Bio-Energy Projects & Opportunities from Sugarcane

TSB is geared for the future and sustained growth

20 February 2013

Nico Stolz

Overview

- What is sugarcane?
- Energy opportunities under development
- Energy in Action - Our Partnership with Growers

Tsb Cane Supply Area
70% of Irrigated North of SA Industry

What is sugarcane?

Sugarcane history

- Cultivated since 6000BC
- Columbus introduced sugar cane to the "new world."

- Jan van Riebeeck tested cane from Jakarta in the Cape.

- "Imfe" was already grown by the Zulu in KwaZulu-Natal when the first settlers arrived.
- The first sugarcane crop in SA planted by Edmund Moorewood in 1848 at his farm "Compensation". In 1851 the first sugar in SA was made with a wooden roller mill.
- By 1860 there were 40 mills scattered over KwaZulu-Natal – actively exporting sugar.

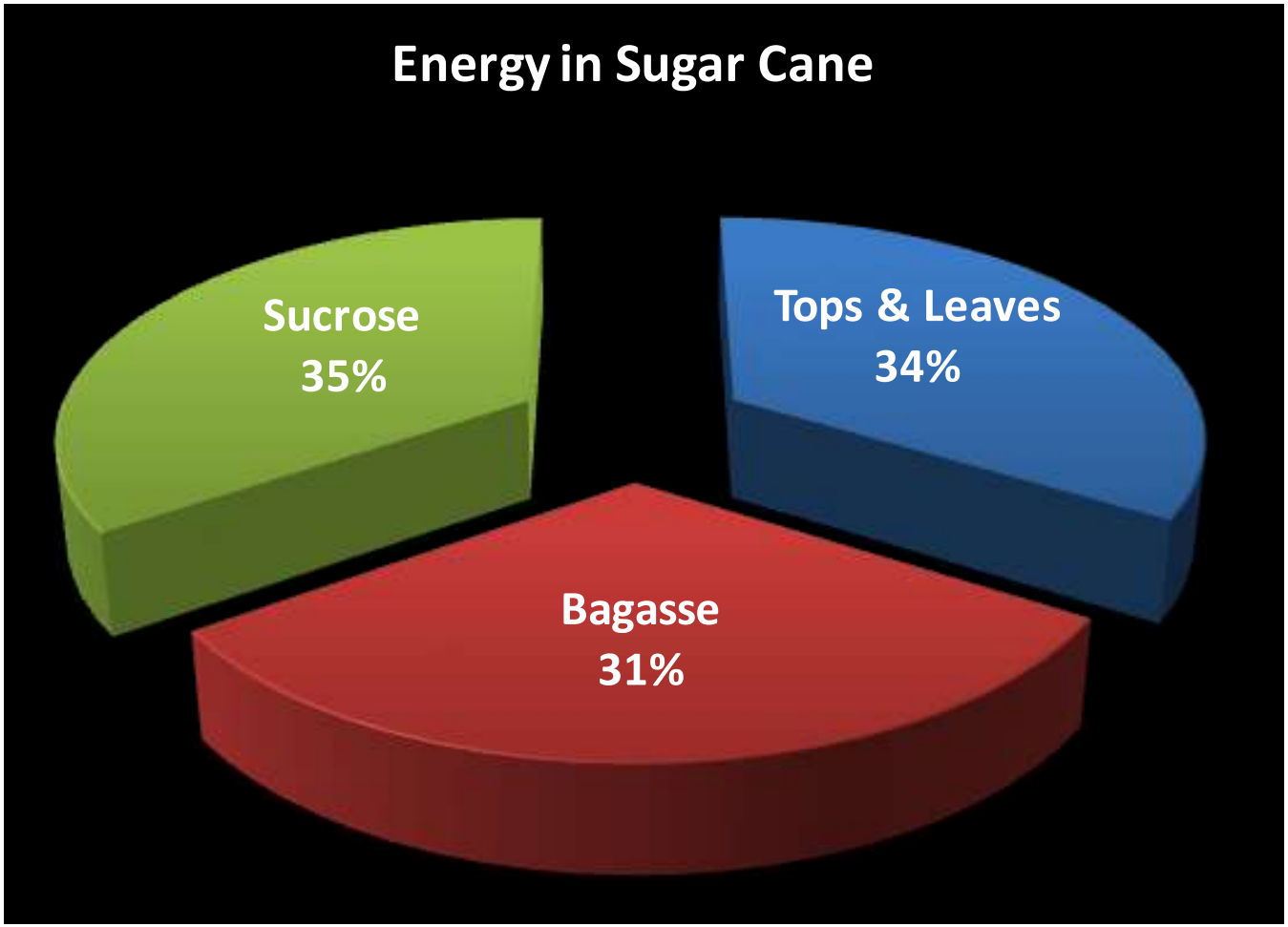
- Currently 14 Mills, 2,2 mil tons sugar from 19,9 mil tons cane

Sugarcane

- Sugarcane is one of the most efficient plants to capture and convert atmospheric CO_2.

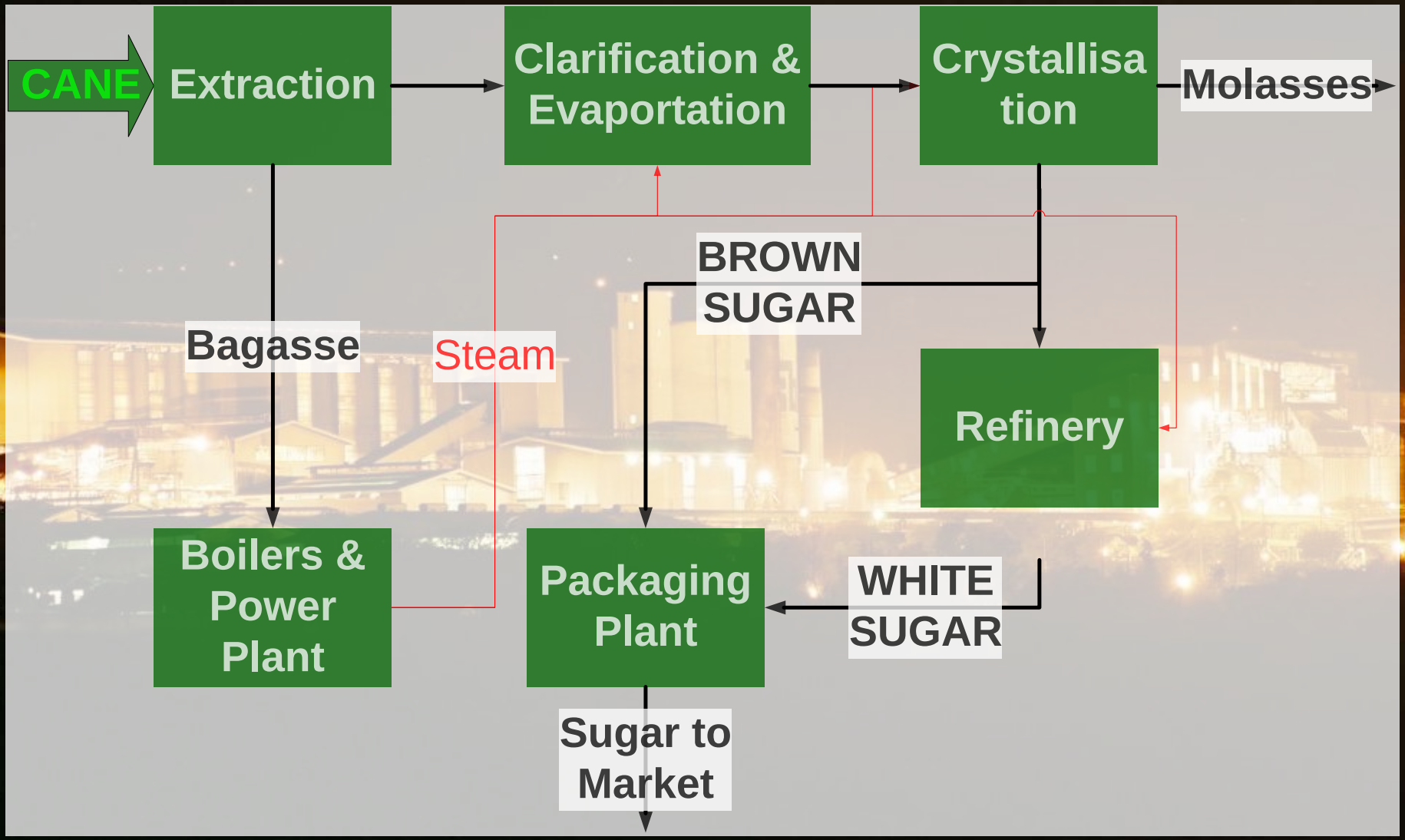
- For sugarcane to produce carbohydrates it needs:
  - Carbon (from Carbon Dioxide)
  - Water and
  - Sunlight (temperate climate)
  - Also soil with the right nutrients

Energy Potential of Cane



- 6 625 MJ/ton cane (422 kg dry) = 0.153 tons oil ; Pippo & Luengo, 2013

Understanding a Sugar Mill



Direct Energy Opportunities

Current Initiatives in Tsb

- Detailed investigation of using "brown leaf" as a fuel source to generate additional energy.
  - "Green Cane" has additional cost to deliver.
  - Brown Leaf has challenges and require separation prior to the sugar process – work in progress.
  - Brown leaf can increase SA's renewable power generation and provide an additional source of income to the Grower.

Current Initiatives in Tsb

- Extensive Review of Energy Efficiency & Energy Use
  - Ultimate goal is to achieve Risk Mitigation and Energy Independence through efficient use of underutilised process streams and resources for example:
  - Komati Mill needs thermal energy and not all the steam generated passes through turbines – opportunity exist to utilise the "work" contained in the high pressure steam.

Current Initiatives in Tsb

- Tsb is currently in advanced engineering phase to use this steam more effectively. Opportunities are:
  - Possible additional turbine to increase electrical output (EIA in progress)
  - Thermal recompression of low pressure vapour to reuse in the factory.
- But nothing comes for free or cheap!

Opportunities from Sugar Cane

- Sugar Cane can contribute to the SA Economy by producing: (Proven Technologies)
  - Biofuels – Ethanol & Butanol, Petrol & Diesel via gasification
  - Renewable Electricity via Co-Generation & the use of Brown-leaf
  - Biosolvents – Furfural & Acetone, Butanediol
  - Bioplastics – Polylactic Acid, Polysuccinic Acid & Bio-Polyethylene, Starch Based packaging

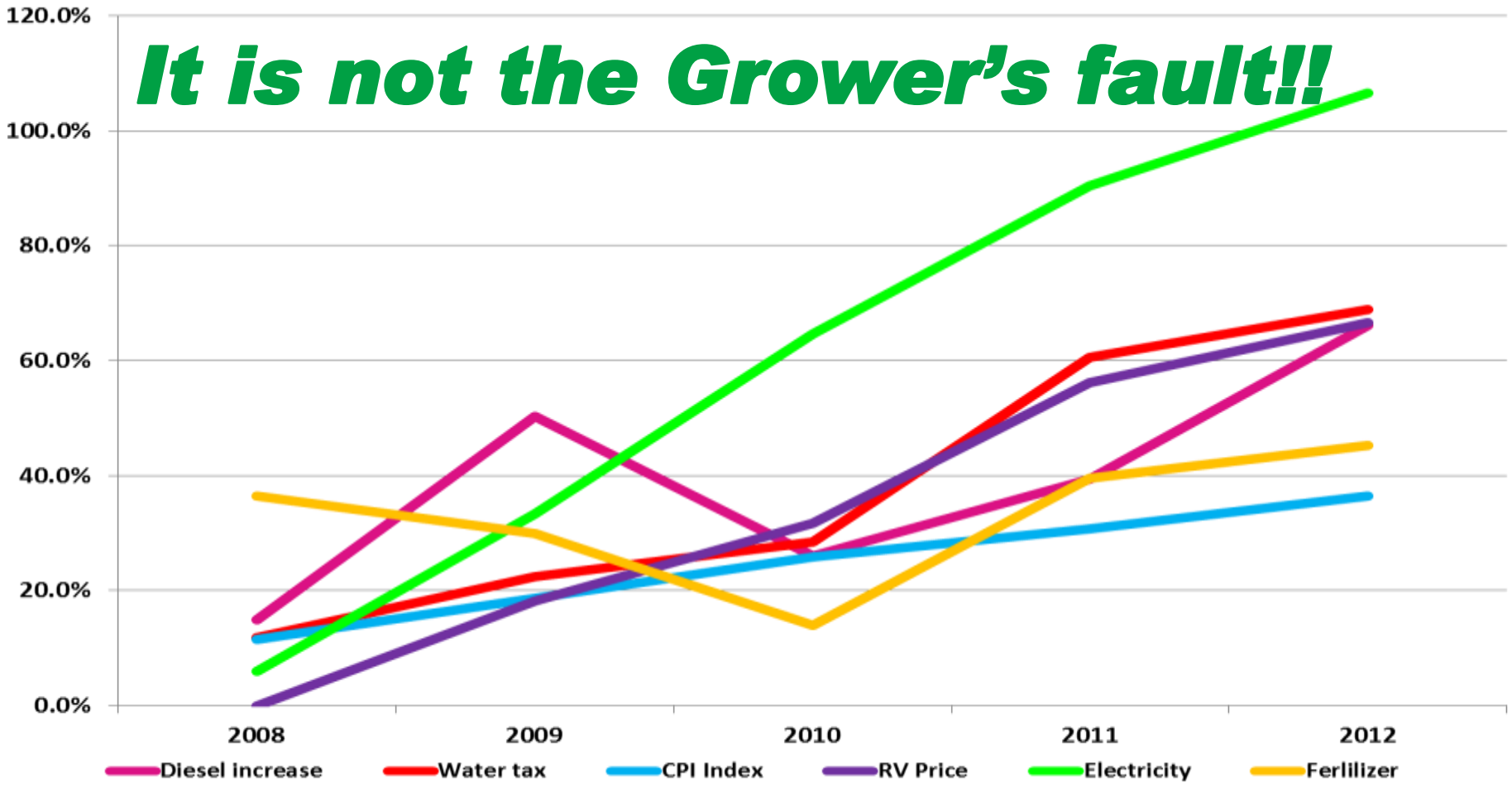
"Anything that can be made from a hydrocarbon (petroleum) can be made from a carbohydrate (plants)." - Henry Ford & William Hale

Hurdles to Implementation

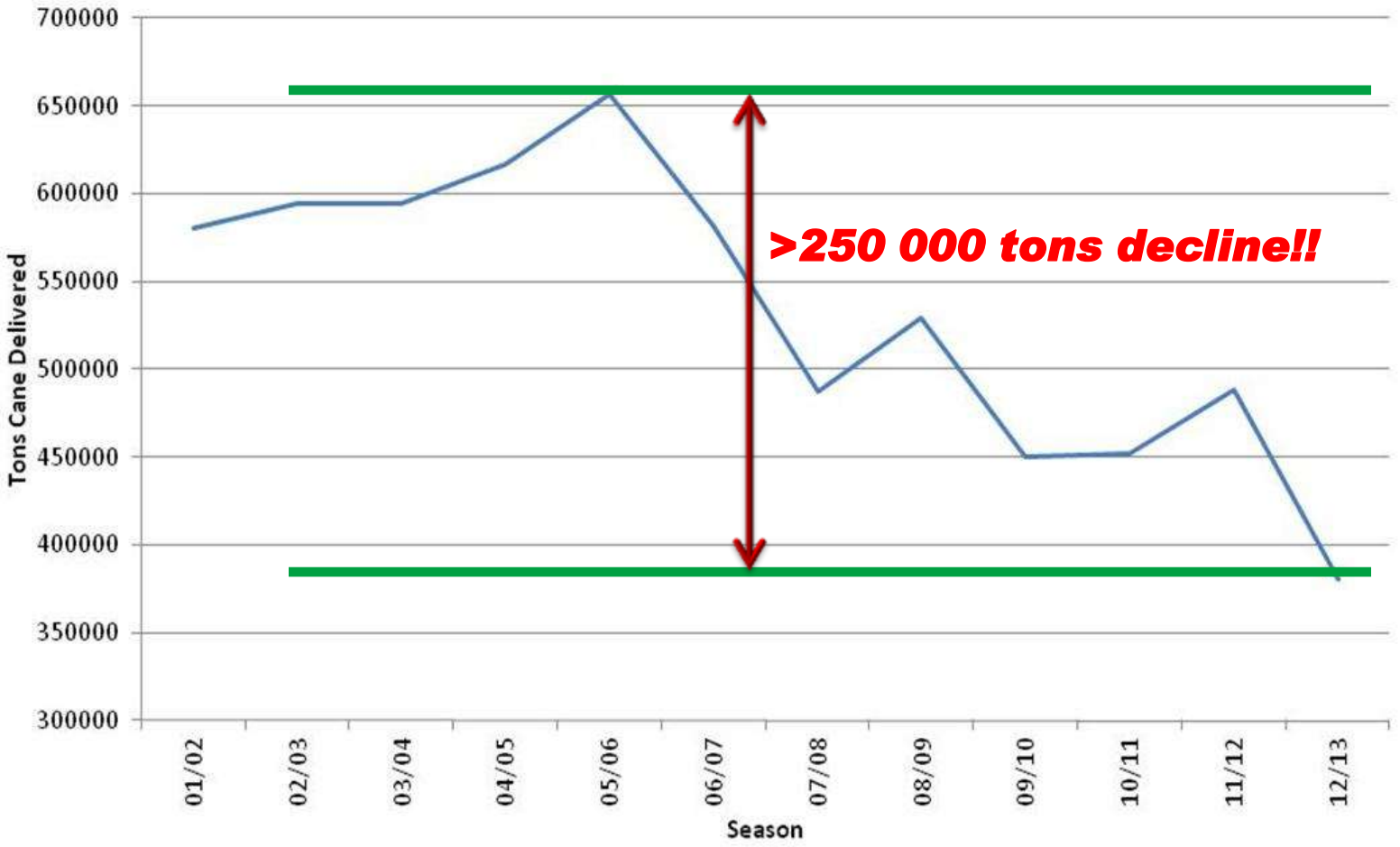
- Lack of clear enabling regulatory framework to participate in National Initiatives:
  - Co-generation of renewable electricity from sugar in SA can supply electricity mostly in winter peak demand. Fortunately Co-Generation has been included in the determination announced on 19 December 2012. The procurement process is expected to commence in 2013.
  - Ethanol – Sugar cane is the best performing crop GLOBALLY to contribute to fuel-ethanol. (USA Advanced Fuel) In SA Government is proposing to price ethanol based on sorghum. SA already missed the 2013 blending target. Licensing criteria is unclear – will an established industry that can **protect jobs** be considered or only new green field projects?

Partnership with Growers to develop a rural energy solution

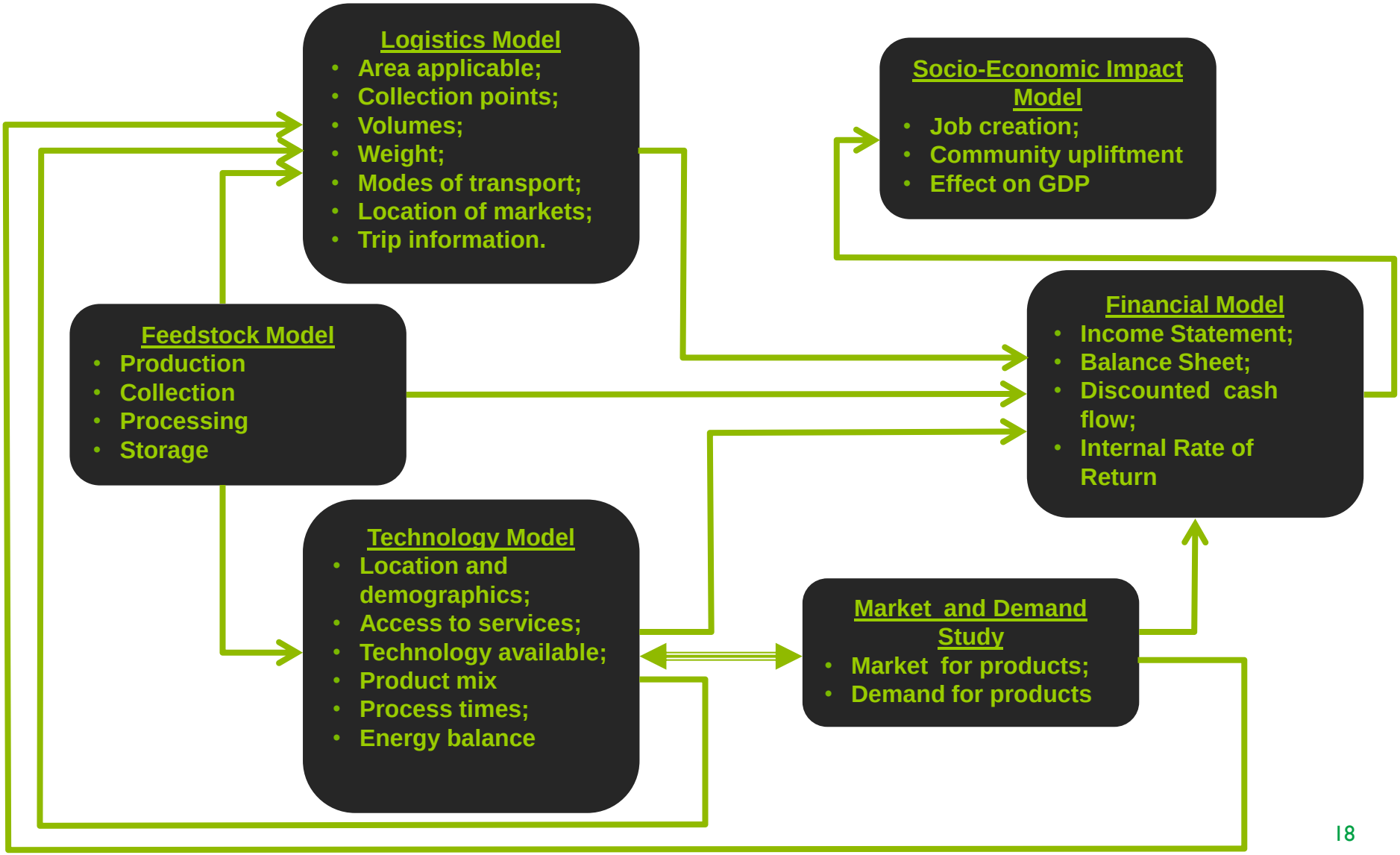
Primary Driver for the Project



SSG Production declining



Partnership between Tsb, MpCGA & Aurecon with co-funding from EEP



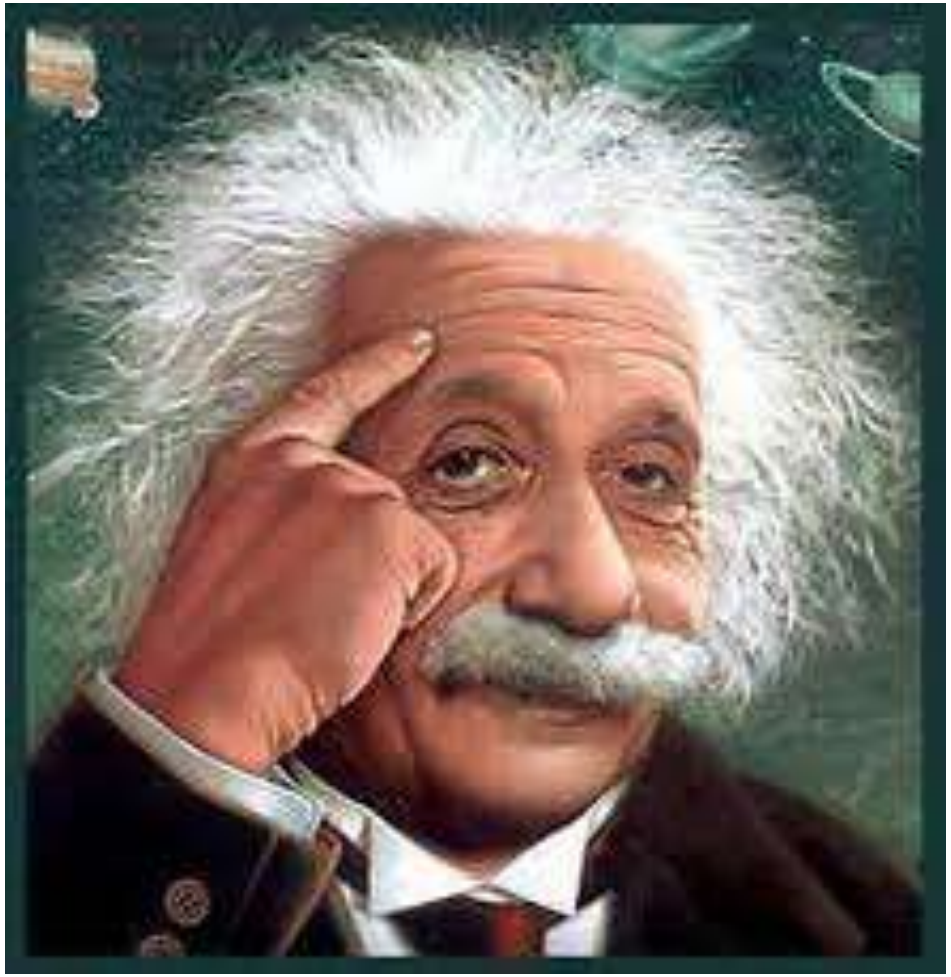
Product – Market Acceptance Testing

Next Steps

Way Forward: A detailed Feasibility study has to be completed. This study will address:

- Validating and Increasing the volume of tops and green leaves used prove inbound transportation costs. (Equipment & operational)
- Markets must be explored and letters of intent secured for the products.
- Establish a pilot plant and operate for a season to understand the effect of externalities and process variables

Mpumalanga has people and resources to establish a sustainable bio-energy industry and help make the world a better place.



We can't solve problems by using the same kind of thinking we used when we created them.

Albert Einstein

Thank you

Nico Stolz
Specialist Engineer: Energy
Tel: 013 791 1268
Cell: 082 553 8854
Email: stolzn@tsb.co.za

This presentation is provided for information purposes only on the express understanding that the information contained herein will be regarded as **strictly confidential**. It is not to be delivered nor shall its contents be disclosed to anyone other than the entity to which it is being provided and its employees and shall not be reproduced or used, in whole or in part, for any purpose other than for the consideration of the projects described herein, without the prior written consent of Tsb Sugar RSA Pty Ltd. The information contained in this presentation does not purport to be complete and is subject to change. This is a commercial communication. The presentation does not include a personal recommendation and does not constitute an offer, or the solicitation of an offer for the sale or purchase of any product or service. Neither is this presentation binding Tsb Sugar RSA Pty Ltd to any investment in the projects described herein.

Whilst every care has been taken in preparing this presentation, no employee of Tsb Sugar RSA Pty Ltd gives any representation, warranty or undertaking and accepts no responsibility or liability as to the accuracy, or completeness, of the information in this presentation. Past performance is not indicative of future results. For the avoidance of doubt, our duties and responsibilities shall not include tax advisory, legal, regulatory, accounting, engineering or other specialist or technical advice or services. You are to rely on your own independent appraisal of and investigations into all matters and things contemplated by this presentation. By accepting this presentation, you agree to be bound by the foregoing limitations. Kindly note that this presentation does not represent an offer of funding or co-investment.