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Ben is on various local and international bodies – including the International Advisory Council on Global Bioeconomy, on the Global Bioeconomy Challenge Steering Committee and its FAO-led Working Group on Metrics and Indicators, co-chair of the International Bioeconomy Forum, and Executive Chair of the GMO Executive Council. He chaired the Bioeconomy Initiative workstream under South Africa's presidency of the G20 in 2025.



Strategic Science, Technology and Innovation: Opportunities in Agriculture – the SA Bioeconomy



**science, technology
& innovation**

Department:
Science, Technology and Innovation
REPUBLIC OF SOUTH AFRICA

Ben Durham
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DSTI mandate:

Bio-economy Strategy 2014

To be a **significant contributor** to the country's economy by 2030, in terms of the **gross domestic product (GDP)**, through the creation and growth of **novel industries** that generate and develop **bio-based services, products and innovations**, with a corresponding growth increase in new and existing companies.



Approach: (1) Coordination; (2) NSI development; (3) Strategic programmes

4 thematic strategic programmes, **namely:**

* **Agriculture;**

* **Health**

* **Industry & Environment**

* **IK-based Technology Innovation.**

DSTI mandate:

DSTI Decadal Plan (of WP on STI) 2022

- *purposeful approach to increasing STI's impact on addressing the challenges, while considering environmental sustainability.*
 - *Job creation*
 - *Skills development*
 - *Export growth and competitiveness*
 - *Poverty reduction*
 - *Innovation and 4-IR, etc*

Challenges in the agricultural sector include the loss of arable land, high input costs (seeds, machinery and pesticides), low technological innovation, and inadequate advisory services

Outputs must include new bioinnovations, more farmers becoming commercialised, increased nutrition security, skills development and new production value chains, as well as precision agriculture and digital capabilities to modernise the sector.



DSTI mandate:

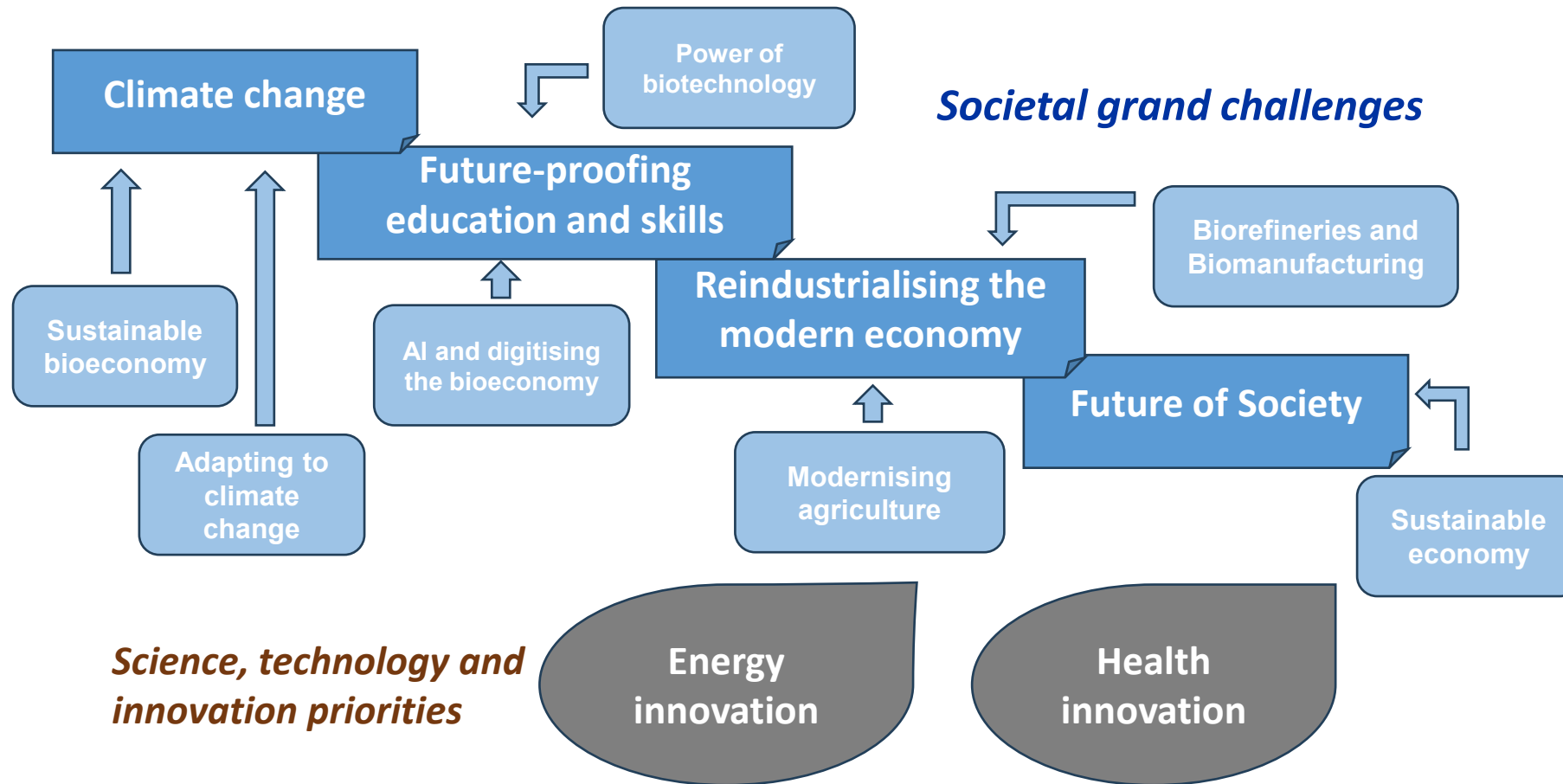
The Climate Change Act 22 of 2024

- establishes a legal framework for South Africa's transition to a low-carbon, climate-resilient economy and society, providing mechanisms for mitigation, adaptation, and governance.

Long-term goal of achieving net zero emissions by 2050



DSTI Bio-innovation response to Mandate



Agricultural Bio-innovation Partnership Programme

Goal of ABIPP: Increased productivity, food security and sustainable rural development

- **Principles** – Inclusivity, transformation, partnerships

ABIPP Approach to Innovation:

- **Focus on co-funded multi-disciplinary, multi-institutional agricultural bio-innovation programmes to support** new product development, new processes, including agro-processing, and development and dissemination of technological services.

ABIPP supports the following **strategic** frameworks and outcomes:

- National Bioeconomy Strategy;
- **Modernising of Agriculture (Decadal Plan)** and innovation support to the masterplans of subsectors;
- MTDP Outcome 2 (*Industrial Diversification and Resilient Agrifood Systems*); and
- Supports **Transformation and Inclusion, Innovation Diffusion (DDM)** and **Decision support**.

Key Flagships:

- **Wheat Breeding Platform, National Biosecurity Hub, Strategic Initiative for Grains and Oilseeds, Sorghum Cluster Initiative, Soybean Food and Nutrition Programmes, Bio-innovation Aquaculture Programme, National Grain Research Programme, One Food Programme (SA-UK).**

National Initiatives to be launched in 2026/27 – **National Plant Phenotyping Platform (UP and US), SASSAM (consortium).**

ABIPP is implemented by the Technology Innovation Agency – strategic and supports innovation pipeline.

- In the longer term the **bigger challenge** is “**Scaling Technologies/Innovation**” - ABIPP budget R23M/yr

Climate resilience and food systems:

- **Research on effects of climate change on production** – building the research knowledge base and big data to manage and **predict planting dates**, e.g. Climate Resilience Consortium with Grain SA and **links through a farmer development support programme**, Phahama Grain Phakama.
- **Climate adaptability trials** – alternative crops given changing rainfall patterns, e.g. **canola production in the Eastern Cape**, which is becoming wetter, while the Western Cape (where canola is mostly grown) is becoming drier. **Increased export potential for canola** as many provinces are also starting to plant canola.
- Coordination, facilitation and multidisciplinary, multi-institutional agricultural innovation programmes to drive productive value chains – **working with farmer development support organisations** to ensure access to **technology/innovation support and working with provincial government departments** with a strong focus on local communities and districts (grain, soybean, cotton, marula, Cape Aloe)
- **South African System of Systems for Agricultural Modernisation Pilot Tool**
 - A new "on-farm" digital decision tool for smallholder farmers.
 - **Combines climate models, soil data, and drone imagery.**
 - Currently being tested in the Eastern Cape and KwaZulu-Natal.
- **National Biosecurity Hub**
 - Built in **partnership with the national Department of Agriculture.**
 - Surveillance and information hubs for early warning systems, tracking how climate change alters the spread of crop pests and diseases in the long term.

Nutrition and food security innovation: Technologies, biofortification strategies, or nutrition-sensitive interventions that improve the accessibility, affordability and the nutritional quality of food

ABIPP programmes aimed at strengthening food and nutrition security in South Africa –

- **orange fleshed sweet potato (OFSP) fortified with vitamin A**, which includes processing OFSP into snacks and purees, flour, flakes, and baby puree (six prototypes available to four SMMEs);
- support for processing technique for maize that results in a more nutritious food at household level (**nixtamalisation**, which enhances the bio-availability of nutrients in the maize), with mobile food carts distributed to 10 SMMEs with recipes, food processing and food safety training);
- **soybean food and nutrition programme** with industry – support for increased production and processing in communities (soy yoghurt, milk and snacks);
- exploration of **neglected and underutilised crops**, including indigenous varieties, to support nutrition security with increased nutritional quality: Bambara, groundnut, amadumbe, leafy vegetables cassava and rice. There are various projects in the pipeline.

Market Opportunities – top 10 commodities

- **White & Yellow Maize:** South Africa hit a historic record of **17.25 million tonnes** in the 2025/2026 season; primary market opportunities lie in expanding animal feed milling for regional African partners and technical trade corridors into **China, Taiwan, and South Korea**, while innovation focuses on drought-tolerant seed varieties to counter looming El Niño cycles.
- **Soybeans:** Driven by excellent corn-to-soybean price ratios, production continues to climb to supply localized oilseed crushing facilities; innovation opportunities feature **precision agricultural drones** (a market projected to triple in South Africa) for real-time nitrogen monitoring, alongside regional investment in integrated poultry-feed value chains.
- **Sunflower Seed:** Highly profitable on marginal lands because it requires less upfront cash, the domestic market focuses heavily on replacing expensive crude sunflower oil imports; innovation targets advanced **crushing and extraction technologies** that capture value-added industrial byproducts.
- **Wheat:** As a net importer reliant on roughly 1.85 million tonnes annually, South Africa presents an aggressive import-substitution market; innovation opportunities center on climate-adaptive winter wheat seeds for the Western Cape, localized **milling infrastructure expansion**, and fortified pasta production.
- **Sorghum:** Benefiting from a robust **6.12% CAGR** projection, market demand is surging due to consumer shifts toward gluten-free health foods and premium domestic pet feed; processing innovation focuses on advanced dehulling and milling tech to improve grain palatability.
- **Dry Beans & Pulses:** Driven by a strong 13.3% domestic price increase and expanding demand for affordable plant-based proteins across Africa, market opportunities lean on regional trade; innovation relies on automated sorting and **climate-resilient, short-duration seed traits**.
- **Groundnuts (Peanuts):** Consistently delivering superior profit margins on lower-potential soil types, groundnuts serve high-value confectionary export channels; innovation focus areas prioritize rapid, automated **afatoxin screening technologies** to effortlessly clear strict European phytosanitary barriers.
- **Malting Barley:** Fueled by a highly institutionalized domestic beer and beverage industry, the market requires high-purity grain consistency; crop innovation centers on **IoT-linked moisture sensors** and smart irrigation scheduling to preserve strict malting-grade qualities during volatile seasons.
- **Canola:** Concentrated primarily within the Western Cape's winter rainfall zones, canola captures growing consumer health-oil markets; innovations target regenerative farming practices, such as no-till crop rotation, which successfully tap into high-margin **carbon credit monetization** networks. Extension to other provinces and now exporting as well.
- **Sugarcane:** Moving through an acute structural adjustment putting thousands of rural jobs at risk, the industry is aggressively pivoting away from raw sugar; innovation and market opportunities are focused almost entirely on **biofuel mandates, ethanol production, and green aviation fuel that are being explored**.



Toward an ST&I roadmap for agriculture, forestry and aquaculture

Problem statement:



The triple challenge

- Unemployment (about 30%) • Inequality (Gini coefficient 0.68) • Poverty
- Most food-secure country on the African continent but high household food insecurity
- 35 000 commercial farmers (5% black people), with 300-700 000 smallholders.

Agricultural sector – most resilient sector during Covid-19, but many challenges contribute to low productivity and GDP growth

- Overall: Input cost, prices, competition, loadshedding, climate change, droughts, floods
- Rural/non-metro areas: 3,1 million agricultural households in poorest provinces with limited access to basic services – Limpopo (32,2%), the Eastern Cape (44,3%) and KZN (32,9%)
- Arable land underutilised

Global Food Security Index (2019)

- South African food and nutrition statistics: (a) malnutrition 6,2%; (b) stunting 27,4%;
- (c) share of the population below the global poverty level 15%; and (d) obesity 27%
- Household food insecurity survey (2025): (a) food secure 36,5%; (b) mild-moderate ~45%; and (c) severely food insecure 17%



Emerging Strategic Priorities

Priority Areas Identified Thus Far

1. Climate-smart agriculture and water technologies
2. Digital agriculture and AI
3. Biosecurity and animal health
4. Sustainable intensification and agroecology
5. Agro-processing and value addition
6. Forestry bioeconomy innovation
7. Aquaculture growth systems
8. Food and nutrition security
9. Human capital development
10. Inclusive innovation systems

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- Project Types**
- Green Spaces
 - Water Bodies
 - Urban Infrastructure
 - Transportation
- Project Names**
- 1. Expansion of Green Spaces in the Central Business District
 - 2. Construction of a New Water Treatment Plant
 - 3. Expansion of the Ring Road
 - 4. Construction of a New Metro Station
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- Legend**
- Green Spaces
 - Water Bodies
 - Urban Infrastructure
 - Transportation

G20 – Initiative on Bioeconomy

SA argued that the world (as led by G20) :

- Needs a **Global** response to a global climate crisis
- Should transform ‘classical’ economics into bio-economics. (ie. **sustainable economies**)
- Must recognise that **People & livelihoods** are as important as the **Environment** in the Bioeconomy (10 HLP’s)

- African Opportunity (Africa deriving <10% of final biomass value)
- Metrics & Standards (measure to manage; advance sustainable biomass trade)
- Financing (Bioeconomy Financing Hub for Africa)
- Idealized structure for Global Implementation (coordination, leadership, targets, recommendations, implementation)

Next Steps

Since **SA G20**, the following have appeared (& SA directly involved):

- 1. Int. Bioeconomy Forum** – Forestry; Biorefineries; Metrics & Standards; Repository on bioeconomy information.
- 2. Bioeconomy Challenge** – Trade, Metrics and Indicators, Finance & Sociobioeconomy Working Groups
- 3. Global Bioeconomy Summit** – becoming recognised as the leading bioeconomy venue for thought leadership.
- 4. Global Bioeconomy Partnerships** – a global network of networks.

- Review **SA Bioeconomy Strategy**. Ensure robust metrics development not inconsistent with global views to ensure relevance & participation.

Challenge to PRF:

- We have strongly over-lapping mandates
- We (DSTI) needs to be more aware of PRF's challenges and opportunities, as Pvt Sector has expertise in markets, value chains and related.
- We should be working more closely together, setting innovation and development targets, harnessing our collective assets & skill-sets to increase delivery.

Biomass production is the core of the Bioeconomy

*Dankie
Enkosi
Ha khensa
Re a leboga
Ro livhuwa
Siyabonga
Siyathokoza
Thank you*

M Making < sure it's
possible



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