



Huvis

JV of **SK** chemicals & samyang

 Huvis creates Eco&Green

Eco-friendly recycled polyester


Ecoever™



**Why we need
Eco-Products ?**

1. Social Issues in Environment



● Global Warming

- Ecological adaptation
- Acceleration of melting Iceberg in North/South Pole.
 - Lead to sink the islands in some Area.

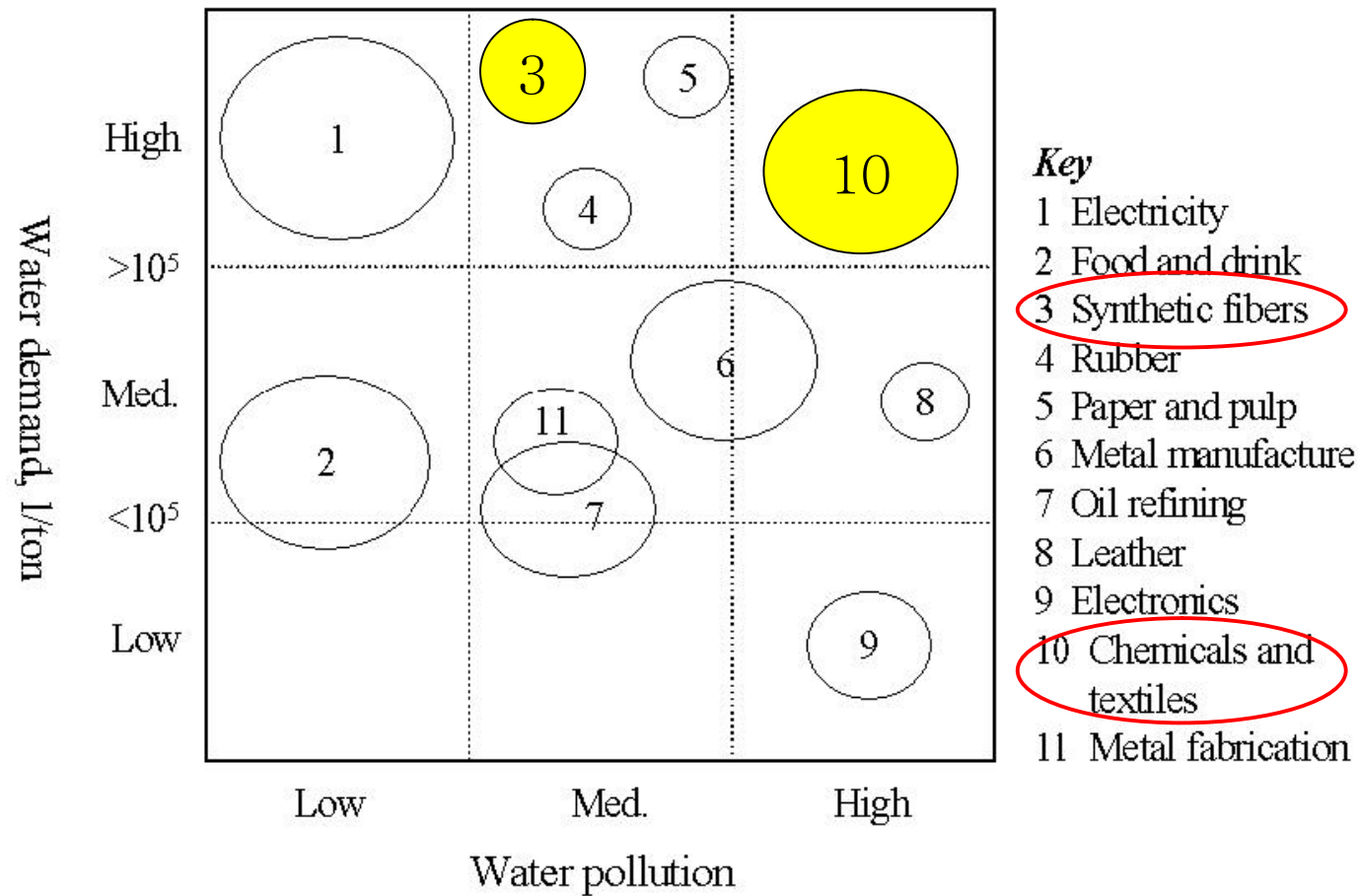
● Exhaustion of Natural Resources

- Coming Crisis because of Natural Resources' exhaustion
- Increasing Dispute between Countries against Resources.
 - Increasing Development of Sustainable Energy,
Development of Recycle products.

● Limitation of Landfill Area / Caution of Second-order Pollution

- Disposing of trash, particularly industrial waste, is growing more difficult because of the lack of landfills.
- Increasing Non-Degradable Trash based on Chemical products
 - Increasing Second-order Pollution.

2. Environmental Pollution in Industry



3. Why we need Eco-products



● Environmental preservation : Green policy

- Recycling of non-degradable Oil based Chemical Product
- Saving ground of waste landfill
- Reducing CO₂ from Burning or Making products
 - Saving the Iceberg from melting because of global warming

● Conservation of natural resources

- Sustainable Products by Recycling post-consumer Products
 - Reduce the total consumption of Natural resources for those products.
- Energy Saving by Short process (from Oil to Polyester Raw Material)

● Social Responsibility

- Keep the promise for hand-over of the clean earth to our children.
- Keep the promise of Eco-Friendly Cooperation

4. Eco-Products in Textile Industry



Recycle Fiber : Polyester, NYLON



Bio-Degradable Fiber : PLA, Bean, Bamboo etc.



Natural Fiber : Organic Cotton, Hemp, etc.

Huvis produce Recycled Polyester(Ecoever), PLA(Ingeo) as Eco-friendly products.

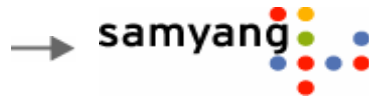
5. Eco-friendly Products in Huvis



Resources



Recycled Polyester



PLA

→ Nature Works



PDO

→ DuPont™

Biz. Alliance



Products

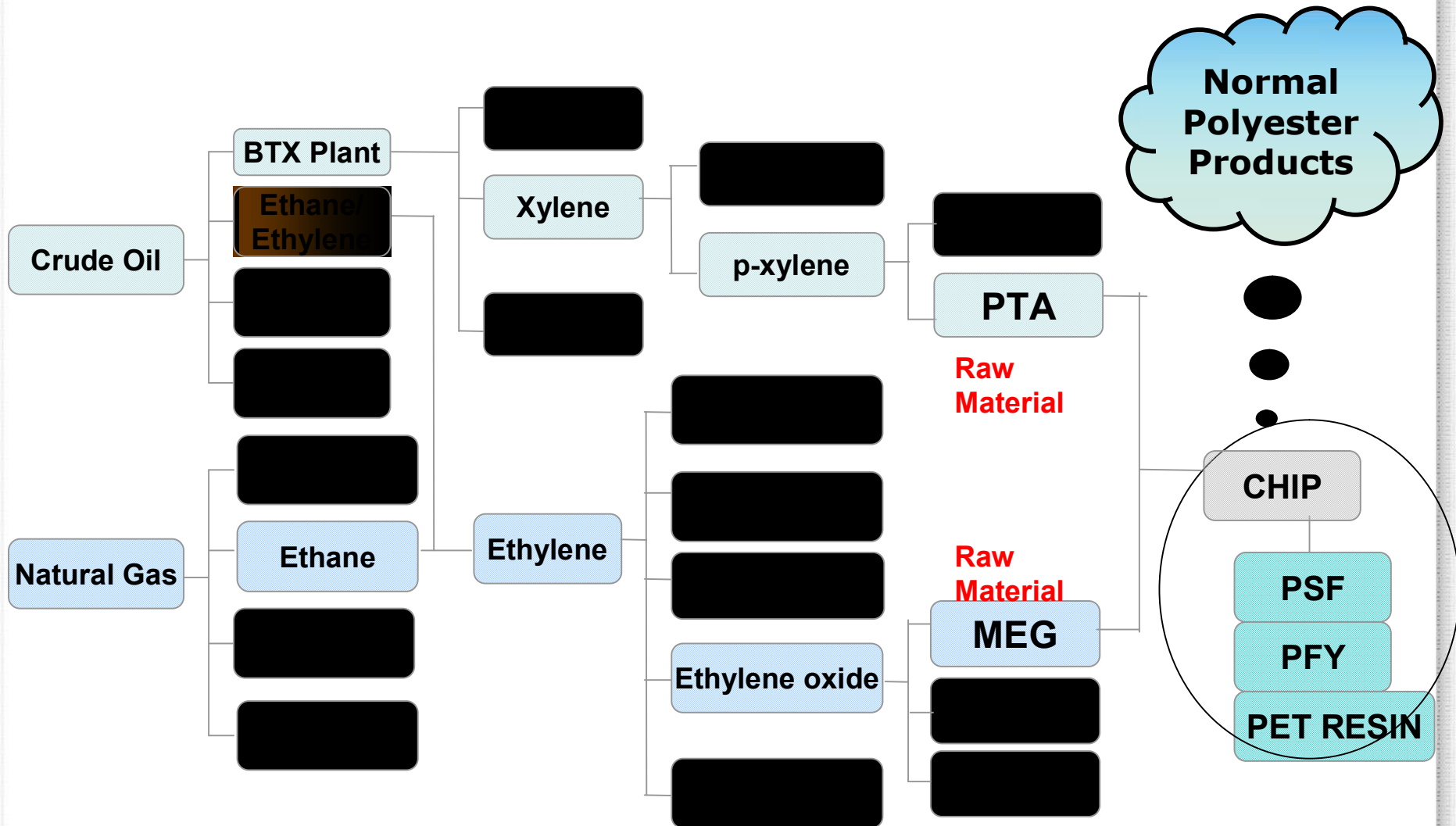


Huvis produce various Eco-friendly products by sourced materials from cooperated high technologied global comapny.

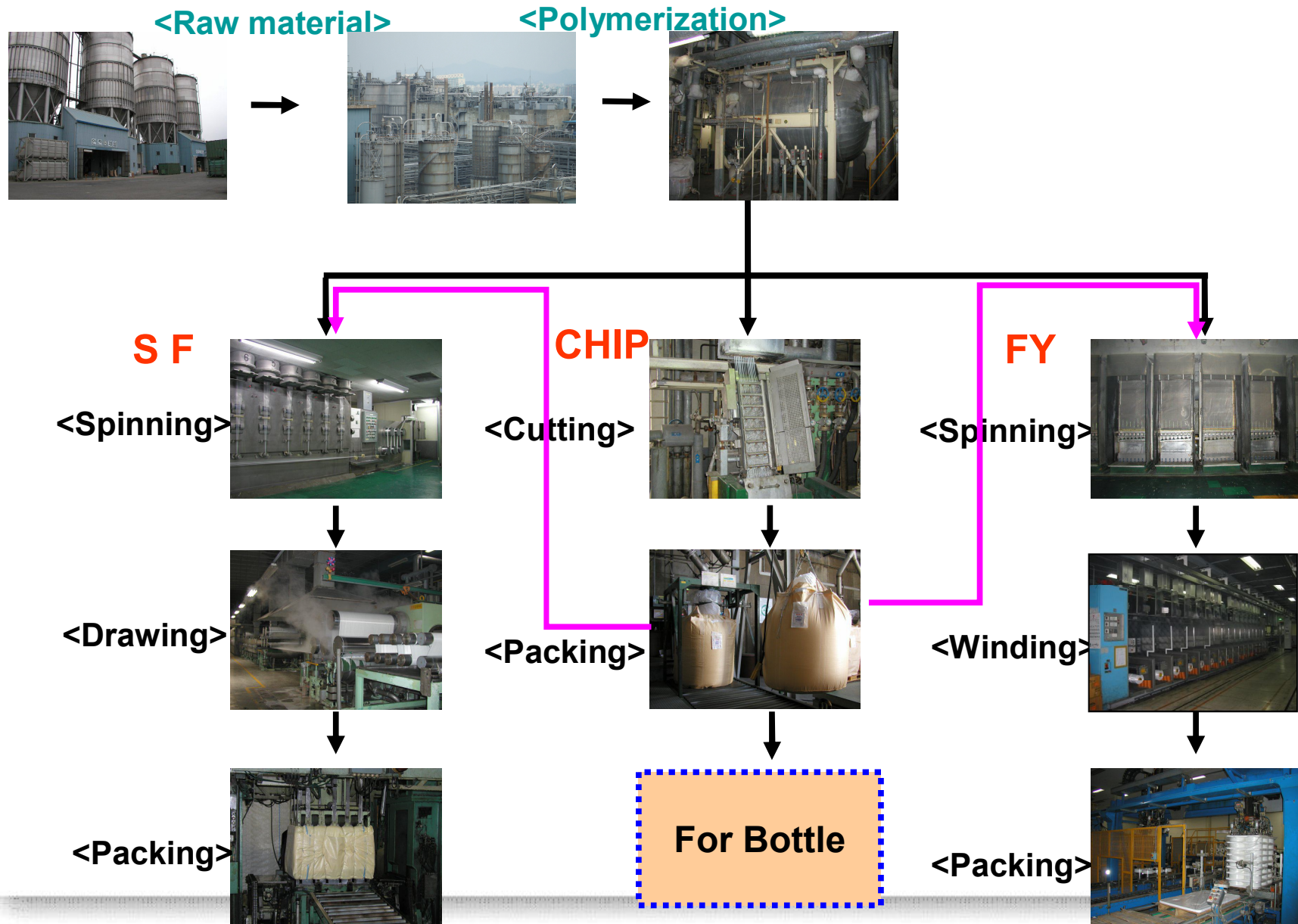


Recycling Polyester

1. Manufacturing Process from Crude Oil



2. Process Overview for Polyester products



3. Recycle Method in Polyester

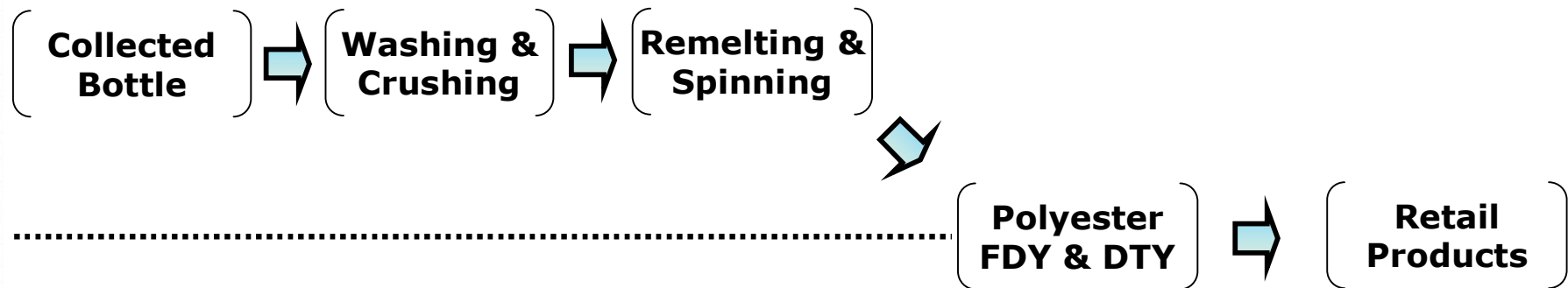
Method	Main Features
Thermal Recycle	<ul style="list-style-type: none">✓ Recovery into Combustion Energy✓ Merit in Economical Efficiency✓ Demerit in Air Pollution Aspect
Material Recycle	<ul style="list-style-type: none">✓ Recovery into Polymer Products✓ Merit in Energy consumption✓ Demerit in limitation of product specification
Chemical Recycle	<ul style="list-style-type: none">✓ Recovery into Raw Material✓ Merit in almost same Quality of Virgin's✓ Demerit in Economical Efficiency

3. Overview of Material and Chemical Recycle

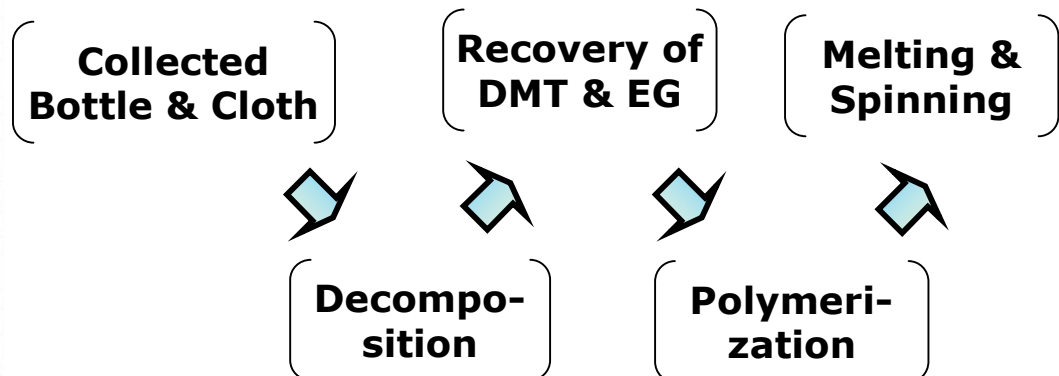


1) Manufacturing Process Flow

Material Recycle



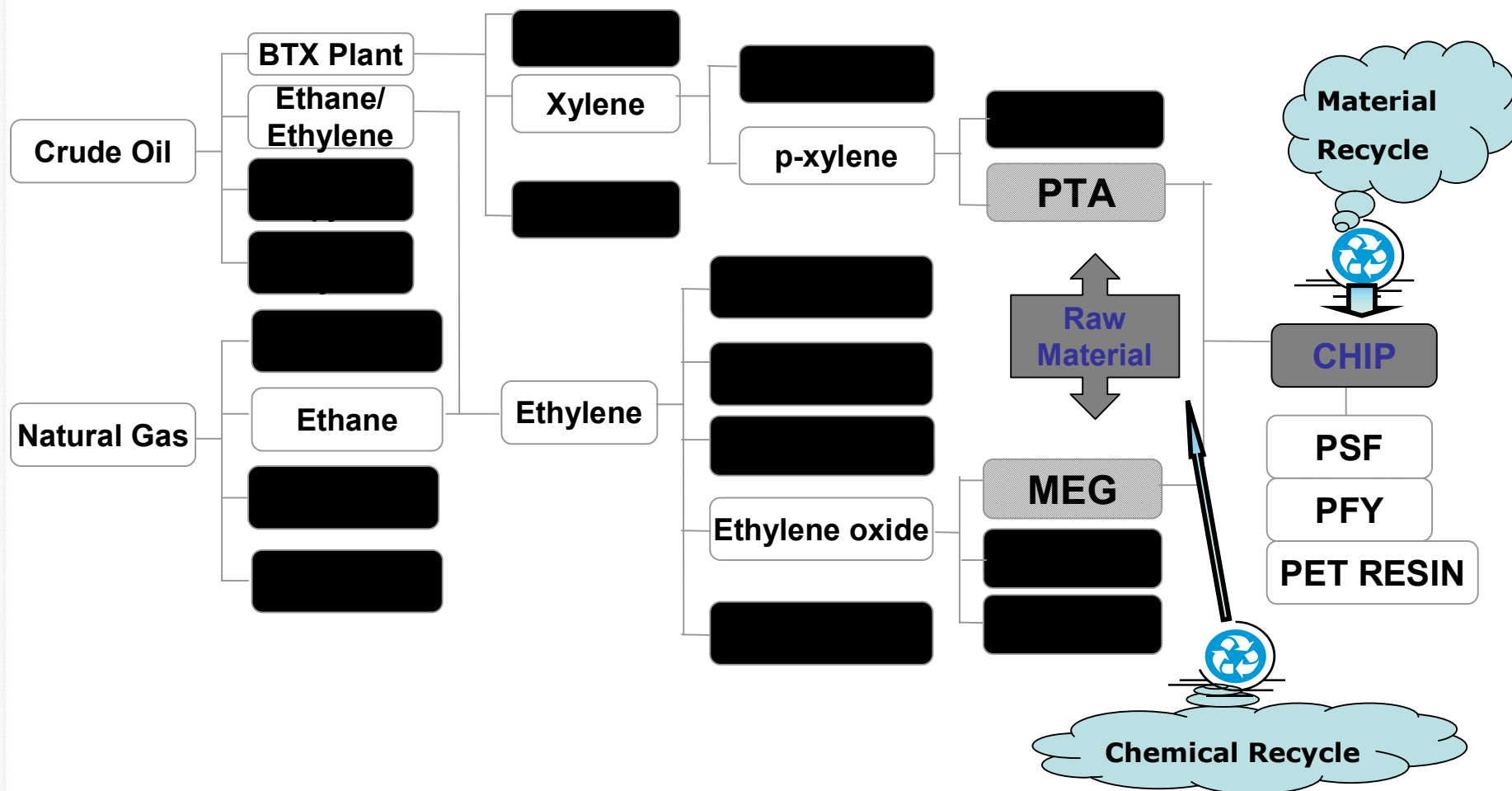
Chemical Recycle



2) Main Features

ITEM	MATERIAL RECYCLE	CHEMICAL RECYCLE
Recourses	Post Consumer : PET Bottle	Post Consumer : PET Bottle, Cloth Pre Consumer : Waste or Spec-out products
Recovery Process	Based on <u>Re-melting process</u>	Based on <u>Decomposition and Repolymerization Process</u>
Merit	<ul style="list-style-type: none"> ➤ Simple Recovery Process ➤ Low Recovery Cost <ul style="list-style-type: none"> ➔ Simple Facility and Low Energy consumption 	<ul style="list-style-type: none"> ➤ Achievable High Purity ➤ Versatility of Polymer specifications <ul style="list-style-type: none"> ➔ Cat. Dye, Full-dull etc.
Demerit	<ul style="list-style-type: none"> ➤ Limited Polymer and Products specifications ➤ Not perfect in Quality <ul style="list-style-type: none"> ➔ Yellowish, Strength etc. 	<ul style="list-style-type: none"> ➤ Complex Decomposition Plant ➤ High Recovery Cost <ul style="list-style-type: none"> ➔ High Energy consumption

3) Products as the results of Recycle process



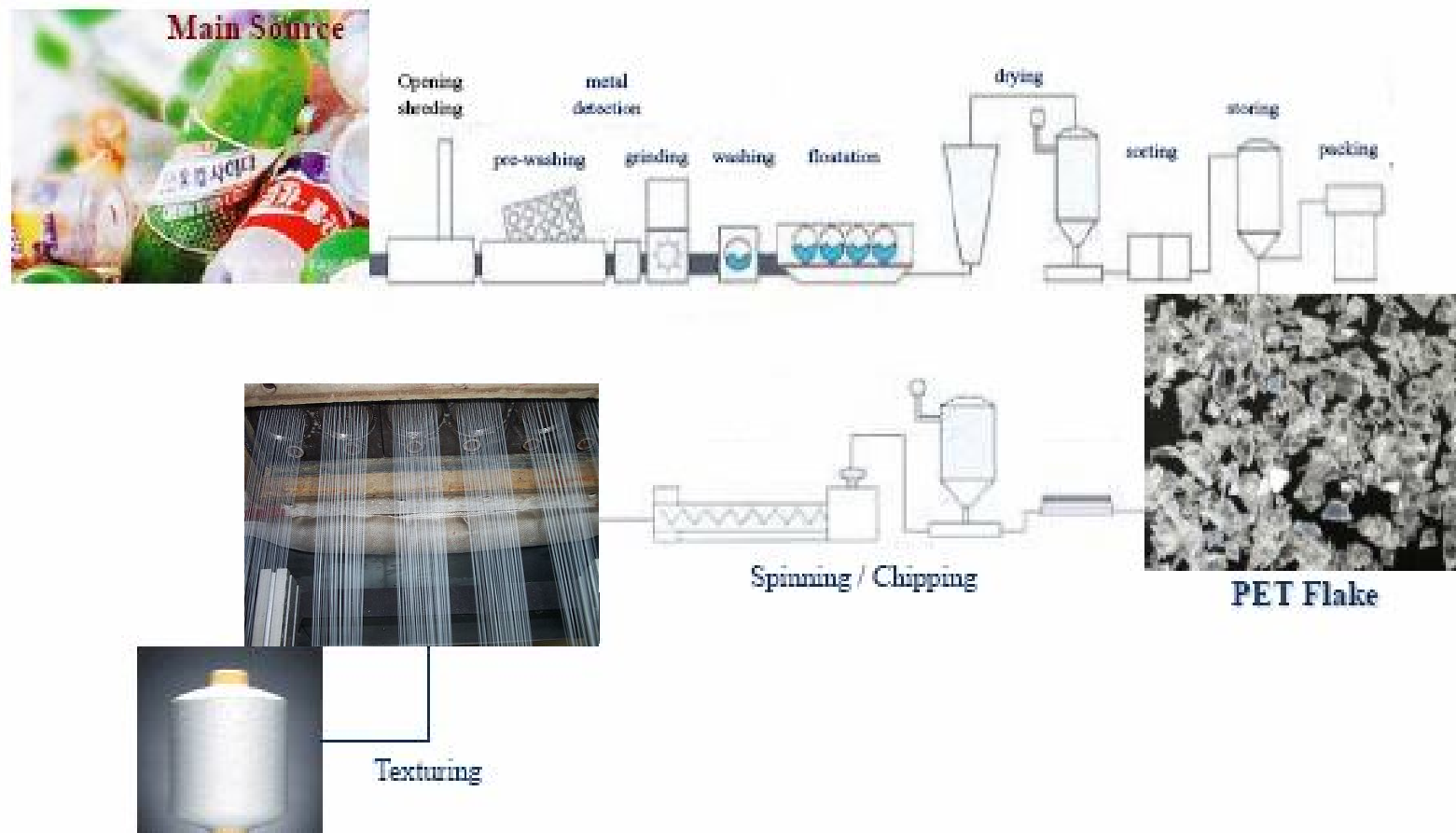


Huvis Recycle Products



1. Peculiarity of Huvis Recycle Process

- 1) Huvis Process is based on "Material Recycle process" using Collected PET Bottle (Post Consumed Source Only).



2) **Huvis Process is based on Collaborated process with highly specialized Company in their Business Area.**

- ➔ **Stable supplying collected Bottle**
- ➔ **Highly skilled Quality management**



Certified by ISO 9001
ISO 14001

Huvis

Certified by ISO 9001
ISO 14001

3) Huvis process can guarantee with High purity from Collected bottle to Recycled products, and can manage for having stable yarn properties and evenness.

→ No Mixture of Virgin Chip

→ Use and Manage “Qualified Grade only” from collected Bottle.

4) Huvis can serve the customer with high-functional and versatile Products.

→ Functional products including Odd Cross-section

→ Versatile specifications from POY to DTY

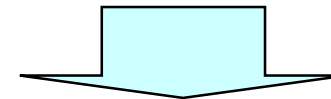
Post Consumed Bottle → Flake



**Recollected
Bottles**



Sorting out



PET Flake



Washing

Flake → Pellet



Pellet → Yarn



1. Yarn Type : POY, FDY, DTY

2. Specifications

1) 0.7 d/f Grade : 50d/72f

2) 1.0 d/f Grade : 75d/72f, 150d/144f

3) over 2.0 d/f Grade : 75d/36f, 150d/48f

3. Functional : Moisture-control, Anti-Microbial etc.

2. Products Specifications



1) 1d/f grade : 50d/48f, 75d/72f, 150d/144f

→ Type : Filament and Textured Yarn

→ Application : High Density Fabric, Soft Hand Feel



2) Normal Grade : 50d/36f, 75d/36f, 150d/48f, 300d/96f

<Hangtag>

→ Type : Filament and Textured Yarn

→ Application : Warp for woven fabric,
Fabric for Shoes or Backpack

3) Function Grade : 50d/72f, 75d/36f, 150d/48f, 150d/72f

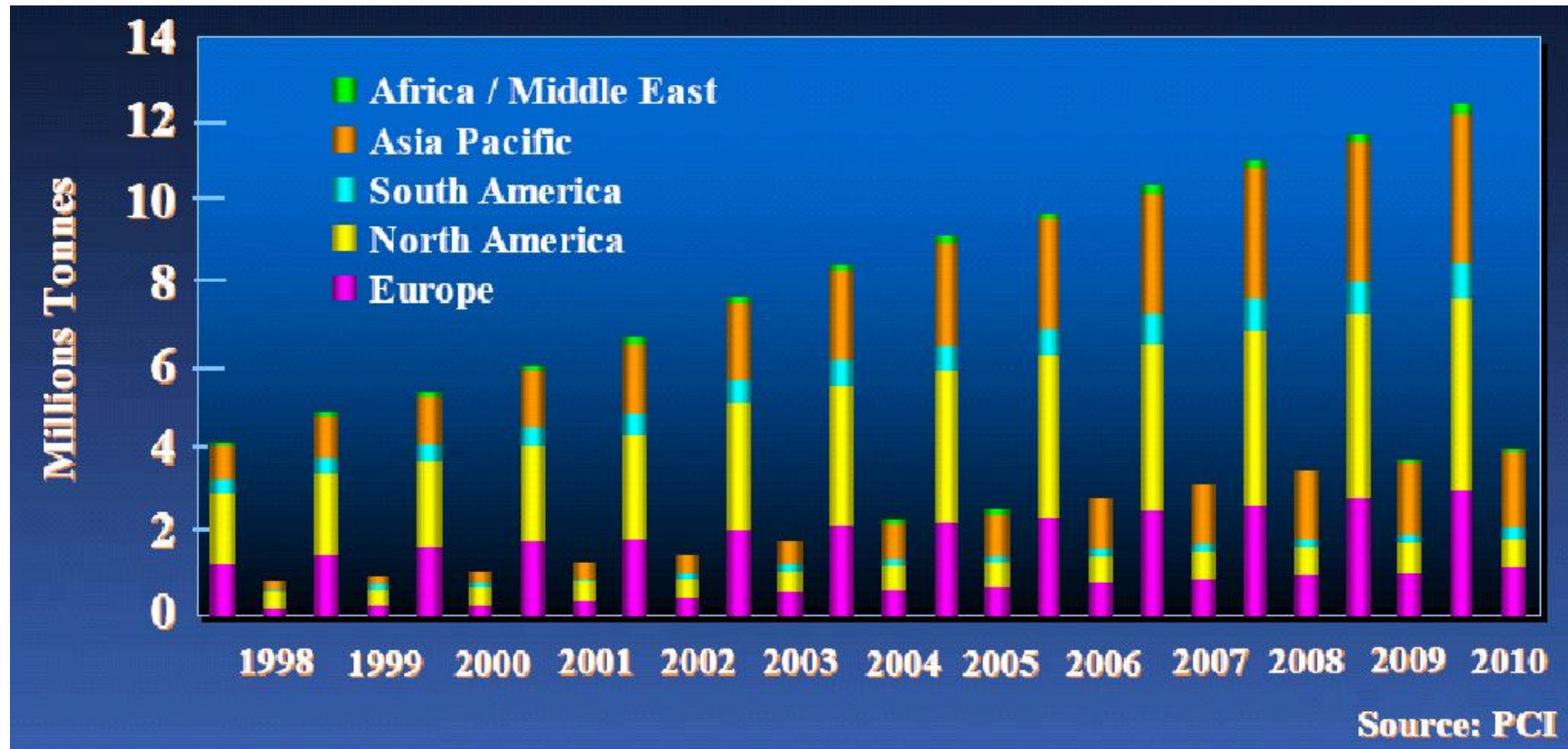
→ Type : Filament and Textured Yarn

→ Functional : Moisture-control, Anti-microbial etc.
Micro-Soft touch

→ Application : Outdoor / Active Sports, Casual etc.

END OF DOCUMENTS

PET BOTTLE CONSUMPTION



● PET BOTTLE 소비량 : 1.0 million tons in 2007

⇒ 28% Collection rate in 2007

● PET 소각시 발생 CO₂ : 2.3 million tons CO₂ in 2007