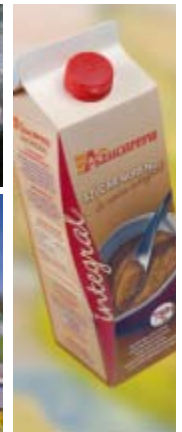


# Challenges and opportunities in polymers & chemicals derived from sugar

Matthew White  
Head of Innovation  
British Sugar

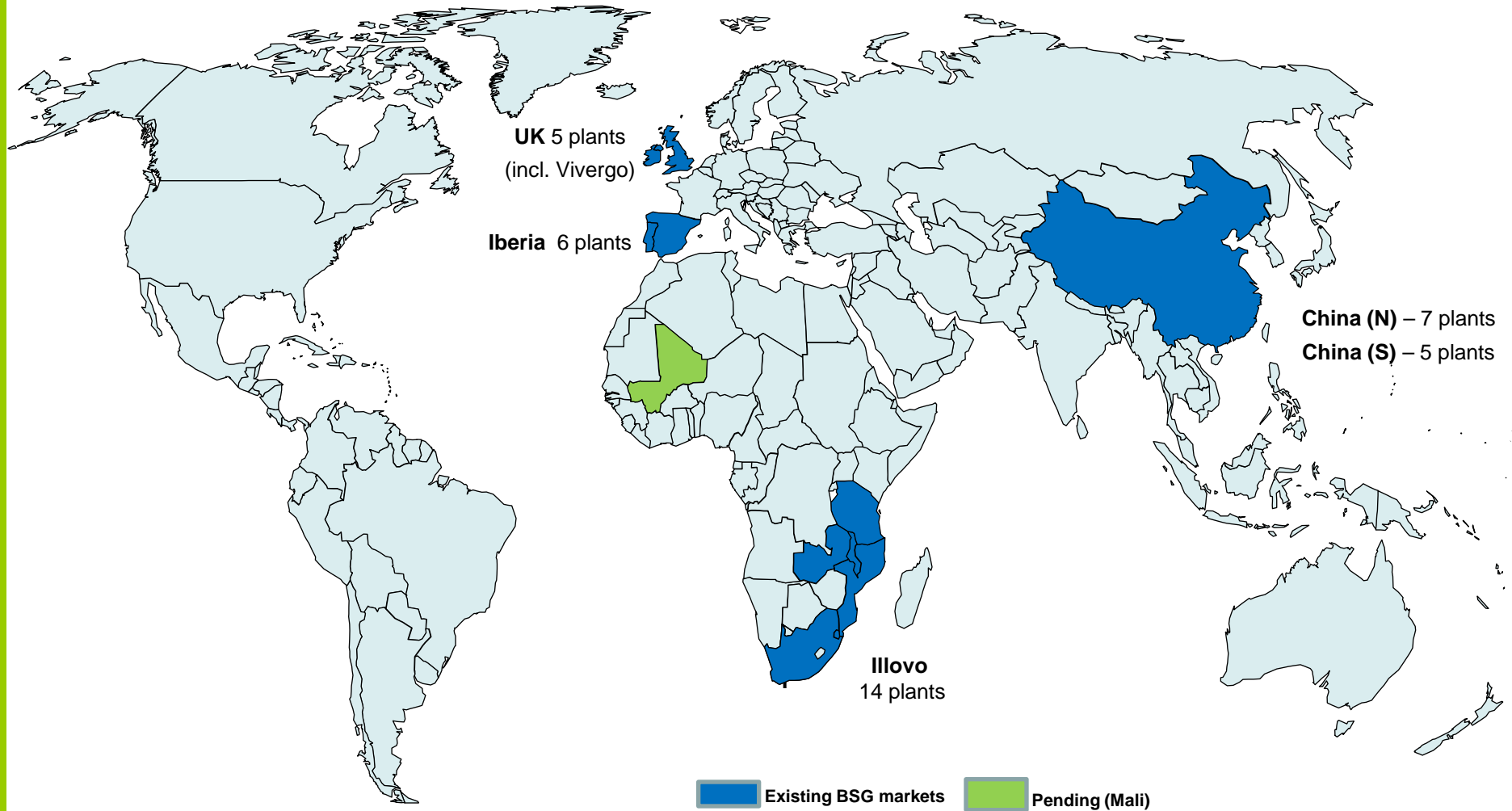


We have a clear vision ....



“the world’s  
**leading**  
sugar business”

# Our geographic footprint



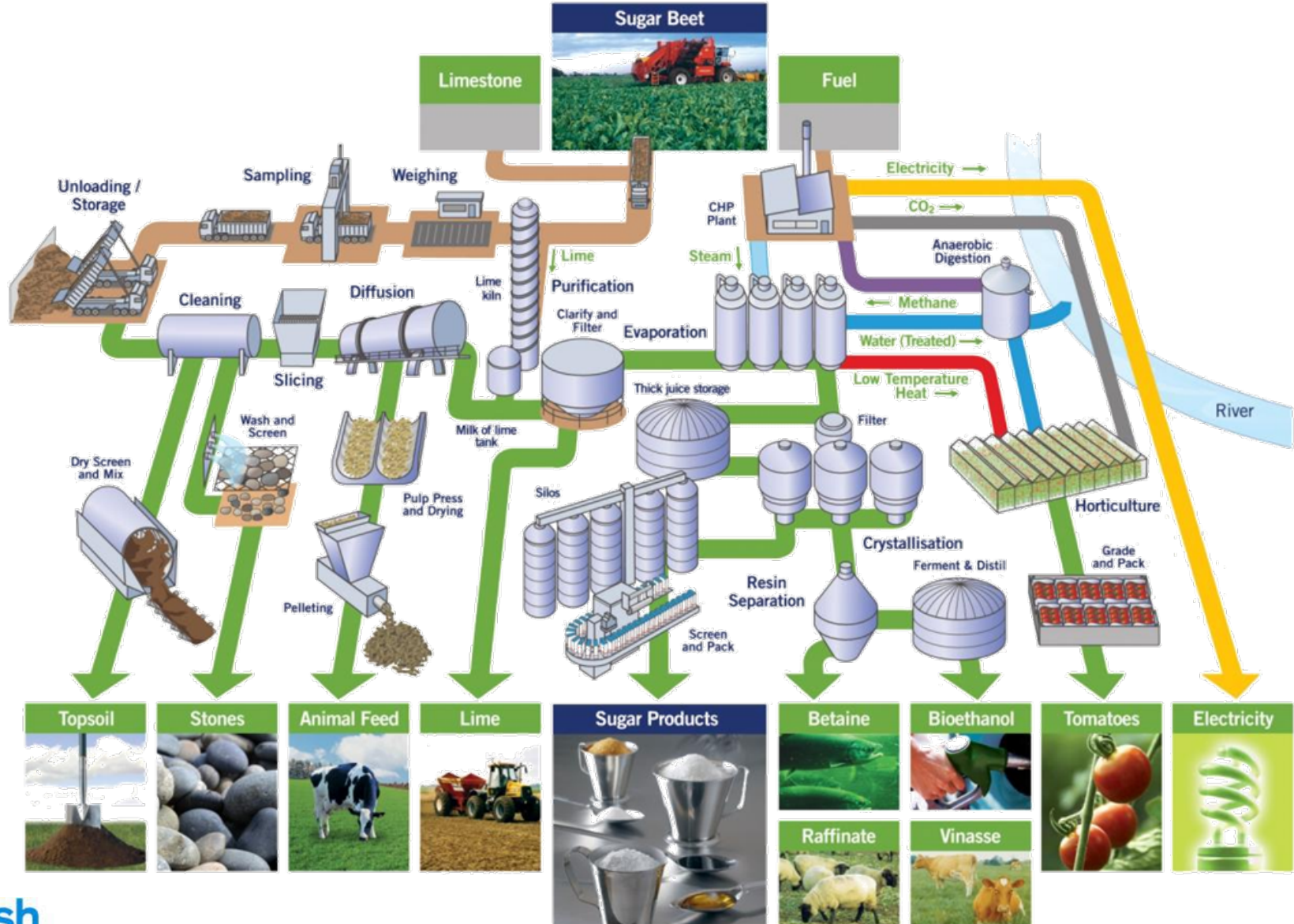
Existing BSG markets Pending (Mali)

# British Sugar Group – the facts today ....

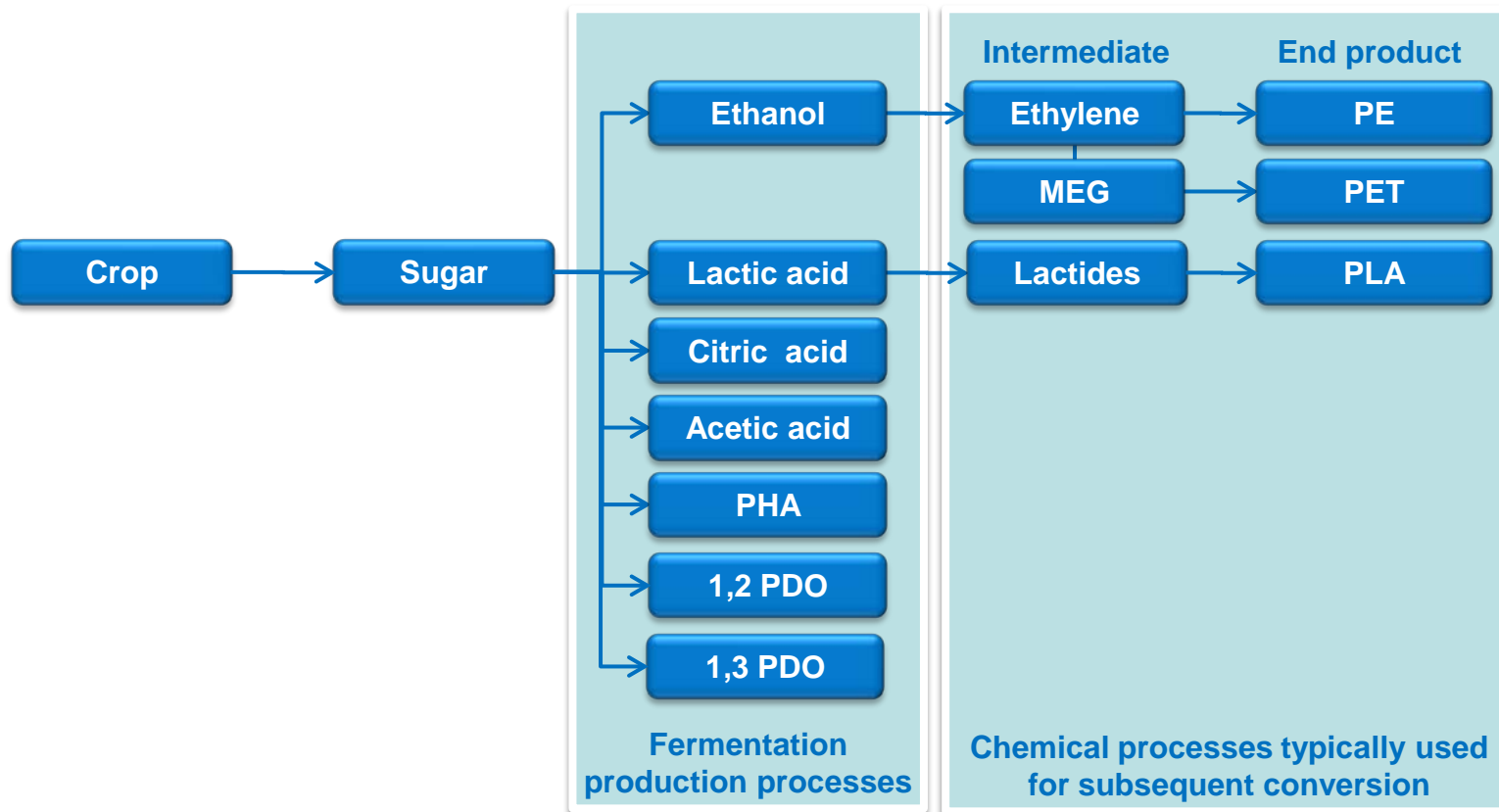
- **British Sugar is a substantial and core business within ABF**
- Operations in UK, Iberia, Africa, and China with a capacity of ~ 5mtpa; current production c. 4.1 – 4.4 mtpa
- Largest purchaser of agricultural products for processing (c. 34m tonnes)
- **Sole UK producer of beet sugar; c. 12 mt of beet processed in Europe**
- 19mt of cane processed by the Group, 6.1 mt of which is produced on our own estate in Illovo farms in Malawi, Zambia, Mozambique, Tanzania and Swaziland
- Top tier agriculture productivity in Illovo for cane and UK for beet
- Lowest cost sugar processor in regions; exceptionally high asset utilisation in the UK
- **Co-products not by-products, increasingly value-added; animal feed, co-generation, betaine, tomatoes, ethanol, furfural and cropguard**
- **UK's first bio-ethanol plant operational at Wissington**
- Leading retail brands; Silver Spoon, Billington's (ABF Grocery), Azucarera, Illovo



# Wissington is an example of the direction being pursued



# Commercial production of chemicals and polymers from sugar is well developed



# Major brand owners are making big commitments

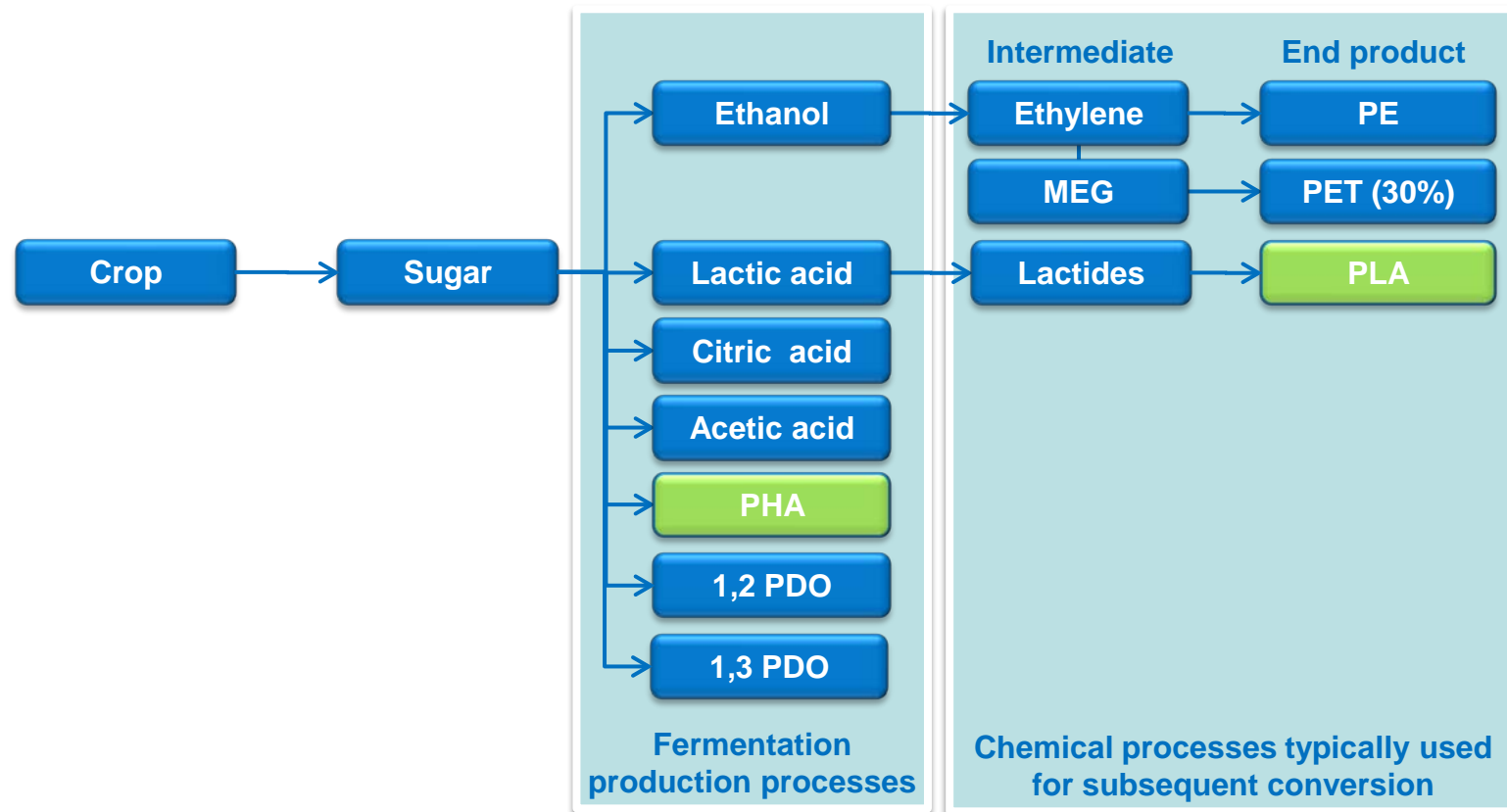


The future of our bottle is taking shape.



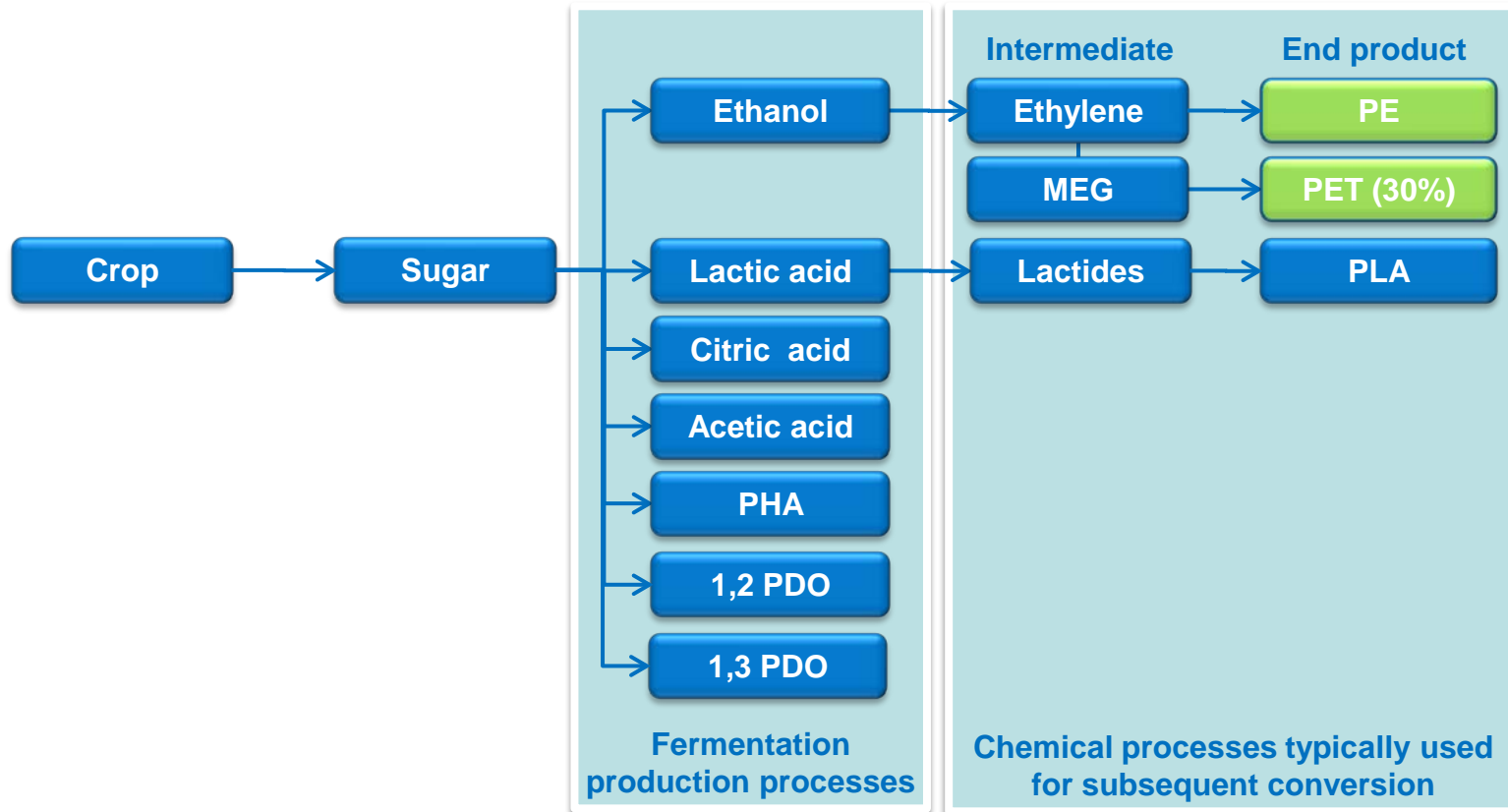
Look for the  logo on pack.  
up to 30% plant-based  
100% recyclable bottle

## Commercially available polymers have focused on biodegradability to date



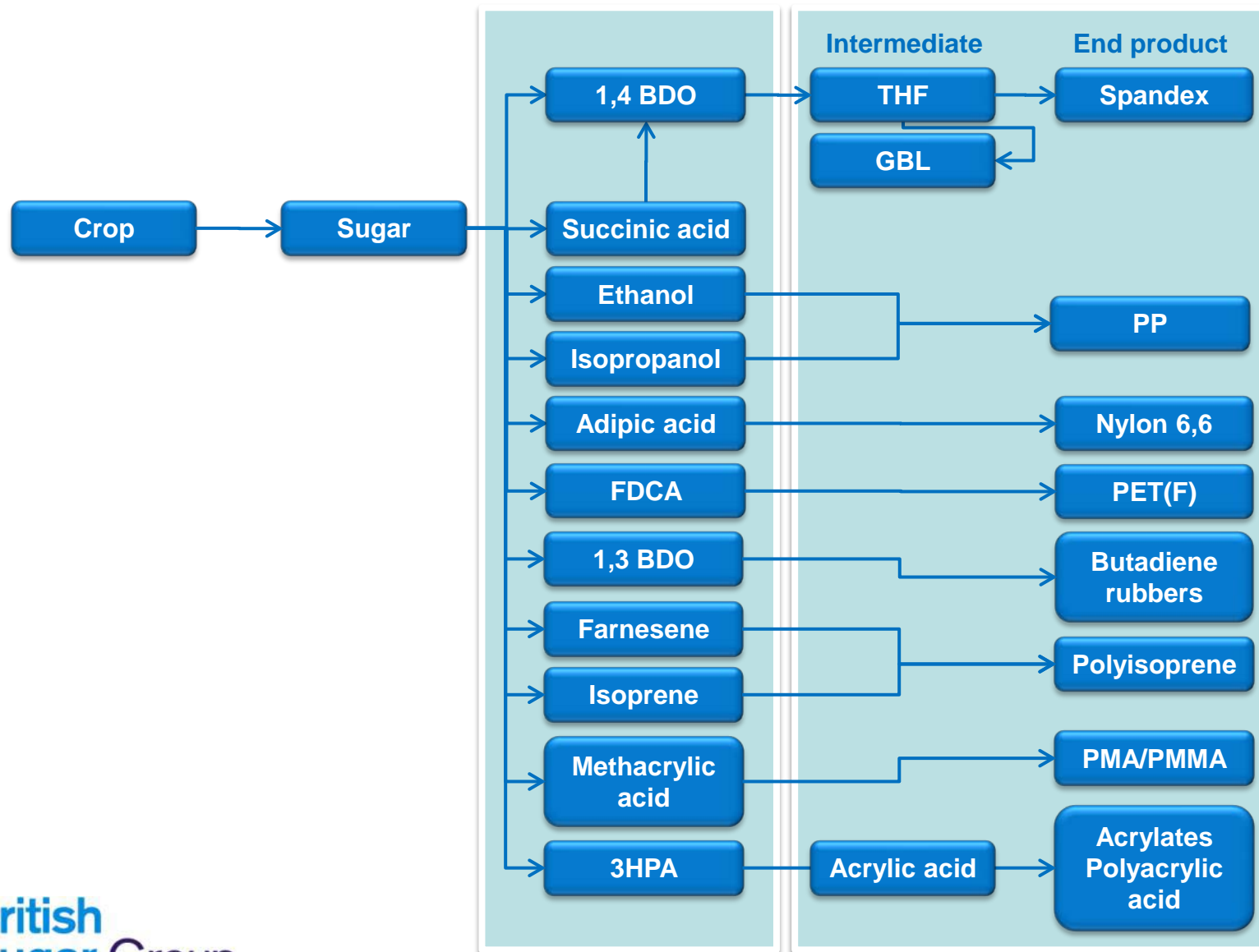
- Starting to genuinely compete with petrochem materials – PLA versus polystyrene
- The properties are being continually developed to more closely replicate mainstream polymers
- Major challenge is lack of compatibility with recycling streams

More recently, drop-in replacements have been developed



- Substantially identical to petrochemical derived materials
- No change to existing manufacturing assets or recycling streams
- Currently being sold at a price premium, but in the medium to long term, only a minor premium, if any, will be accepted by major customers

Expect to see a plethora of polymers derived from sugars over the next 3-10 years



## So why isn't the market saying ¥£\$...?

- Feedstock supply is key
- Business plans are built around unrealistic assumptions of the cost for fermentable sugars
  - Sugar is a valuable material in its own right
  - Other feedstocks (i.e. starch) to produce fermentable sugars are costly
  - Existing uses i.e. ethanol production, are relatively high value uses for fermentable sugar streams
  - 2<sup>nd</sup> generation production of sugars from biomass are not yet commercially available and have many challenges
- Scale-up is a big issue for many of the start-up companies/technologies
  - It is challenging!
  - Need to demonstrate capability and effective operation to potential financiers
- Demonstration plants can be very expensive, have considerable risk and typically lower rates of return than full scale plants

## In conclusion...

- Renewable polymers and chemicals are finally becoming large scale reality
- Expect to see bio-derived variants of your current materials as well as new to the world materials
- However, in the big scheme of things this is still very niche
  
- Sugar is a very interesting feedstock and we look forward to helping to drive this market forward



# THANK YOU

Matthew White  
[Matthew.White@britishsugar.com](mailto:Matthew.White@britishsugar.com)