



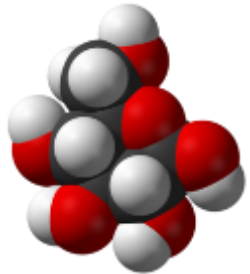
*Gaseous fermentation to
drop-in fuels and chemicals
with advantageous properties*

*Industrial BIO LATAM, Sao Paulo ,
October 27th 2016*



Breakthrough technology : direct fermentation to a gas...adapted to 1G and 2G sugars

I – Fermentation stage



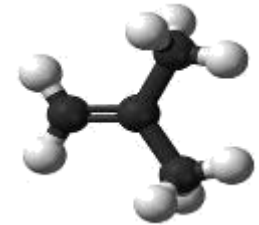
Glucose
Sucrose
Xylose
Other-oses



Natural volatilization of the product

- No accumulation in the broth, no toxicity for the strains
- Pre-purification from broth impurities

II – Extraction from fermentation gases



Isobutene

Combination of proven petrochemical modules

- Simple, Robust
- Cost efficient
- Independant from sugar type

Bio-based Isobutene may substitute
part of the 15 million ton/year
fossil-based isobutene global market :

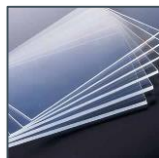
Butyl rubber



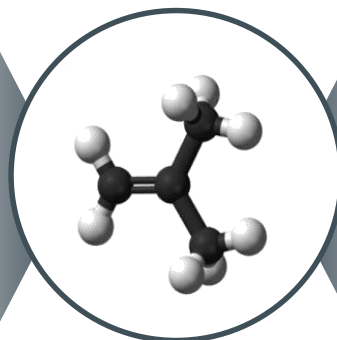
Plastics and
lubricants



Organic glass



Cosmetics



Isobutene



Gasoline

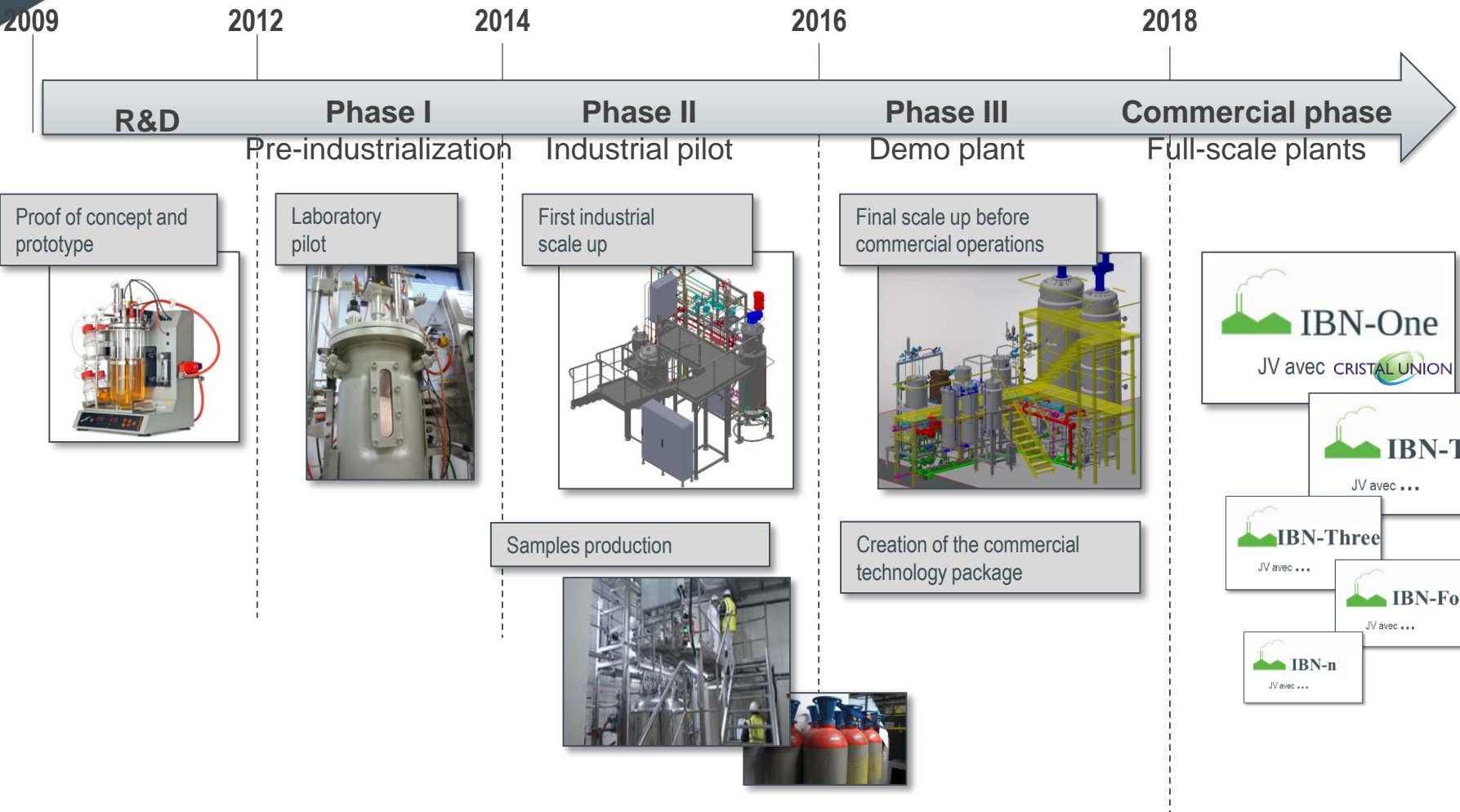


Jet fuel

Market OUTLOOK: in few words

- **SUBSTITUTION to Fossil-based, High-purity grade, ISOBUTENE.**
This fossil grade, currently comes from Cracking units (Fluid catalytic cracking and naphtha crackers) and Propylene oxide production units. High purity grade needs costly purification operations.
- **ON SITE CONVERSION of Bio-based ISOBUTENE .**
Easy conversion to high characteristic gasoline bio-components (isooctene, MTBE/ETBE) or Jet-fuel bio-component (Tri-isobutene & tetra isobutene)
- **SHIPMENT of Bio-based ISOBUTENE, as it is:**
Easy shipment (Logistics same as LPG) to existing Isobutene conversion units (butyl rubber, lubricants, adhesives, sealants, flavors & fragrances and substituted phenols.)

Technological maturity



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