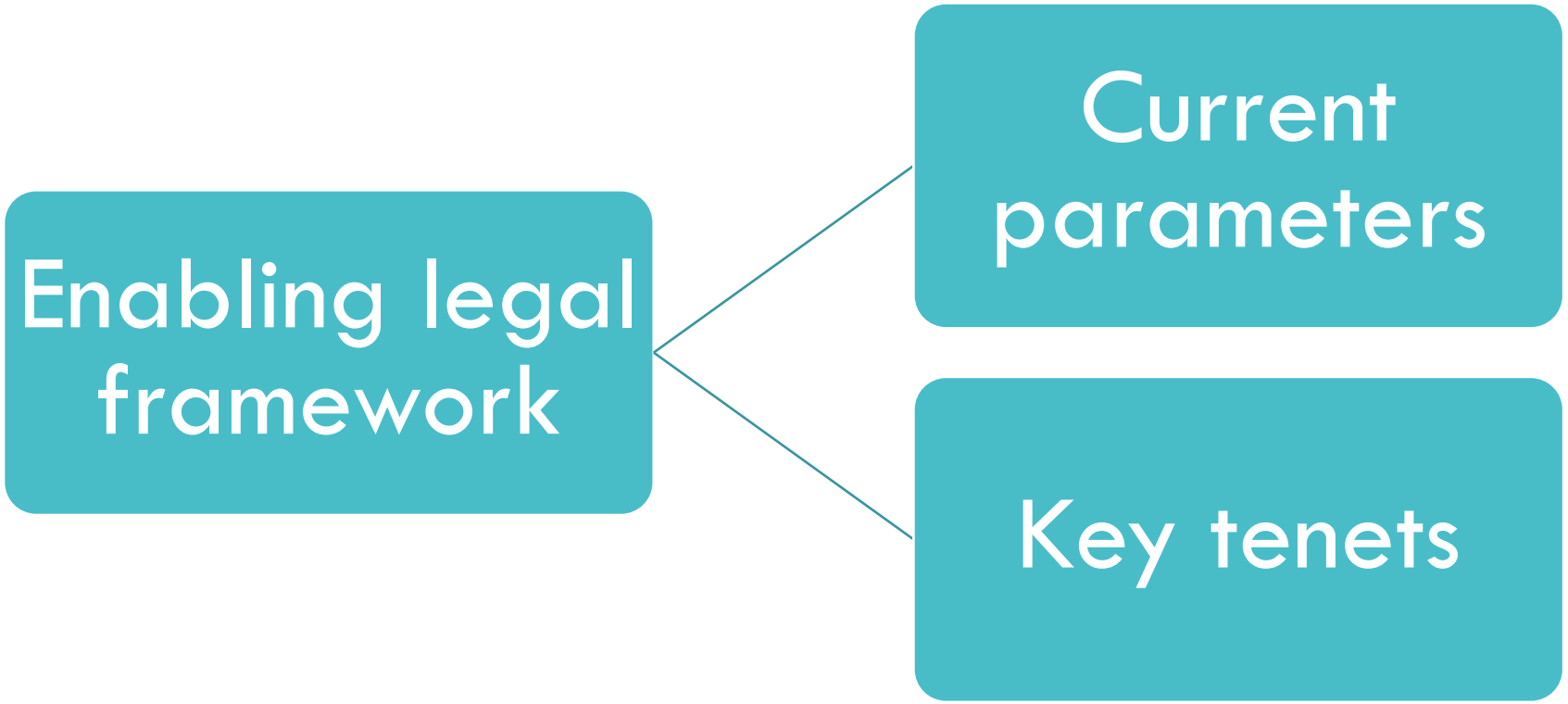
February 2023, Cape Town

THE CASE OF FIBROUS PLANTS THROUGH A LEGAL LENSE

RESEARCHERS: PROF HANRI MOSTERT, PROF ALEXANDER PATTERSON, DR LOUIE VAN SCHALKWYK, DR BERNARD KENGNI

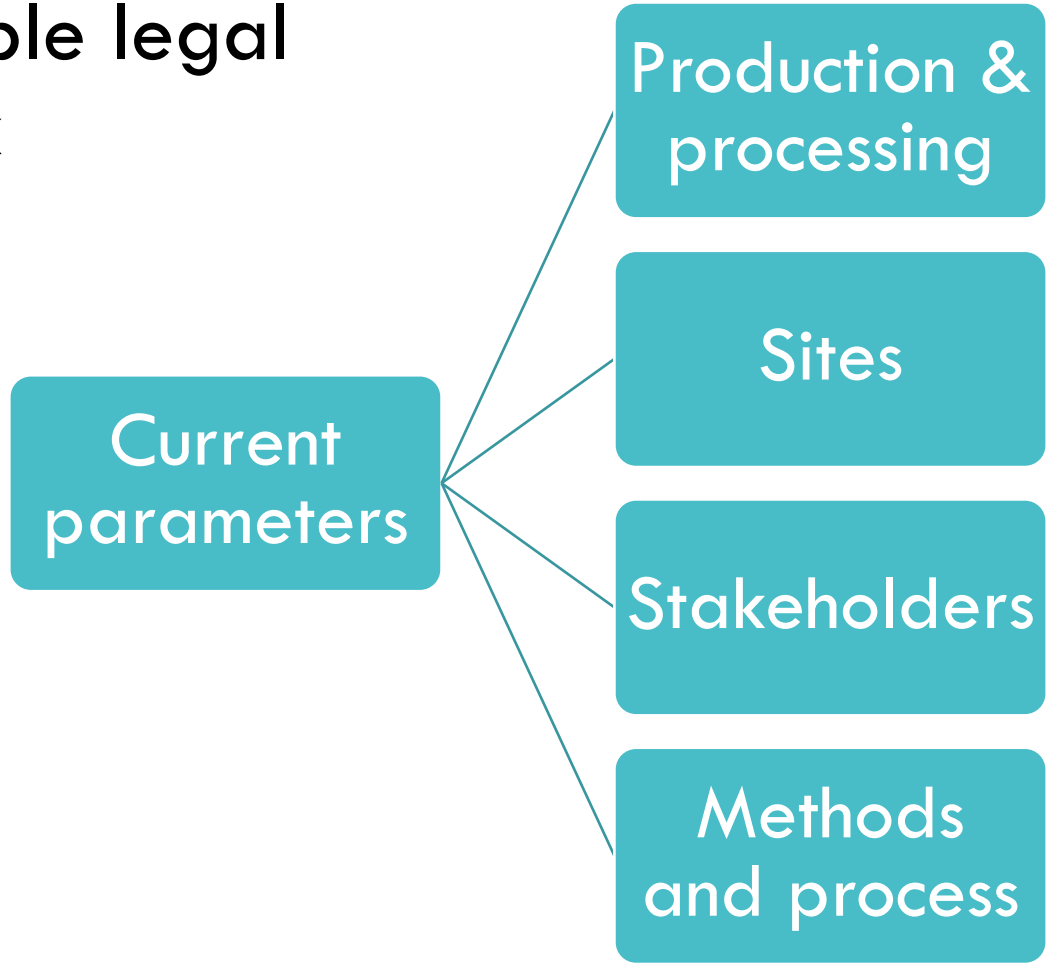
PRESENTED BY: DR ANRI HEYNS

High-Level Overview



DST/NRF South African Research Chair: Mineral Law in Africa • University of Cape Town • Faculty of Law • Department of Private Law
Physical address: Wilfred & Jules Kramer Law School Building, Stanley Road , Middle Campus, Rondebosch, Cape Town
Postal address: Private Bag X3, Rondebosch, 7701, Cape Town, Republic of South Africa

Shortcomings and hurdles in applicable legal framework

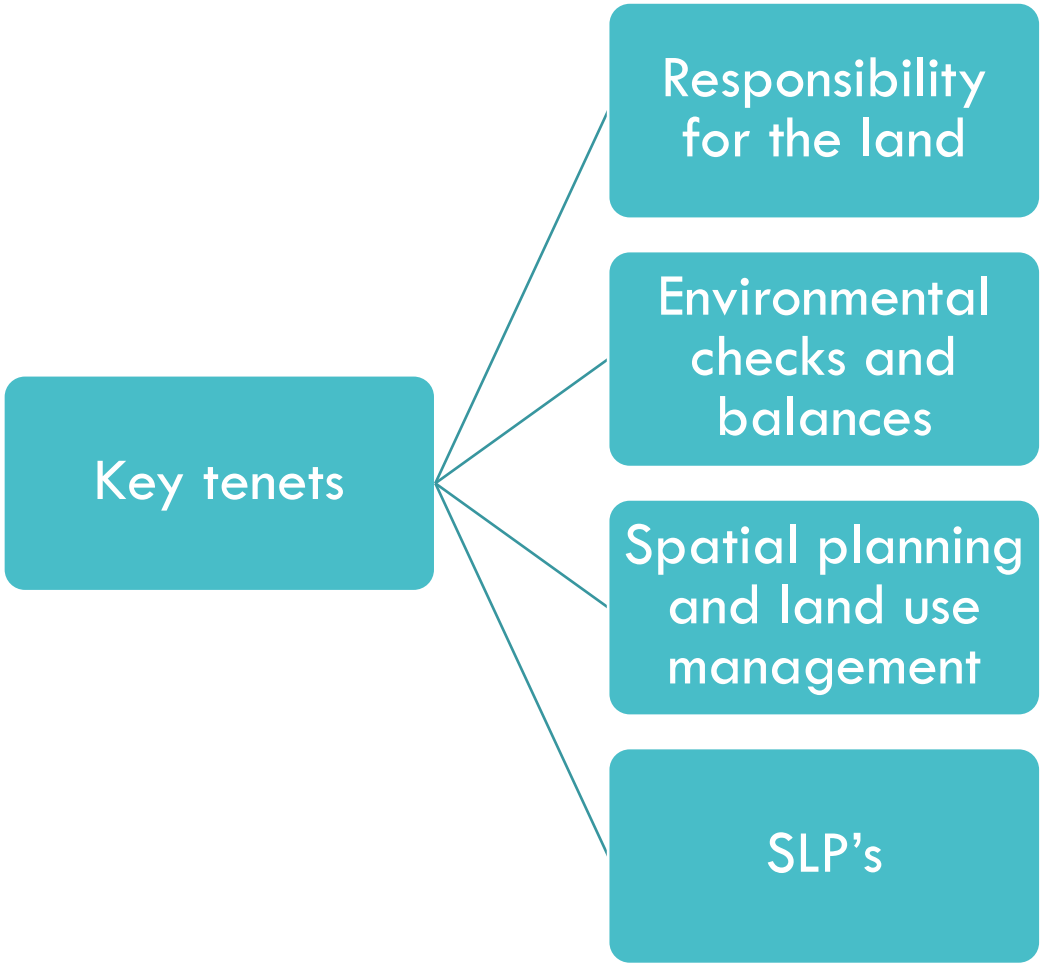


DST/NRF South African Research Chair: Mineral Law in Africa • University of Cape Town • Faculty of Law • Department of Private Law
Physical address: Wilfred & Jules Kramer Law School Building, Stanley Road , Middle Campus, Rondebosch, Cape Town
Postal address: Private Bag X3, Rondebosch, 7701, Cape Town, Republic of South Africa

Parameters

P&P	Sites	Stakeholders	Methods
What, where and how of fibre farming	Rules applicable vary depending on area	Landowners, communities, government and more	Environmental impacts associated with cultivation and conversion?

What will enabling legislation look like?



DST/NRF South African Research Chair: Mineral Law in Africa • University of Cape Town • Faculty of Law • Department of Private Law
Physical address: Wilfred & Jules Kramer Law School Building, Stanley Road , Middle Campus, Rondebosch, Cape Town
Postal address: Private Bag X3, Rondebosch, 7701, Cape Town, Republic of South Africa

RESPONSIBILITY FOR THE LAND

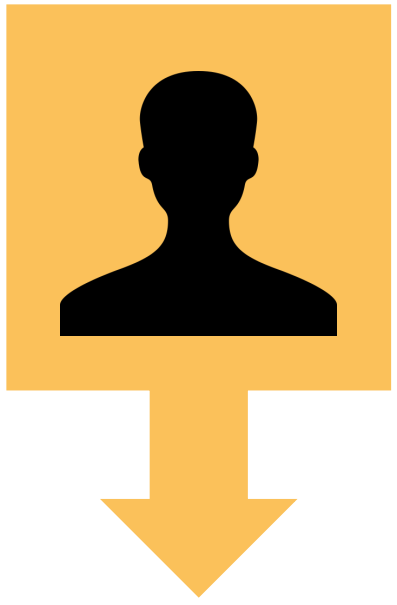
- LANDOWNER USUALLY RESPONSIBLE FOR LAND
- VARIOUS STATUTORY AND COMMON LAW SANCTIONS AND REMEDIES
- IN MINING CONTEXT – TWO SCENARIOS…

DST/NRF South African Research Chair: Mineral Law in Africa • University of Cape Town • Faculty of Law • Department of Private Law
Physical address: Wilfred & Jules Kramer Law School Building, Stanley Road , Middle Campus, Rondebosch, Cape Town
Postal address: Private Bag X3, Rondebosch, 7701, Cape Town, Republic of South Africa

Scenario 1

LAND OWNER &
MINING COMPANY

Scenario 2



LAND OWNER

MINING COMPANY

mlia@uct.ac.za www.mlia.uct.ac.za @mlia_uct

DST/NRF South African Research Chair: Mineral Law in Africa • University of Cape Town • Faculty of Law • Department of Private Law
Physical address: Wilfred & Jules Kramer Law School Building, Stanley Road , Middle Campus, Rondebosch, Cape Town
Postal address: Private Bag X3, Rondebosch, 7701, Cape Town, Republic of South Africa

Sale of land to 3rd party

?

Mining Phase

Extraction

Rehabilitation

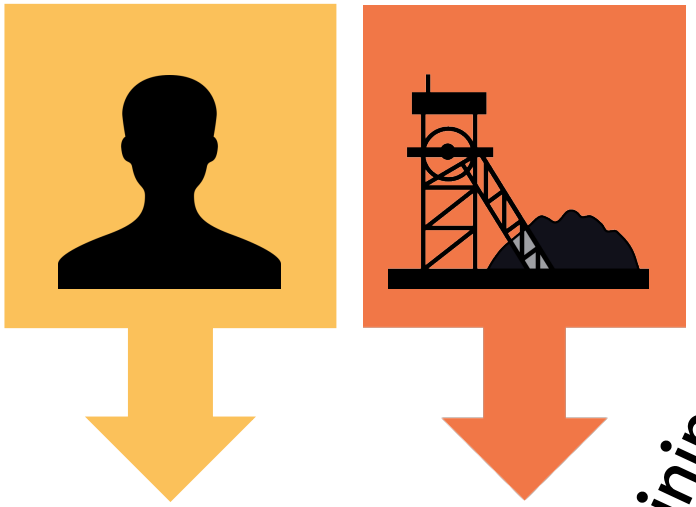
Post-closure

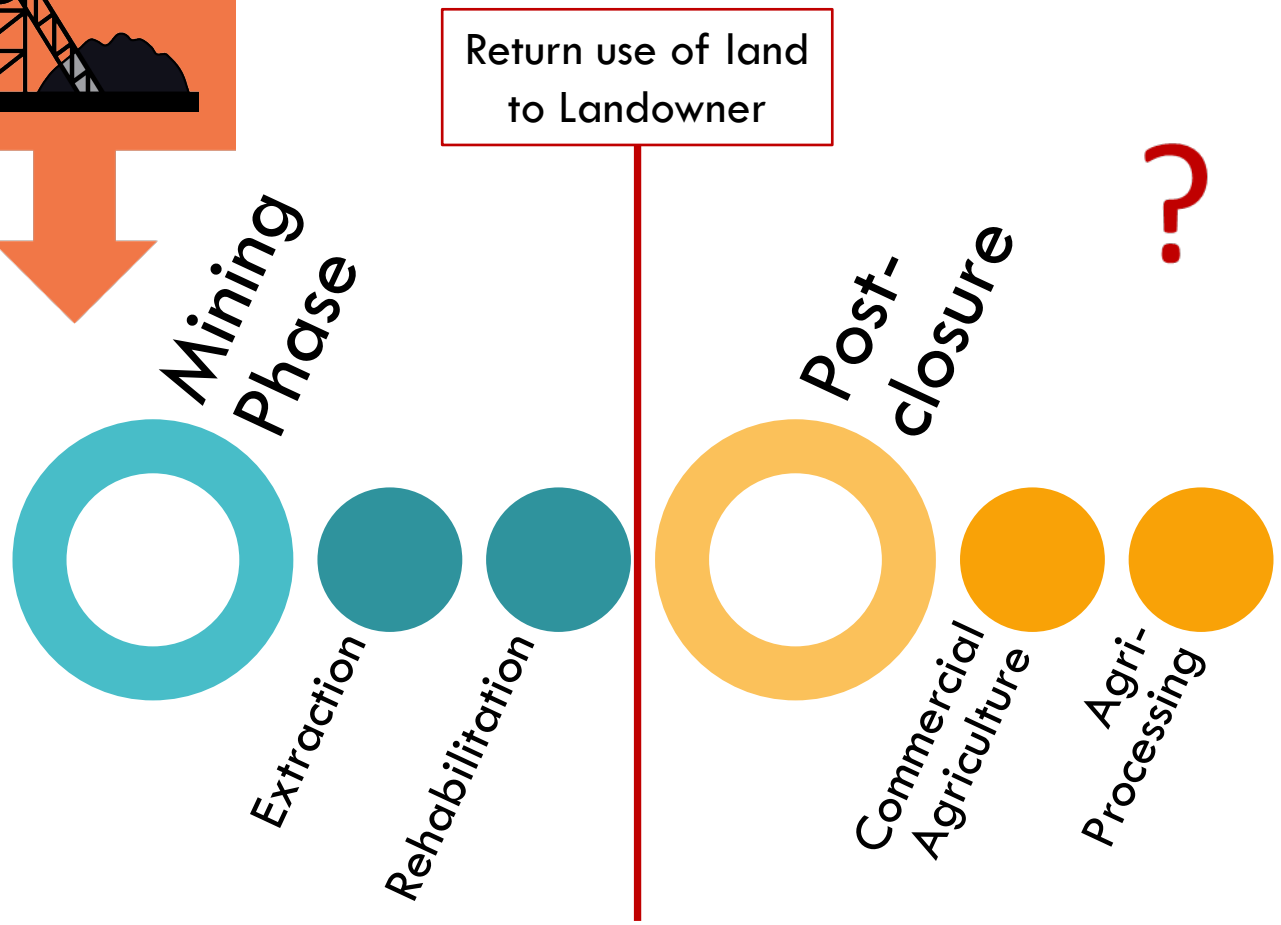
Commercial Agriculture

Agri-Processing

mlia@uct.ac.za www.mlia.uct.ac.za @mlia_uct

DST/NRF South African Research Chair: Mineral Law in Africa • University of Cape Town • Faculty of Law • Department of Private Law
Physical address: Wilfred & Jules Kramer Law School Building, Stanley Road , Middle Campus, Rondebosch, Cape Town
Postal address: Private Bag X3, Rondebosch, 7701, Cape Town, Republic of South Africa





DST/NRF South African Research Chair: Mineral Law in Africa • University of Cape Town • Faculty of Law • Department of Private Law
Physical address: Wilfred & Jules Kramer Law School Building, Stanley Road , Middle Campus, Rondebosch, Cape Town
Postal address: Private Bag X3, Rondebosch, 7701, Cape Town, Republic of South Africa

ENVIRONMENTAL CHECKS & BALANCES

- Various laws, each addressing specific environmental issue
- Some common generic legal tools:
  - Decision-making and creation of plans
  - Listed activities
  - Administrative and criminal procedures
  - Empowering environmental authorities
- Numerous checks and balances – many hurdles
- Limited incentives

SPATIAL PLANNING AND LAND USE MANAGEMENT

- SPATIAL PLANNING AND LAND USE MANAGEMENT REQUIREMENTS (SPLUMA)
- INTEGRATION OF SOCIAL, ECONOMIC AND ENVIRONMENTAL CONSIDERATIONS WITH LAND USE PLANNING
- INTEGRATED DEVELOPMENT PLAN (IDP), SPATIAL DEVELOPMENT FRAMEWORKS (SDF)
- ZONING

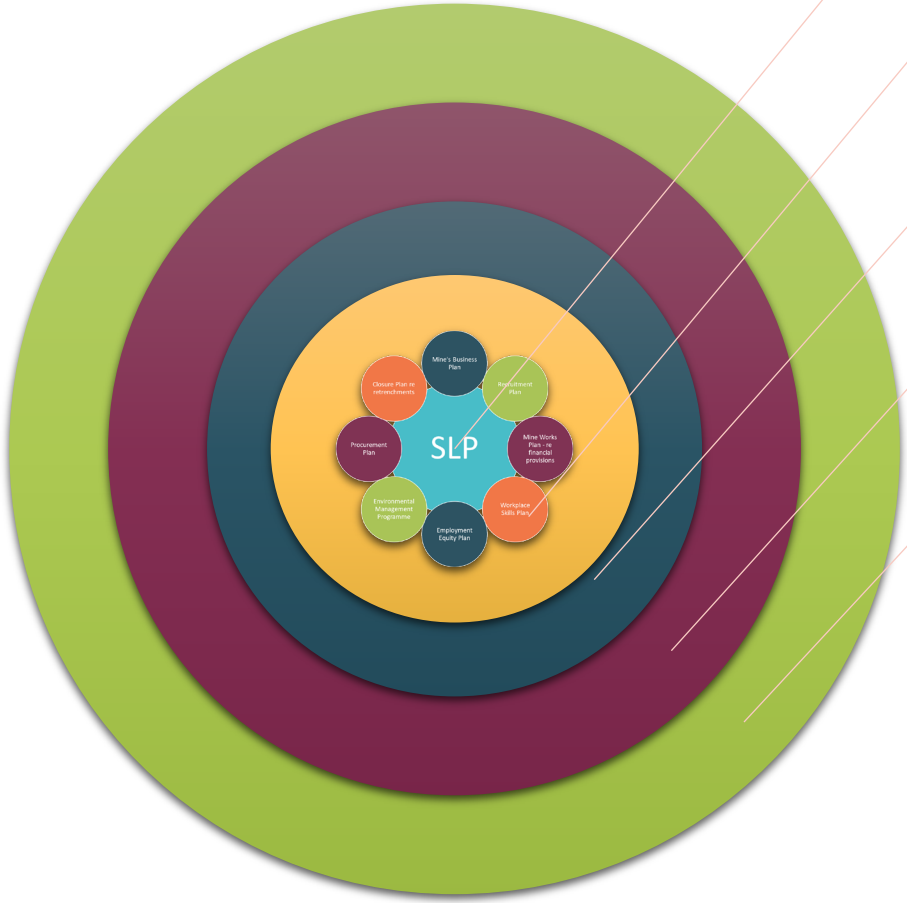
SPATIAL PLANNING AND LAND USE MANAGEMENT

- SPATIAL PLANNING AND LAND USE MANAGEMENT REQUIREMENTS (SPLUMA)
- INTEGRATION OF SOCIAL, ECONOMIC AND ENVIRONMENTAL CONSIDERATIONS WITH LAND USE PLANNING
- INTEGRATED DEVELOPMENT PLAN (IDP), SPATIAL DEVELOPMENT FRAMEWORKS (SDF)
- ZONING

SOCIAL AND LABOUR PLANS (SLP'S)

- PURPOSE OF SOCIAL & LABOUR PLAN:
  - STIMULATE JOB-CREATION; ADVANCE SOCIAL & ECONOMIC WELLBEING
  - TRANSFORMATION: SOCIAL AND ECONOMIC INCLUSIVITY & EQUALITY
  - CONTRIBUTE TO SOCIO-ECONOMIC DEVELOPMENT
- LOCAL ECONOMIC DEVELOPMENT PROGRAMME:
  - MINE PROJECTS SUPPORTING INFRASTRUCTURE AND POVERTY ALLEVIATION
  - PROJECTS MUST ALIGN WITH MUNICIPALITY'S IDP
- DOWNSCALING AND RETRENCHMENT
- HUMAN RESOURCES DEVELOPMENT PLAN

SLP POLICY FRAMEWORK



SLP

Integrated Development Plan

Mining Charter

National Development Plan

Sustainable Development Goals

DST/NRF South African Research Chair: Mineral Law in Africa • University of Cape Town • Faculty of Law • Department of Private Law
Physical address: Wilfred & Jules Kramer Law School Building, Stanley Road , Middle Campus, Rondebosch, Cape Town
Postal address: Private Bag X3, Rondebosch, 7701, Cape Town, Republic of South Africa

LAW REFORM REQUIRED

- Pro-active law
- Fiscal & other incentives

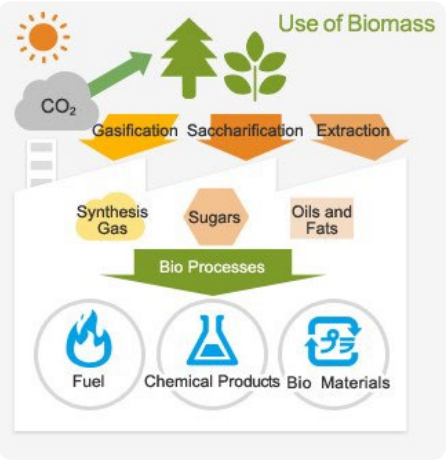
mlia@uct.ac.za www.mlia.uct.ac.za @mlia_uct

DST/NRF South African Research Chair: Mineral Law in Africa • University of Cape Town • Faculty of Law • Department of Private Law
Physical address: Wilfred & Jules Kramer Law School Building, Stanley Road , Middle Campus, Rondebosch, Cape Town
Postal address: Private Bag X3, Rondebosch, 7701, Cape Town, Republic of South Africa

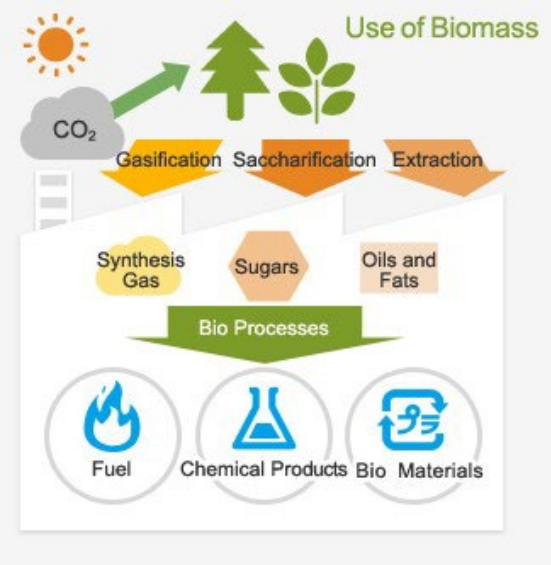
THANK YOU

mlia@uct.ac.za

Exploring value-addition opportunities in Cop II



The biorefinery concept



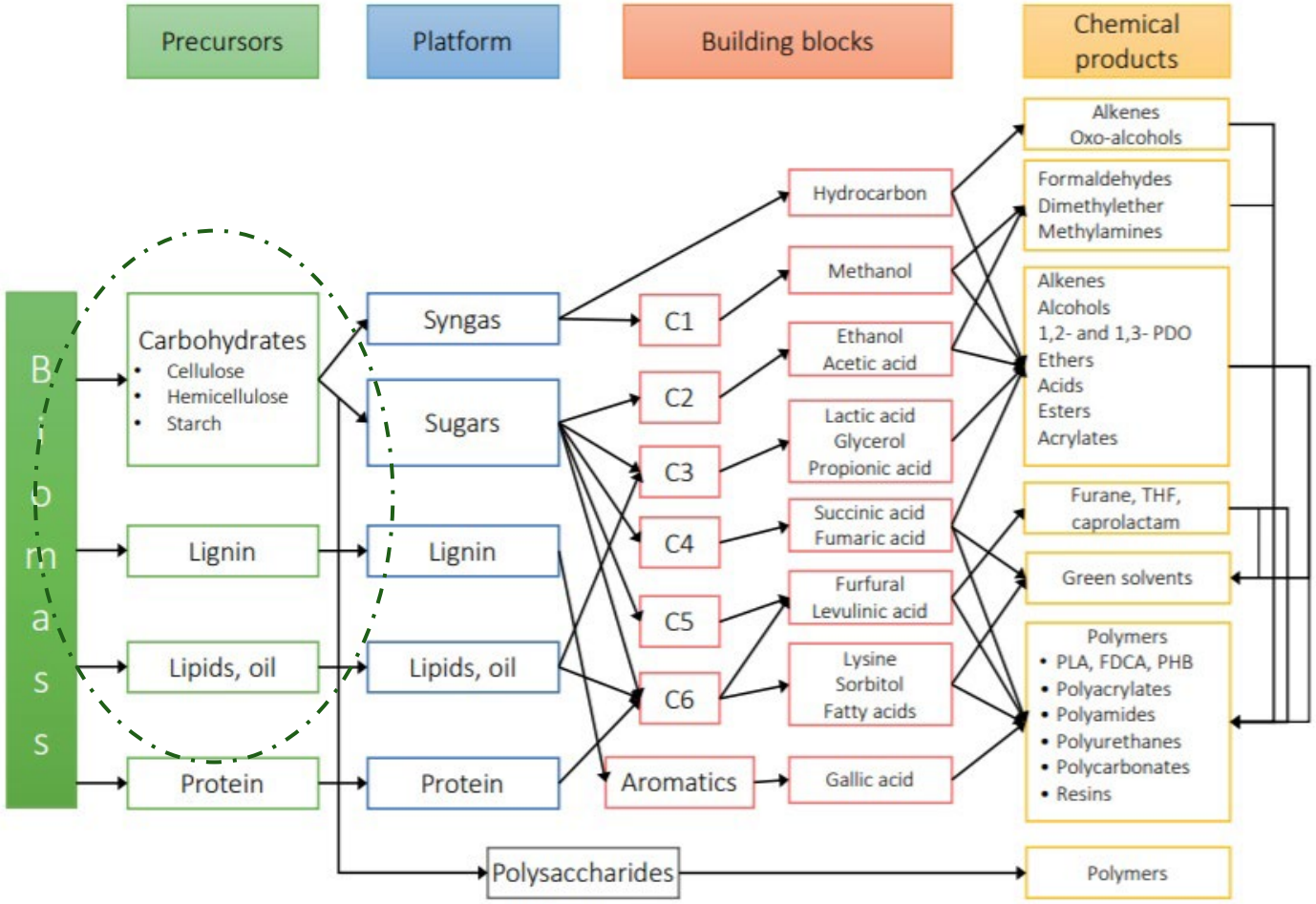
"A biorefinery is a facility that integrates biomass conversion processes and equipment to produce fuels, power, and chemicals from biomass"

- Significant amount of plant-based (lignocellulosic) biomass is left behind after fibre processing (e.g. low quality fibres, seeds, leaves)

- Depending on the biomass characteristics and ease of processing, a mix of high-value products (e.g. platform chemicals), energy products (e.g. biofuels) and low-value biomass products (e.g. biochar) can be produced using biorefinery technologies

- Biorefinery products can enhance the Regenerative Agriculture initiative by providing additional revenue, creating sustainable and green products, and fuel a dynamic successor plant-based economy by supporting mining communities after the closure of mines

Biorefinery product space – how to choose products of interest?



- Focus on carbohydrates, lignin and lipids/oil as resources + relevant production platforms

- Prioritise products with high market interest (local and international) and high technology readiness level (> 8)

- Identified 60 biorefinery products of interest:

- High-value bioproducts (platform chemicals) (24)
- Energy products (12)
- Low-value biomass products (23)
- High-value bio-polymers (1)

(Abdilla – Santes, 2020)

Iterative work with DPRU and additional analyses

- Narrowed down initial list of biorefinery products to a smaller list of frontier products

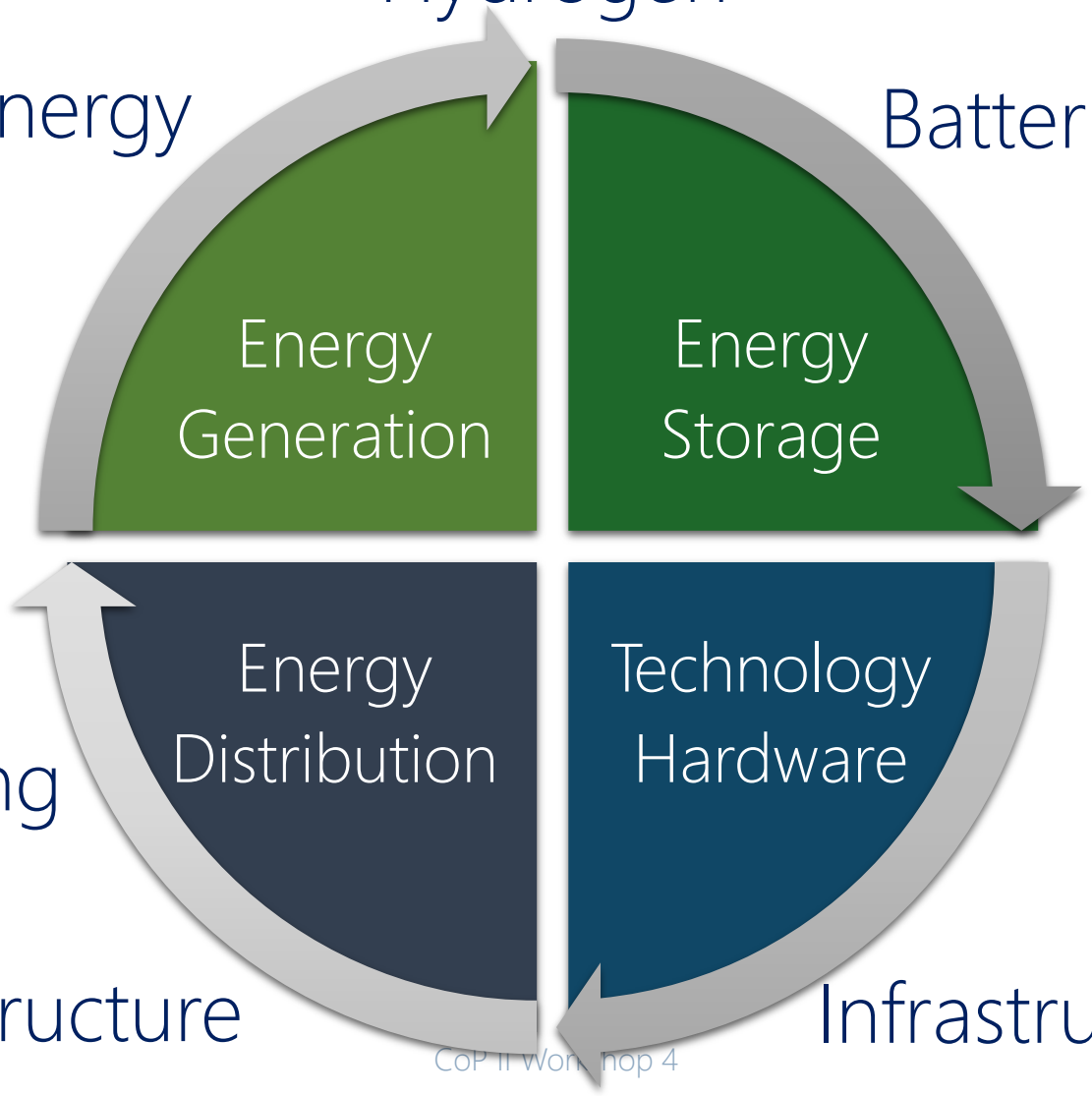
- Chosen frontier products are a mix of high value platform chemicals, energy products and low value biomass products

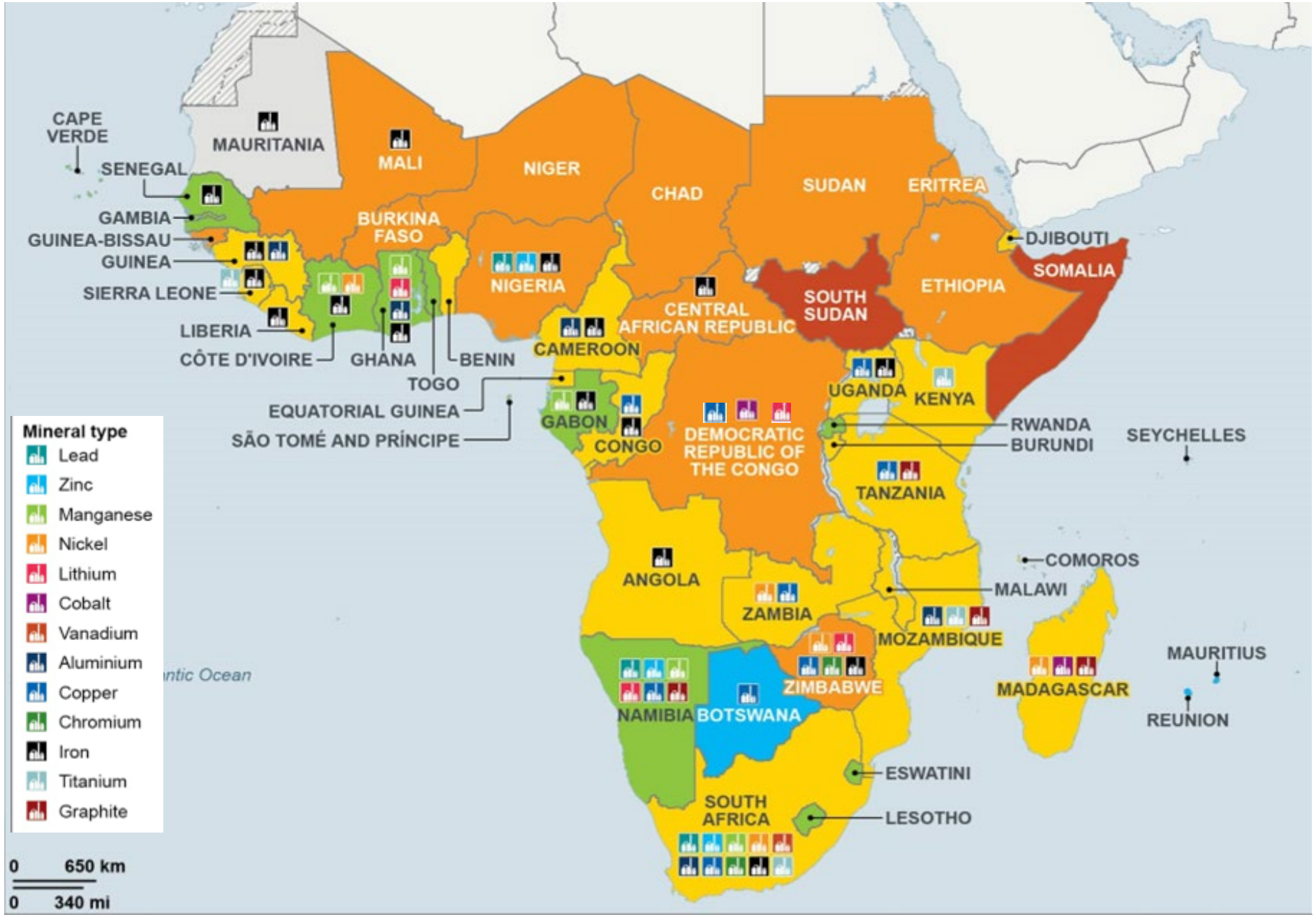
- Additional analyses:
  - Investigate different product clusters on:
    - Technical feasibility
    - Techno-economics investigation
    - Comparing economic outcomes

- Fundamental understanding of incorporating biorefinery operations in the Regenerative Agriculture initiative → Challenges vs Opportunities

- Consolidate cross-disciplinary and iterative work

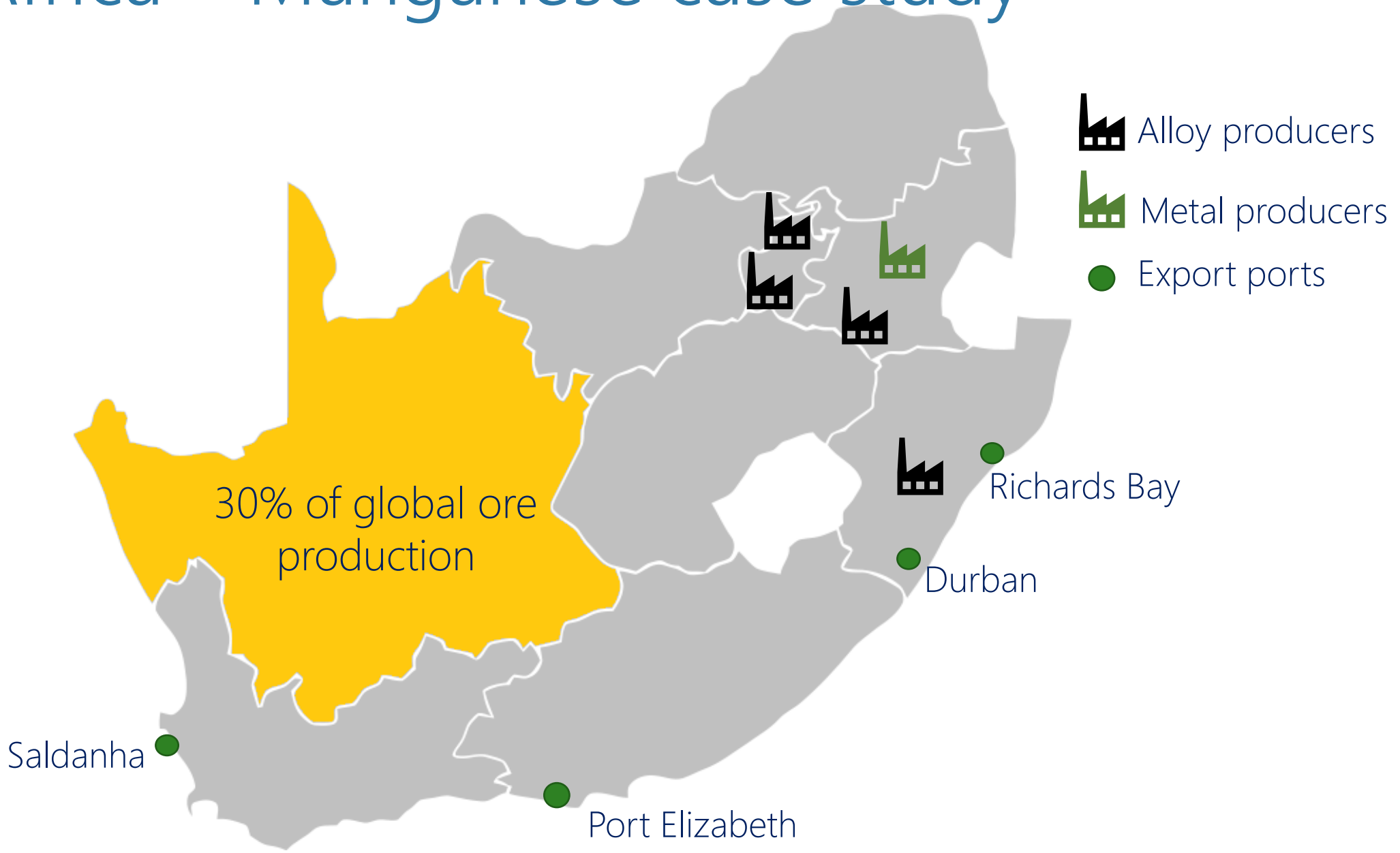
Technology for the transition to a low-carbon economy





Africa will play a major role in the supply of critical technology minerals

South Africa – Manganese case study



Manganese role in the low-carbon economy?

Manganese ore

Currently 90% of global demand

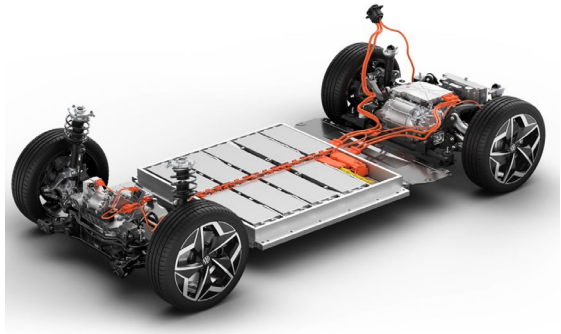
About 5% of global demand

Steel

Battery

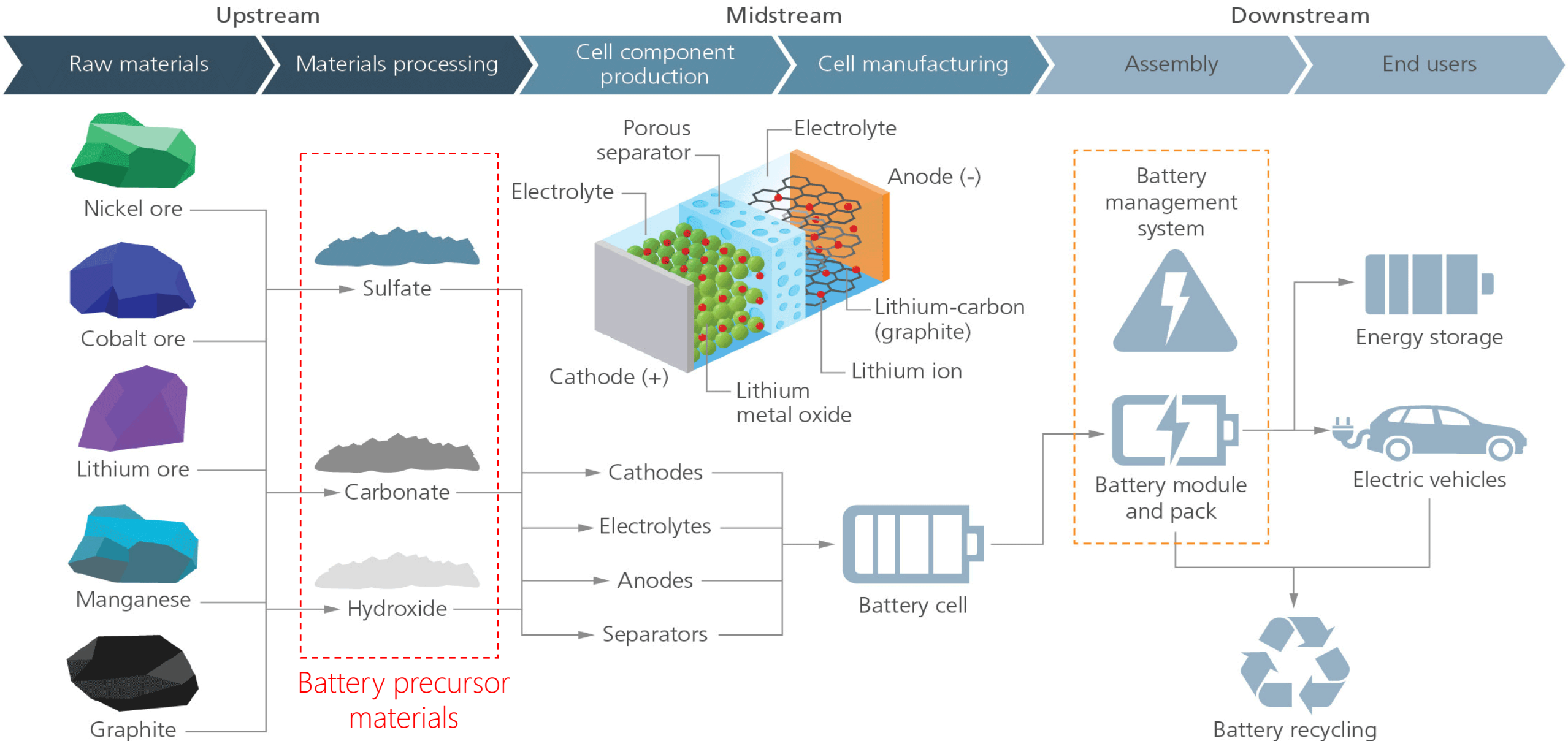
Structural steel for renewables' infrastructure e.g. wind turbines

High strength steel which is used to make lighter weight automotive and EV car bodies



Cathode in Lithium-ion batteries for EVs and energy storage

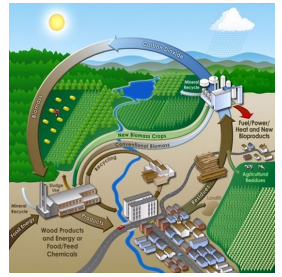
How do we move down the battery value chain?



Economic Development Challenge (problem)

Industrial Policy Intervention (solution)

The biorefinery concept (Paper 1)



Leveraging strategic minerals to localise the transition (Paper 2)

Iterative Cross-Disciplinary Approach (methodology)

Bio-process engineers and material scientists

Economists

Step 1 — Identification of product level industrial opportunities

Step 2 — Mapping products to international trade data

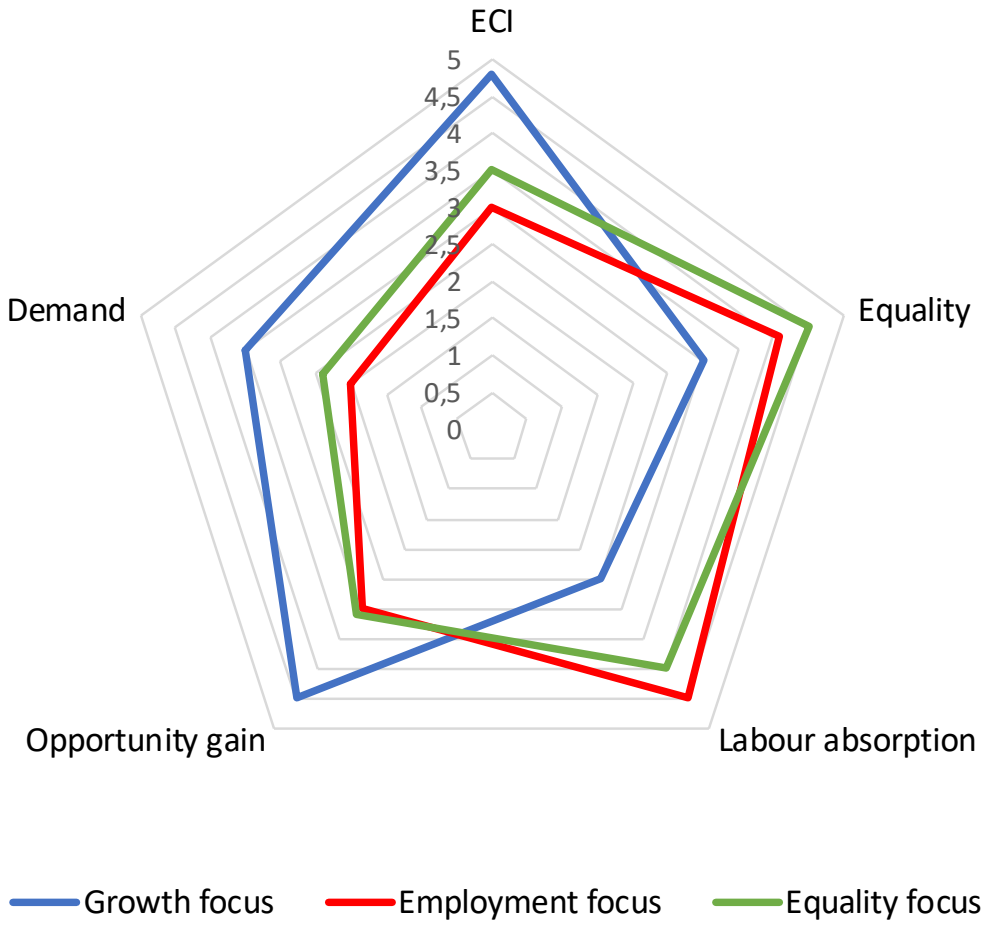
Step 3 — Apply economic complexity and industrial relatedness metrics to identify industrial diversification opportunities

Step 4 — Techno-economic analysis

Outcome — Set of targeted product-level industrial policy interventions that drive specified policy parameters

Policy Calculus to aid economic development goals

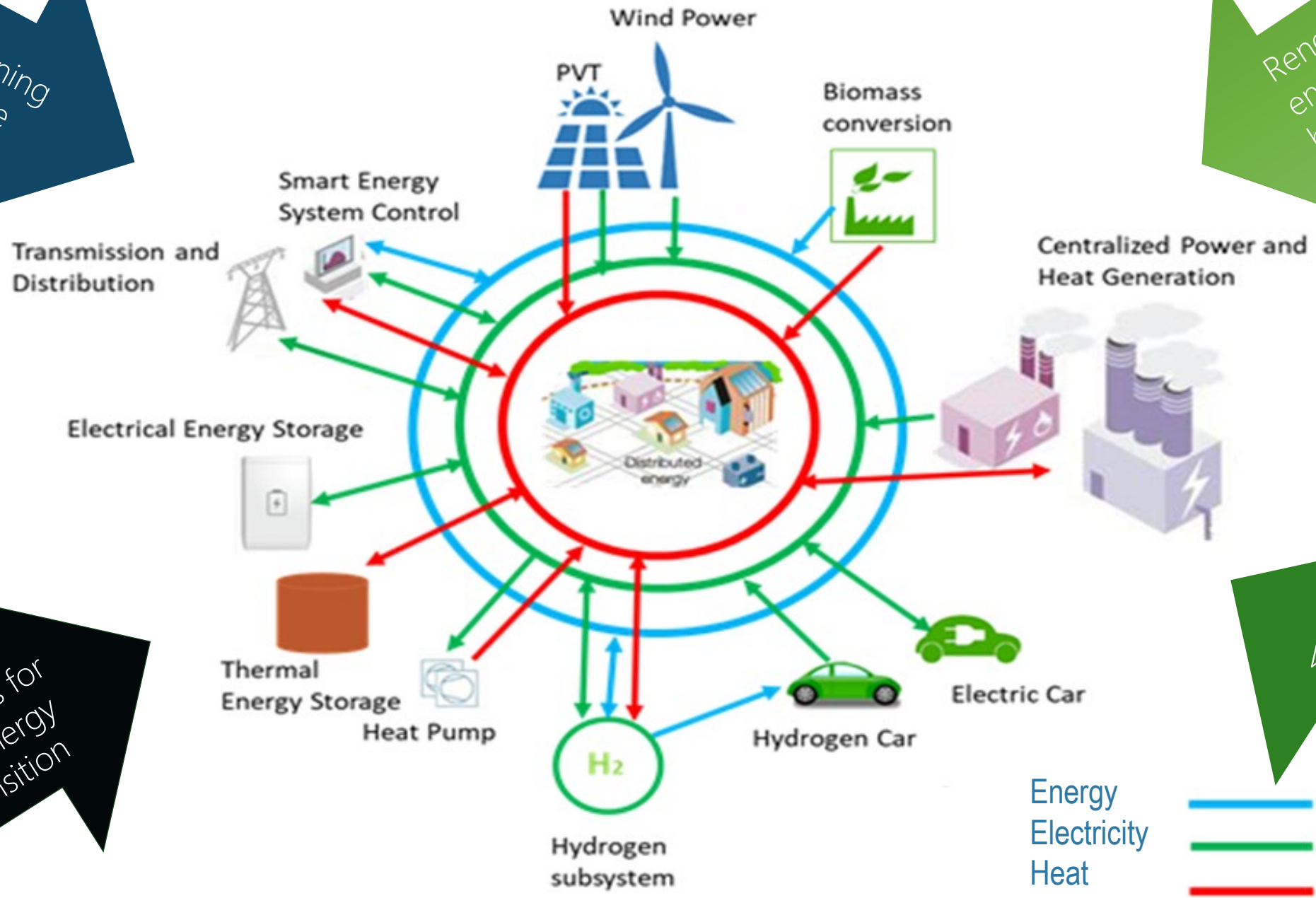
A key research outcome to emerge from the CoP II research is the development of a policy calculus to aid the policy maker in choosing between sets of industrial diversification opportunities



Integrating opportunities .....

Post-mining land use

Renewable energy & biomaterials



Materials for the energy transition

Waste Valorisation

http://www.resilientfutures.uct.ac.za/about-Towards-Resilient-Futures

Synthesis/conclusions