

Alcohol To Jet – SKA  
Full Replacement Bio-Jet Fuel



**FUNDAMENTALS & The FUTURE**

April 23, 2014



# JET FUEL

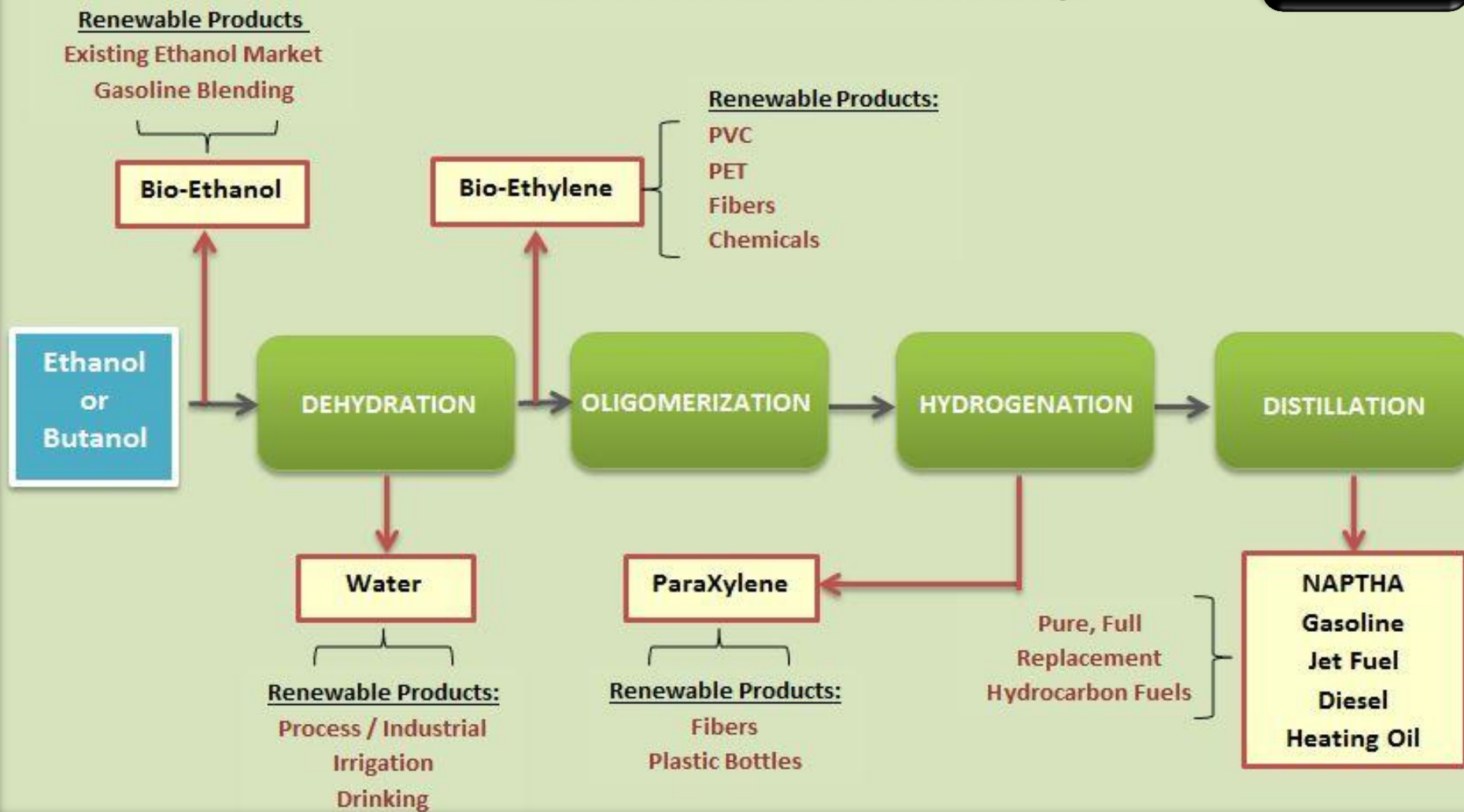
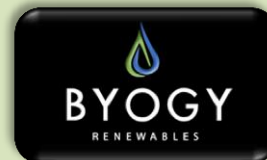
## Basic Definitions

- **JET FUEL** “Standalone” hydrocarbon that can be used in turbine engines
- **BLENDSTOCK** Hydrocarbon product that can “only” be used as an additive to FUEL
- **DROP-IN FUEL** JET FUEL that is the result of “Blending” JET FUEL & BLENDSTOCK
- **REPLACEMENT JET FUEL** Alternative JET FUEL requiring “no blending”

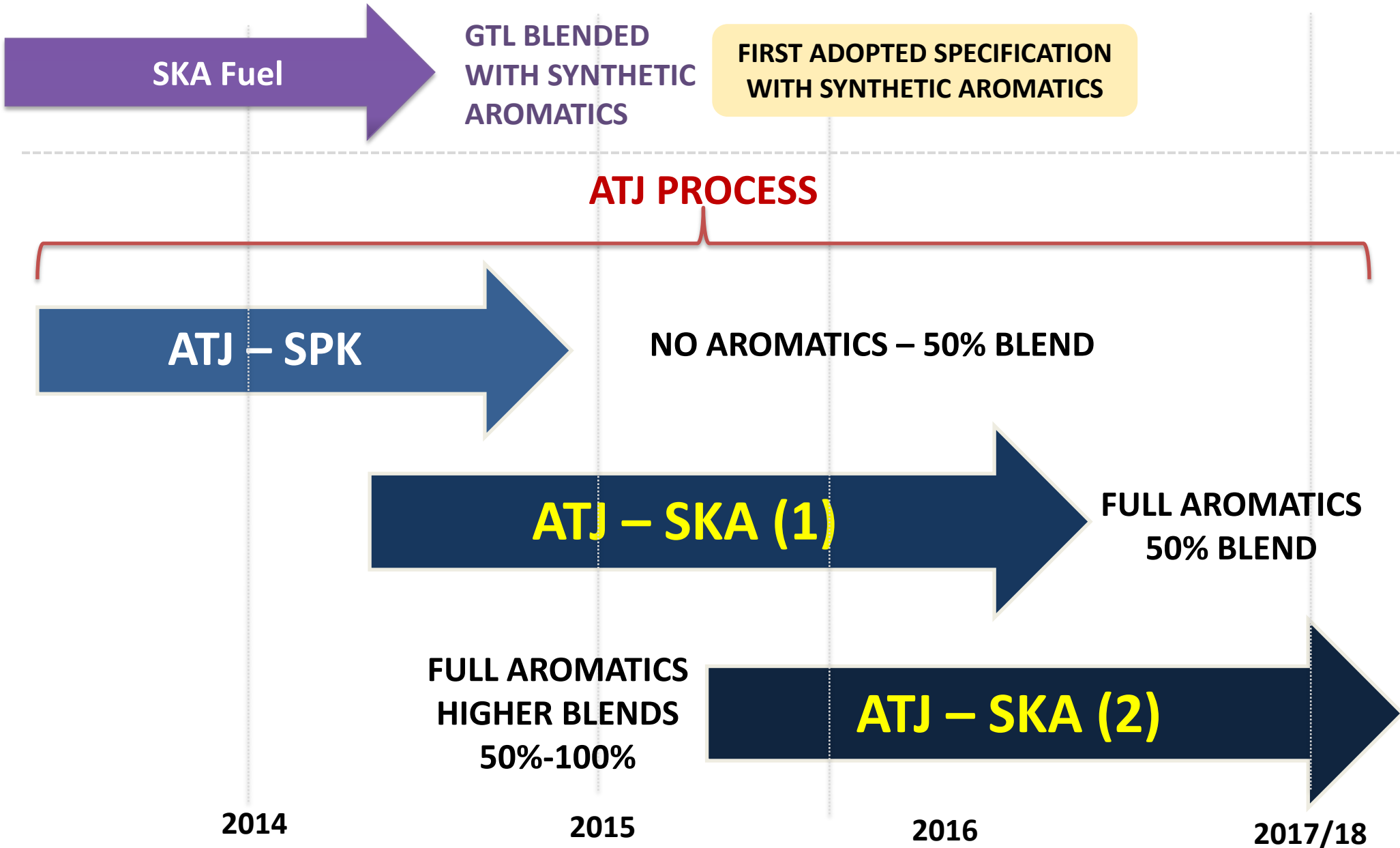
# The Byogy Bio-Refinery Process

*Ethanol To Bio-Fuels and Bio-Chemicals*

*"The Products of a True Bio-Refinery"*



# ASTM : Alcohol To Jet - Timing Projection



# Developing A Renewable Aviation Fuel Industry

## *Primary Drivers To Achieve Scale & Cost*

*Fundamental  
Requirements  
For Any Fuel Industry*

**Scale & Cost**

**Feedstock**

- 70% of the final fuel cost

**Technology**

- **Biological vs. Catalytic**  
*(new vs. known)*

**Fuel Quality**

- **Blendstock Additive vs. Full Fuel**

# The Fundamental Drivers Inherent to the ATJ-SKA

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## FEEDSTOCK

**Existing Mature Global Industry**  
**Sugar Yields & Cost Improving**

## TECHNOLOGY

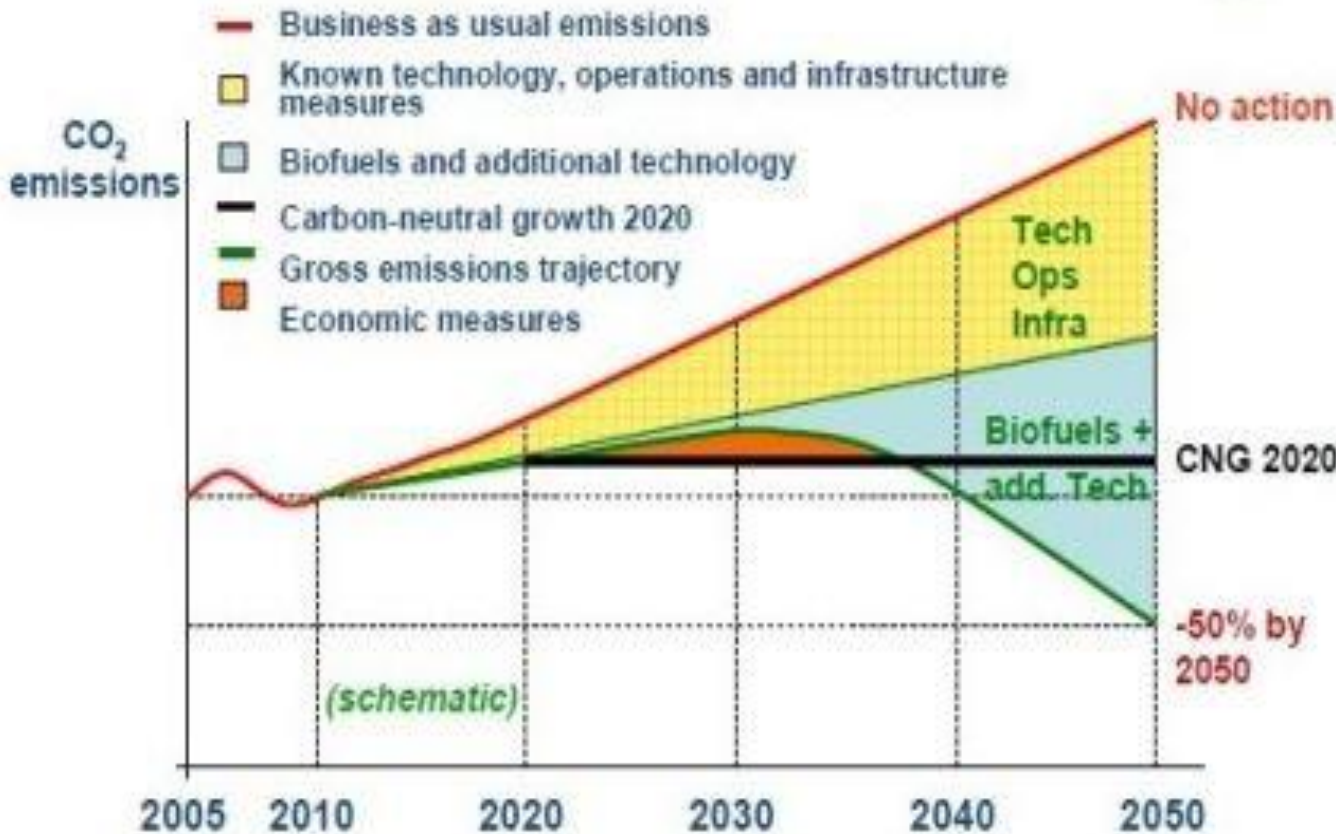
**Proven Catalytic Process, No Synthetic Biology**  
**Low CAPX & OPX**

## FUEL QUALITY

**Full Aromatic & Carbon Distribution**  
**No Change to Any Infrastructure**  
**No Blending Issues**



## Emissions reduction roadmap



*It Will Require High Blends Of Renewable Jet Fuel to Achieve ICAO CNG Mandates*

Improvements to engines, airplanes & Air Traffic Management

Aviation Biofuels are the only solution to achieve CNG goals



# Byogy ATJ-SKA Brazil Initiative



- **ADVANCED FLIGHT TESTING PROGRAM :**

*Flight, engine and systems testing with higher blends and 100% Byogy ATJ-SKA*

AVIANCA SELECTED AB 319/320 with GE CFM 56 ENGINE



- **ENVIRONMENTAL STUDY & REPORT**

*Detailed LCA database for all potential alternative aviation fuels in Brazil to evaluate:*

**Fuel Burn Efficiency** - **Carbon Reduction** - **Maintenance Cost Savings**

*To be provided to ANAC for use in evaluating the ICAO 2050 CNG benefit prior to the ICAO September 2016*

- **ASTM HIGHER BLENDING SPECIFICATION :**

*Supplemental Research Report To ASTM for allowing higher blending ratios; 100% ?*





# **Brazilian Efforts for Aviation Alternative Fuels Development ANAC Initiative**

**Jan. 28 – 29th, 2014**

2014 CAAFI General Meeting

Washington, D.C

ALTERNATIVE JET FUEL  
SUSTAINABILITY  
ANALYSIS LCA FOR  
SUGARCANE  
FEEDSTOCK

- Objective: Foster the development and adoption of locally produced biofuel, **based on existing feedstock sugarcane** by providing precise information regarding the environment benefits of this particular type of renewable biofuel.

ASSESSMENT OF CNG  
NEEDS FOR BRAZILIAN  
AVIATION

- Objective: Provide support for government and industry actions/decisions based on a common goal for renewable bio-jet fuel production within the country.

## BYOGY's ATJ SKA – KEY POINTS

- Using existing Global Ethanol feedstock
  - At the most Competitive Pricing with crude oil
  - No Blending Limitations with petroleum derived fuel
  - Delivering to operators the benefits of
    - Lower fuel consumption
    - Lower engine maintenance cost & higher reliability
    - Significant beneficial environmental impact
- as required under the ICAO CNG-2020 Mandate*