PW Rein: Challenges facing diversification in sugarcane processing

- Recent world sugar trade patterns emphasise the need to diversify to be sustainable
- Diversification options
  - Ethanol
  - Electricity for export
  - Energy from lignocellulosics
    - Biomass to liquid (BTL)
      - Sugarcane is the only “energy” crop commercially proven on a large scale
- Challenges faced
  - Need to become biomass processing plants
  - Biorefineries can utilise synergies
  - Government and regulation authorities have a great influence
  - Need to push the boundaries
  - Energy efficiencies need to be improved
  - Harvesting issues – green cane harvesting?
  - Look at other biomass crops – eg sweet sorghum,
  - Look at GM or “designer” cane
- Strategies for change
  - How do you change an industry that has done the same things for over 100 years
  - Progress research from bench-scale to commercial reality
  - Are subsidies necessary? Do these come from industry or government?
- Collaboration has advantages
  - Allows for a broader field to be researched
  - Spreads costs and risk
  - Each partner must have something of value to contribute
  - Objective must be to create new value, not just exchange information
- JUST DO IT
- Some thoughts
  - Substantial change requires industry and government commitment
  - The first steps, ethanol and electricity, are technologically risk free
  - Diversification will lead to improved sustainability
  - Sugar operations will increasingly look at GHG emissions in designing new products
  - Exploit the small carbon footprint of cane sugar
  - Other biomass crops complement sugarcane processing in many cases
  - A sugar mill is the ideal starting point for the stage-wise implementation of value adding activities
  - Be prepared to change – it’s a mindset thing. “The only constant is change”
  - SASTA is a spur to innovation
V Kochergin: Sugar Industry Diversification: Pathways to non-ethanol fuels and chemicals

- Need for diversification
  - Continue sugar production
  - Integration of emerging technologies into existing allows for significant cost reduction by utilisation of capital assets
- Paradigm shift from sugar processing to cane processing
- Look at $ per hectare and ensure this is attractive and sustainable
- Biofuel options
  - 1st generation
    - Bioethanol
    - Biodiesel
  - 2nd generation
    - Cellulosic ethanol
    - Butanol
    - Thermochemically derived fuels – methanol, ethanol, hydrogen, Fischer-Tropsch gasoline and diesel
- Some thoughts
  - The cheapest source of carbohydrates are sugars that are made available by milling/diffusion
  - Fibre should be partially, or fully, utilised as a source of renewable energy/power for value-added fuels or products
  - Proportion of fibre used for fuel/chemical production needs to be evaluated for each individual pathway – fuel production should be thermodynamically feasible
  - Further separation of sugars may be feasible for added value chemicals production
  - Economic feasibility will be guaranteed via integrated technologies with a portfolio of products
- Various biorefinery concepts were presented
  - Bio-isoprene
  - Bioplastics
  - Co-location of algal facilities – CO₂ and energy provided from sugar processing plant
- Key questions
  - What feedstock can be complementary to cane?
  - How many acres and where should it be planted?
  - What are the quality requirements for carbohydrate feedstocks?
  - What are the best integration scenarios?
  - How to evaluate economic and environmental impacts?