SE4ALL HIGH IMPACT OPPORTUNITY

BIOENERGY

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Enzymes save energy, chemicals and raw materials

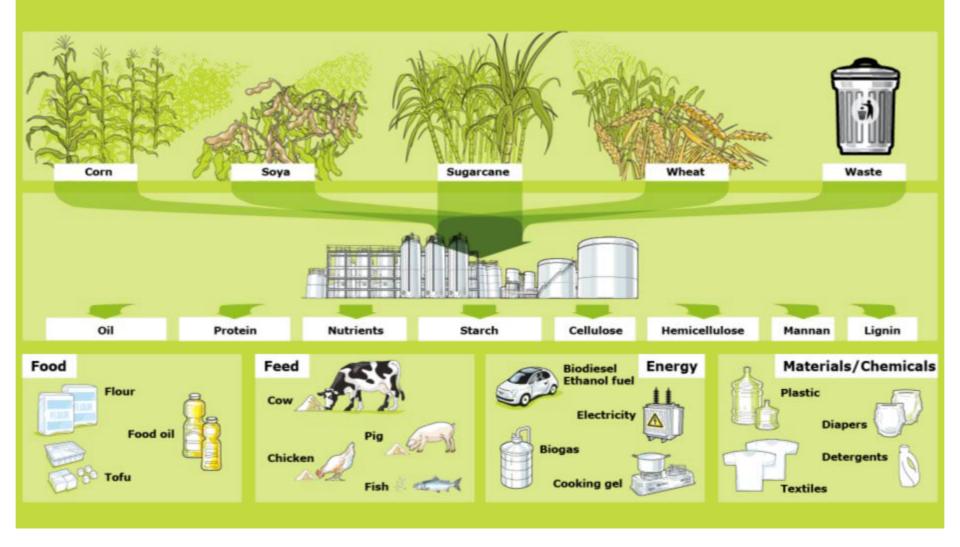


BASED ON INNOVATION:

- 14% of sales re-invested in R&D
- >7000 patents granted or pending
- >1300 employees in R&D (>20%)

HOW A BIOREFINERY WORKS







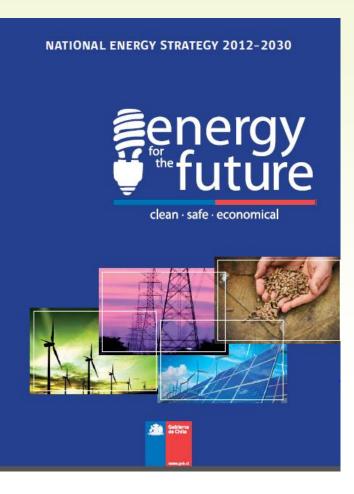
Government, Academia and Private Sector pilot initiatives :

2G - Cellulosic Consortiums

Forestry Industry

- BIOENERCEL
- 3G Algae
- BAL BIOFUELS

COPEC, PETROBRAS, PETROALGAE





ACROSS THE WORLD CELLULOSIC **"2G"** ETHANOL IS FAVORED AS AN ALTERNATIVE TO FOSSIL FUEL

EU

- 10% of renewable fuel in transport by 2020 via Renewable Energy Directive
- The favoring of cellulosic biofuel with double and quadruple counting towards the target pending on feedstock is currently under review

CHINA

- 5 million tons (1.7 bn gallons) of biofuel per year by 2015 mandated via the Bioenergy Five Year Plan
- Target to be doubled by 2020
- Main growth to come from cellulosic biofuel as food based biofuel has been capped

USA

- 22 bn gallons of biofuels per year by 2022 of which 16 bn gallons are expected to be cellulosic
- Mandated via the Renewable Fuel Standard - RFS

INDIA

- Target of 20% biofuel of transportation fuel
 pool by 2017
- Cellulosic biofuel favored as only nonfood feedstock according to the national policy on biofuels

SOUTH EAST ASIA

- Indonesia: E5 to increase gradually to E15 by 2025
- Thailand: Ethanol production target of 9 ML/day in 2022 from 3 ML/day in 2008
- Philippines: E10 to increase to E20 by 2025

BRAZIL

- E18-27 mandate
- Target of doubling EtOH output by 2020 requires significant amounts of cellulosic EtOH

NOVOZYMES CAN CONTRIBUTE TO 2G ETHANOL DEPLOYMENT IN CHILE



