



遠東新世紀股份有限公司

FAR EASTERN NEW CENTURY CORPORATION

ECO Friendly PET

STAVIAN
CHEMICAL

FENC SSP Division

彭清族 Peng, Ching-Tsu July/05. 2012

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Page	Outline
1.	FENC Group & 5 years green mission
2.	What is Polymer & PET
3.	Food grade Recycle PET
4.	Fast Reheat Energy Saving PET
5.	Bio-PET
6.	Sb-Free PET

1-1. Far Eastern Group



Textile & Synthetic Fiber

- 10 Major Sectors
- 224 Subsidiaries
- 9 Public Listed Companies in Taiwan
- 50,000 Employees
- Total Asset over USD 46.6 Billions



Cement & Building Materials



Petrochemicals & Energy



Hotel



Construction



Financial Service



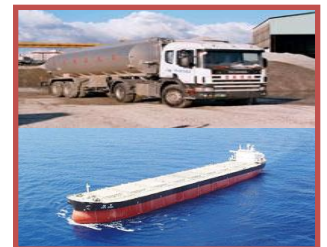
Retails & Department Stores



Communications & Internet



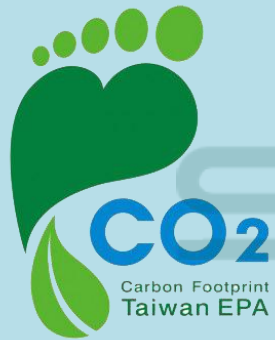
Social Responsibilities



Sea/Land Transportation

1-2. FENC 5 years green mission

Bio-ethanol



Fast reheat



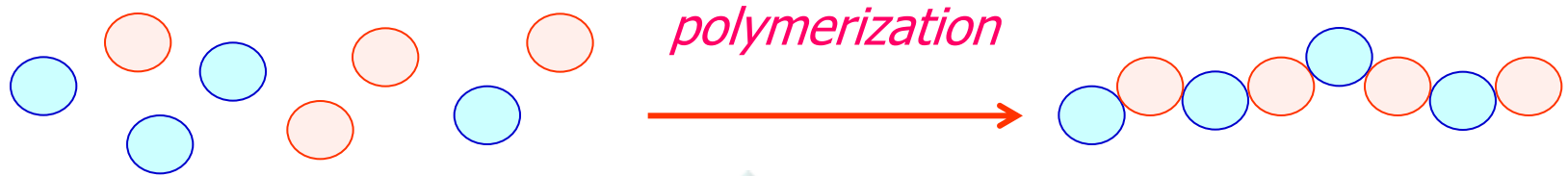
Sb-free PET



Recycle PET



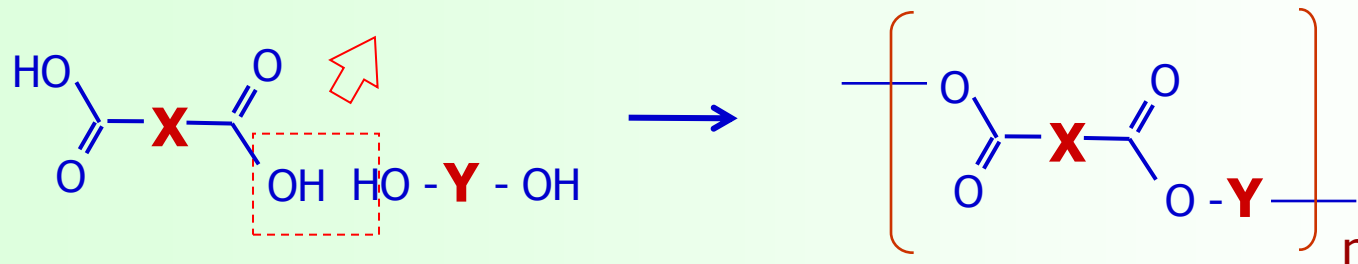
2-1. What is Polymer



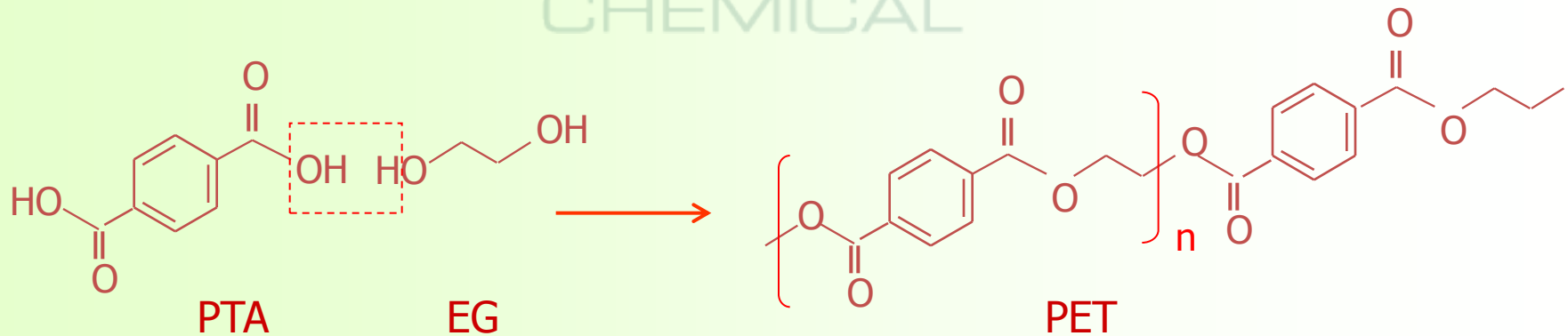
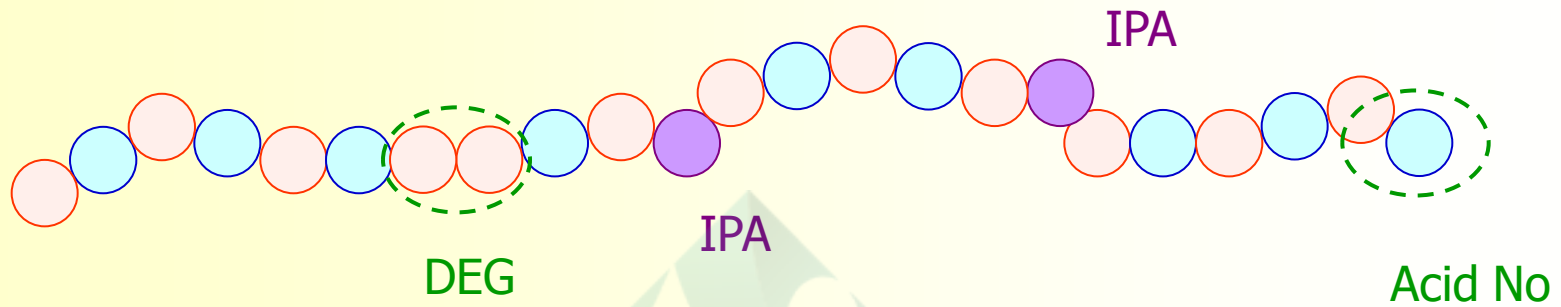
■ Step Polymerization: PE, PP, PVC, PS, PMMA



■ Polycondensation: PET, Nylon, PBT, PC, PEN



2-2. PET : Poly(Ethylene Terephthalate)



3-1. Food Grade rPET: CO2 Emission



PX → PTA
Ethylene → EG



PET → Bottle → Beverage
(0.79)



B2B Recycle (1.4)

(2.86)



DNV

**VERIFICATION STATEMENT OF
PRODUCT LIFE CYCLE GREENHOUSE GAS ASSERTIONS**
Statement No. 00005-2011-CFP-TWN-4
Page 1 of 2

Far Eastern New Century Corporation
Initiate reporting of
**Product Greenhouse Gas Inventory Management Report of
1 Kg Polyester Chip (CB-602R) (2010)**

Scope of Verification
Det Norske Veritas (hereafter "DNV") has been commissioned by Far Eastern New Century Corporation (hereafter "the Company") to perform a verification of the product life cycle greenhouse gas assertion of the Company's Product Life Cycle Greenhouse Gas Inventory Management Report (hereafter "the Inventory Report") with respect to the following product: 1 Kg Polyester Chip (CB-602R), and the data from Far Eastern New Century Corporation : No. 369, Ya Tang Yuan, Wen San Road, Wen San Li, Hsinpi, Hsin Chu County, Taiwan, and the time period is from Sept. 1, 2010 through Dec. 31, 2010.

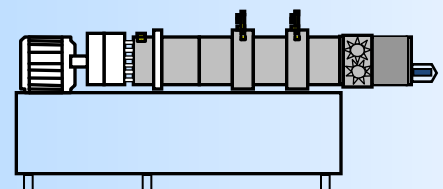
Boundary of Verification
 Business to Consumer Business to Business

Verification Criteria and GHG Programme
The verification was performed on the basis of PAS 2050: 2008 and ISO 14067-1(CD), 2010 given to provide for consistent product life cycle GHG emission identification, calculation, monitoring and reporting.

Verification Statement
It is DNV's opinion that with reasonable assurance the product life cycle greenhouse gas assertion of the Inventory Report of 1 Kg Polyester Chip (CB-602R) (2010), which was published on 1 July, 2011 (Rev. 1), is free from material discrepancies in accordance with PAS 2050: 2008 and ISO 14067-1(CD), 2010.

Clin-Nan Lin
GHG Verifier
August 16, 2011

David Hsieh
District Manager
DNV Certification Taiwan



3-2. FENC Food Grade rPET Products



- Reduce **50%** CO2 Emission.
- Environmental Friendly.
- Commercialize in 2010: **CB-600R/602R/608R**

- ✓ Target quality : **FDA, EU, Danone, Coke, Pepsi, Nike, Adidas...**
- ✓ Recycle technology : **ORD & Buhler recycle process**



Used bottle

Collection

Flake washing

R-Chips

3-3. Food Grade rPET Information



rPET 25-30 % → 50%



rPET 5-10 %(2009) → 20%(2014)



2011 Suntory sold rPET package
2012 April: formal approval of the government

- ✓ Coke(2015): Wt. reduce 7 % 、 Bio 100 % 、 rPET 25%
- ✓ Danone: CO2 Emission ↘ 30 % , Wt Reduce 12 % , rPET 25 ↗ 40%
- ✓ Nestle: rPET 25%
- ✓ Pepsi: Eenergy/Water Fully Renewable, CO2 -50%, Wt Reduce

3-4. EU/US/JP PET Food Grade Spec.

- Virgin PET migration Test: FDA Sec.177-1630 (PET)

f (g)	Water	n- Heptan	Alcohol
Temp.	250 °F	250 °F	120 °F
Time	2 hrs	2 hrs	24 hrs
Conc.	100%	100%	50%
Spec.	<0.5 mg/inch ²		(For 50% Alcohol)

- Recycle PET:
 - ✓ Product: FDA migration Test
 - ✓ Process: Challenge Test

3-5. rPET FDA Challenge test



DEPARTMENT OF HEALTH & HUMAN SERVICES

Public Health Service

- **FDA challenge Test:** Soaking Flake/Resin in different chemical reagents at 40°C for two weeks.
 - Chloroform 10% (Polar/Volatile), Toluene 10%(Non Polar/Volatile), Benzophenone 1%(Polar/Non Volatile), Lindane 1% (Non Polar/Non Volatile), Organometallic (Cu²⁺ 2-Ethylhexanoate) 1%
- **After B2B recycle process:** the residual chemical reagents <220 ppb
- **The residual chemical reagent >220 ppb,** migration test should be
 - Normal: Extraction by 10% Ethanol 30d*40°C < 10 ppb
 - Hot Fill: Extraction by 10% Ethanol (2hr*70 °C +30d*40°C) < 10 ppb

3-6. 中華民國食品器具容器包裝衛生標準

食品器具容器包裝衛生標準

- 第一條 本標準依食品衛生管理法第十條規定訂定之。
- 第二條 塑膠製食品容器及包裝不得回收使用。
- 第三條 食品器具、容器或包裝不得有不良變色、異臭、異味、污染、發霉、含有異物或纖維剝落。
- 第四條 食品器具、容器、包裝應符合下列試驗標準：

食品級回收PET 清潔/去污/純化技術已相當純熟, 歐美先進國家使用多年且已訂定明確法律規範, 確保回收PET流程符合食品包材衛生標準。台灣礙於既有法規, 無法契合環保潮流, 達到節能減碳的最大效益。

3-7. rPET Process(1): Washing line

Cakes 瓶磚



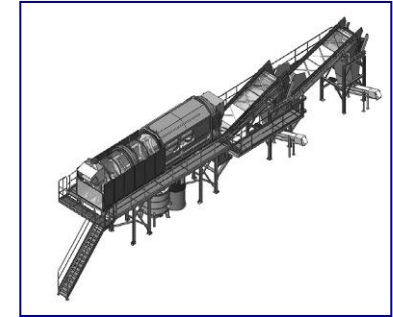
Cakes Feeding



Debaling



Hot Prewashing



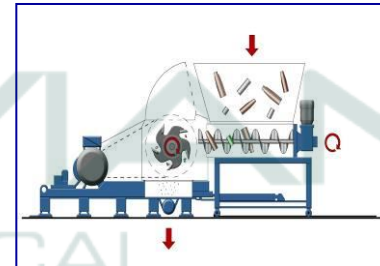
Auto Sorting



Manual Sorting



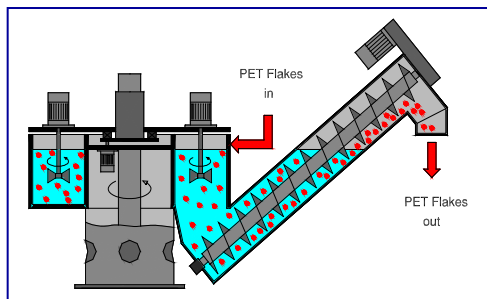
Granulator



Metal Detector



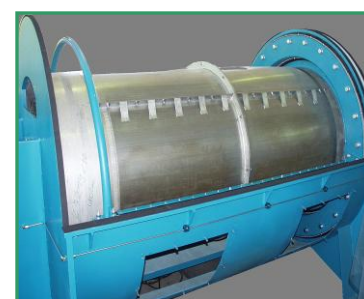
Turbo Washing



Friction Washing



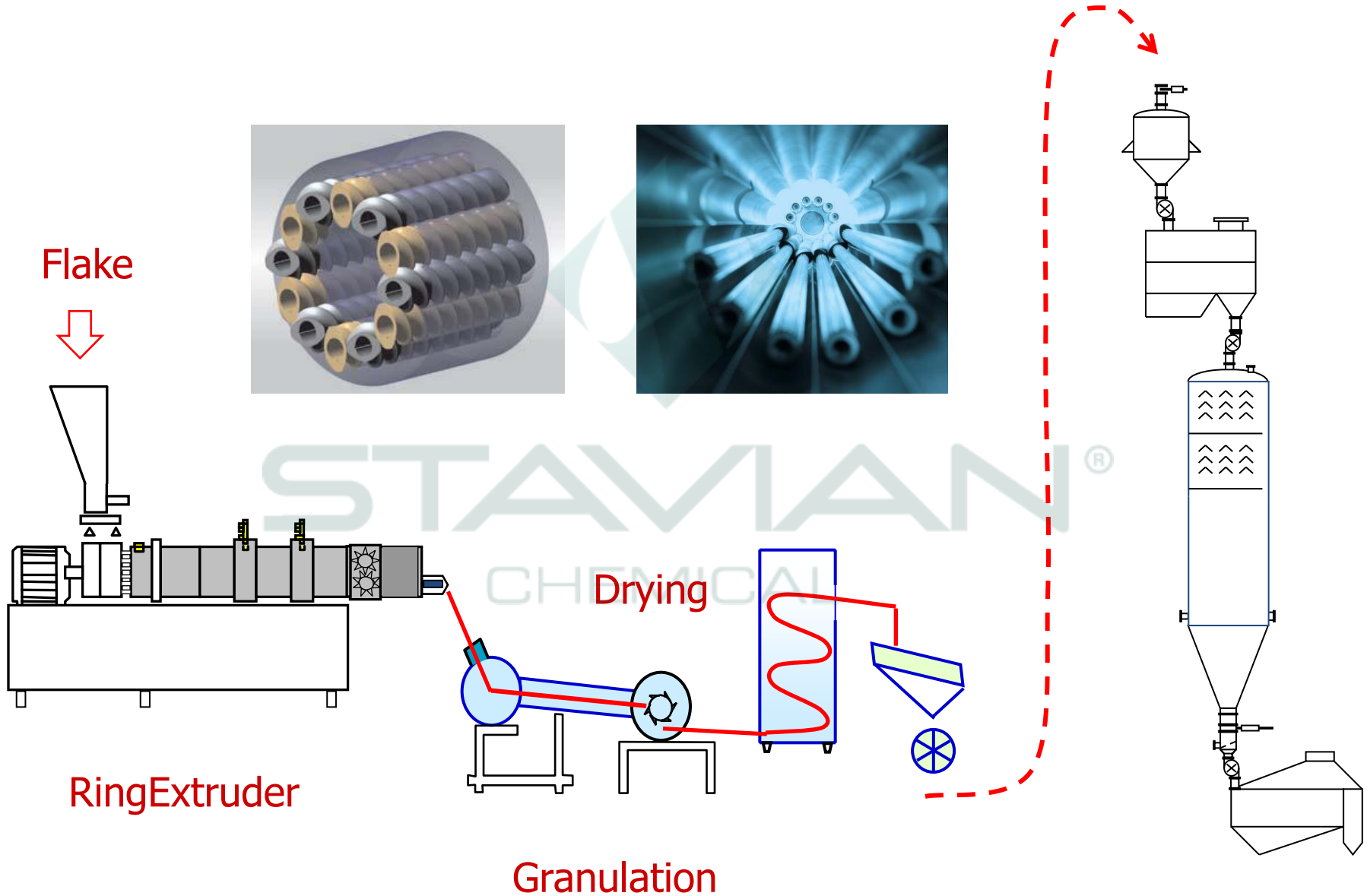
Centrifuge



Floating separation



3-8. rPET Process(2): Purify Technology



3-9. FENC rPET Certificates & customers



DEPARTMENT OF HEALTH & HUMAN SERVICES

Public Health Service

Food and Drug Administration
5100 Paint Branch Parkway
College Park, MD 20740

November 2, 2010

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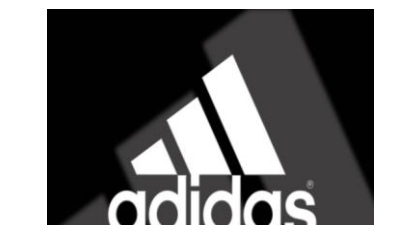
Re: Prenotification Consultation (PNC) 982

Dear Mr. Peng and Mr. Tsai:

This letter is in response to your electronic submission of September 27, 2010 (PNC 982), requesting an opinion letter on the regulatory status of your post-consumer recycled polyethylene terephthalate (PCR-PET) material (referred to as CB-602R) for use at levels up to 100% recycled content in the manufacture of PET containers in contact with food containing not more than 50% ethanol by volume. The PCR-PET is also intended use as components in manufacture of water bottles, soft-drink bottles and heat-resistance bottles (hot-fill or Condition of Use C, as described in [Table 2](#), which can be accessed from the Internet in the Ingredients and Packaging section under the Food topic of www.fda.gov.)

You indicated that you have obtained a sublicense agreement in 2009 with Buehler AG for adopting your Bottle-to-Bottle super clean recycling process that is identical to the Buehler's process we have previously reviewed and issued a letter of no objection dated June 13, 2001. You stated that there are a set of complete recycling system and quality control system for flakes in your washing plant and all finished PCR-PET material must meet with the flake specifications Buehler provided. Based on a large trial production you performed in July 2010, you indicated that both recycling process and finished PCR-PET material meet the Buehler's specifications. You submitted for our review a copy of the letter of no objection letter, along with a flow sheet of CB-602R (for your recycling process), the Buehler process we previously reviewed, and a design basis for the Buehler process (with respect to production capacity and specifications of the finished recycled material). You also submitted the results of end tests for CB-602R material that show your recycled material meets the specifications as described in 21 CFR 177.1630(f) and (g) applied to virgin PET intended use in contact with food and alcoholic beverages that do not exceed 50% alcohol content by volume. You stated in your September 27, 2010 email that the difference between CB-602R (PNC 982) and CB-608R (PNC 983) is only the retention time in the reactor of solid state polymerization (SSP) process that yields different IV values.

We have previously reviewed the Buehler's recycling process and concluded that it is effective in reducing potential contaminants from PCR-PET to levels that result in dietary concentrations not to



4-1. Fast Reheat PET



- Energy Saving up to **30%** on Blowing Machine
- Maximize Blowing Machine Capacity/Output
- Improve Light Weight Bottle Performance

1st generation Traditional Fast Reheat

CB624 IV: 0.72(Aseptic)

CB612 IV: 0.845(CSD)

CB616 IV: 0.830(HR)

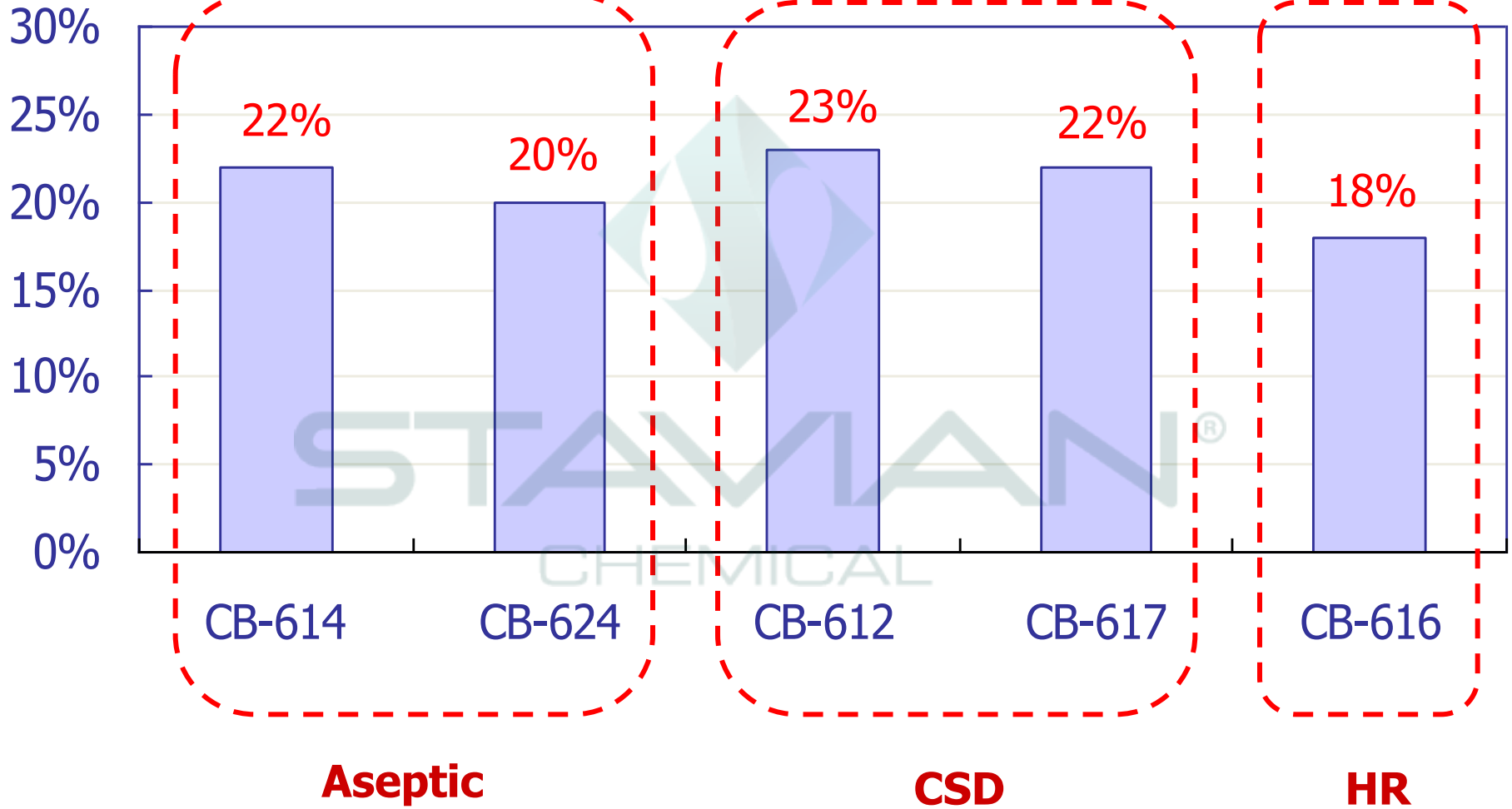
2nd generation Clear Fast Reheat[®]

CB614 IV: 0.80(CSD)

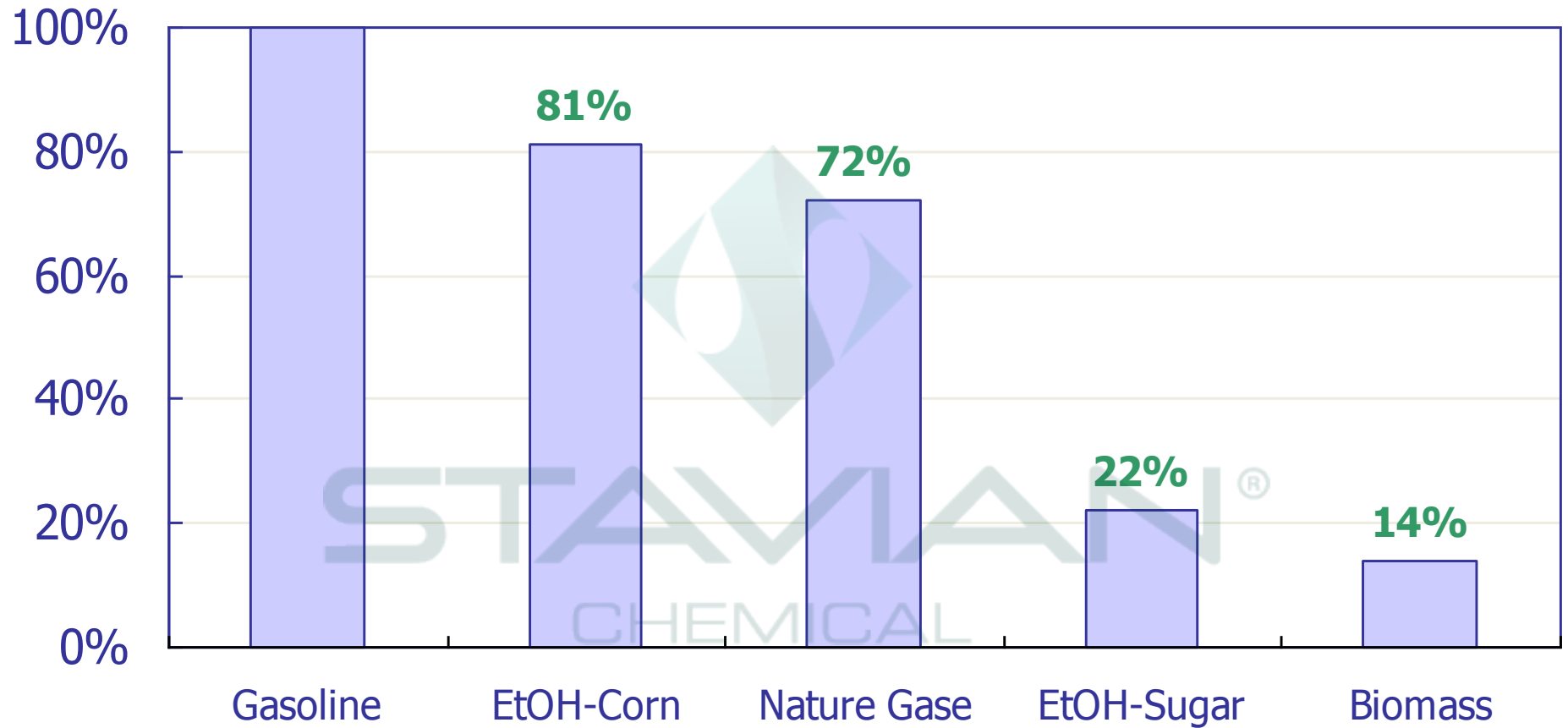
CB617 IV: 0.85(Aseptic/CSD)



4-2. Energy Saving Comparison



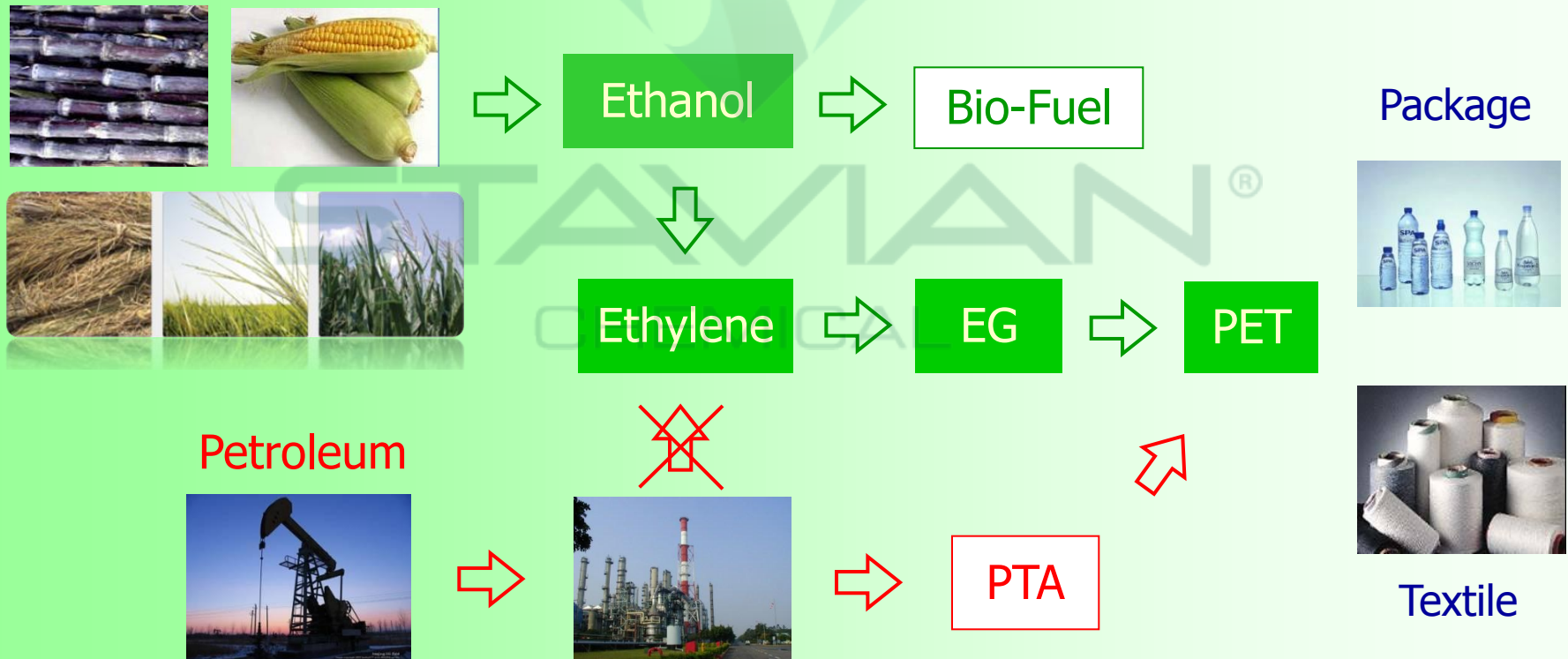
5-1. Cellulose Fuel: CO2 Emission



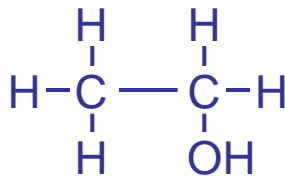
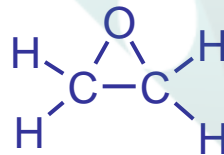
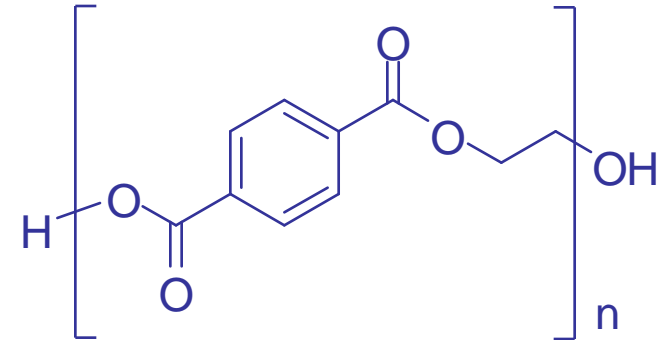
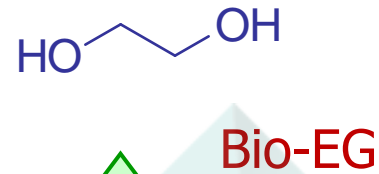
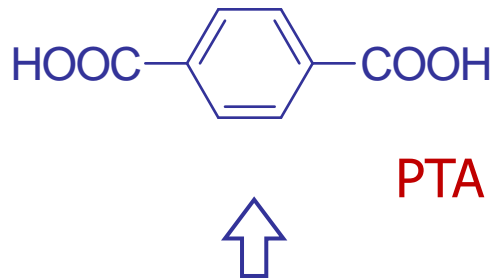
5-2. Bio-PET Process

**Agricultural wastes &
Non-food plants**

- Reduce of Petro Base MEG
- Reduce 30% Carbon Dioxide Emission
- FENC Commercial product in 2010

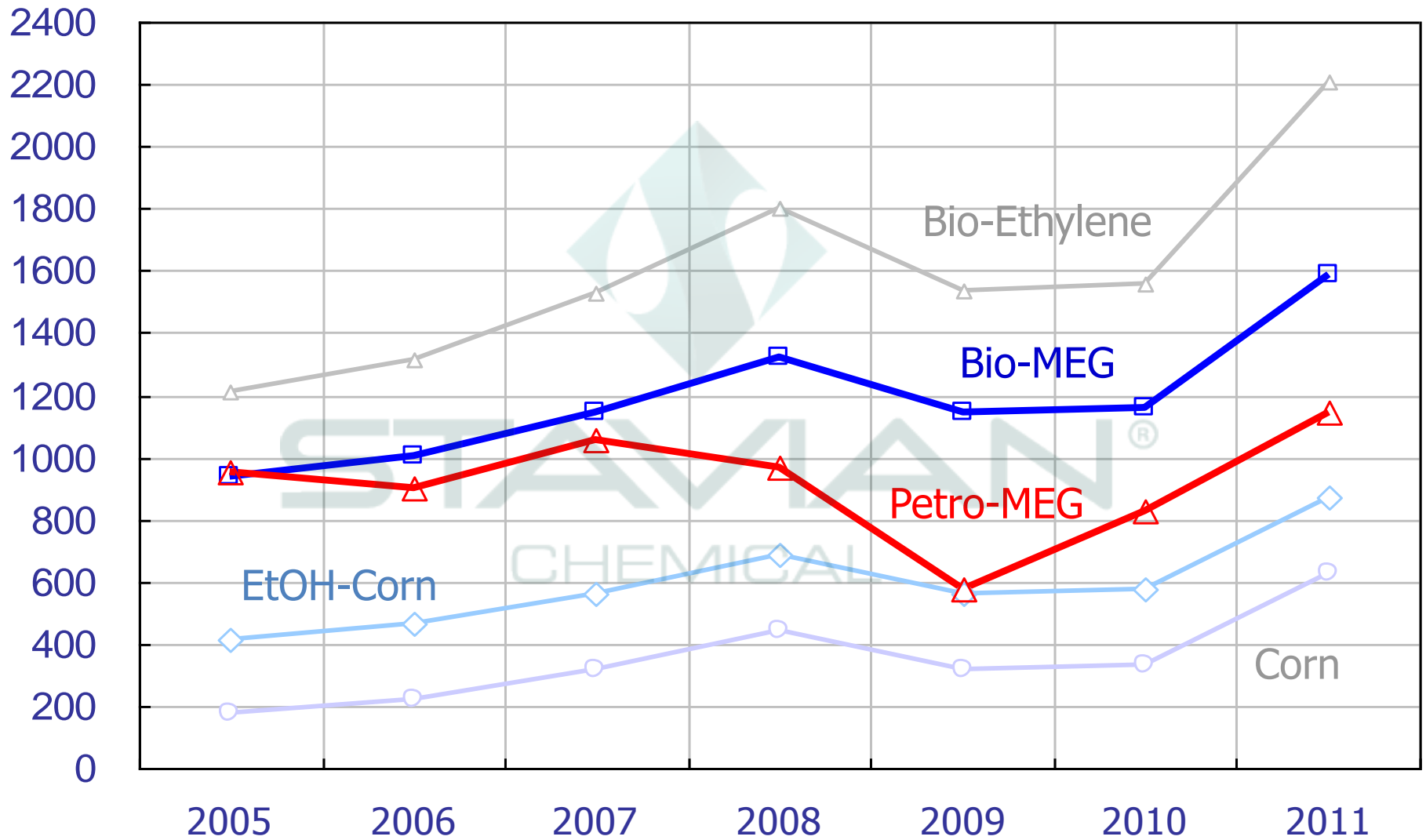


5-3. Cellulose-Based Bio-MEG/PET



5-4. Bio-MEG Market Price simulation

(US/T)



6-1. Sb-free PET: Biocompatible, Nontoxic

Titanium catalyst

CB-621 IV: 0.75 (HR)

CB-622 IV: 0.73 (Aseptic)

CB-624 IV: 0.72 (Aseptic)

Biocompatible
& Nontoxic

Germanium catalyst

CB-651G IV: 0.73 (HR)

