API Applicazioni Plastiche Industriali Spa
Carlo Brunetti

ECO-INNOVATION & SUSTAINABILITY:
BIOPLASTICS & LCA

GREEN STAR
GREEN skills for enterprises Sustainable
Training for Automotive suppliers clusteR

VENICE 21 September 2015

CONFINDUSTRIA
Veneto SIAV Spa

GREEN STAR
GREEN skills for enterprises Sustainable Training for Automotive suppliers clusteR

API

Action Plan

Activities	Time Frame (complete by)	Person Responsible	Company dept. involved
Definition of the goal and technical elements of the LCA project	Within Oct. 2014	Brunetti/Meneghetti	Innovation, R&D
Assignment to CVR the LCA project. Information and technology sharing with CVR: mapping of the process and products	Within Nov. 2014	CVR/ Cocco/Seragio/Zanella/ Busnardo	Logistic s , Quality, Lab.Testing, Production,
Information and technology sharing with a selected API Customer (Sustainability, Production, Logistics and Design Offices): mapping of the process and products	Within Nov. 2014	Busa/Meneghetti	Sales, R&D
Information sharing with CVR: customer facts and needs	Within Nov. 2014	Busa/Meneghetti	Business Unit Footware, Sales, R&D
CVR LCA analysis: • guidelines for conducting an LCA within the series ISO 14040 and 14044 - Dec. 2014/Jan. 2015	Dec. 2014/Jan. 2015	CVR	VENEZIA RICERCHE
Meeting with CVR and Quality/Business/Marketing Offices to learn the final measured results	Within Apr. 2015	Busa/Meneghetti/Zanetti/ Seragio/Tadolini	Business Unit Footware, R&D, Marketing, Quality, Sales
Meeting with the Customer and the Business Office to present and understand the final results (decision-making step)	Within May 2015	Busa/Meneghetti	Sales, R&D

- **API SpA** has been working in the research, development and production of customized thermoplastic compounds and elastomers since 1956.
- 115 employees, € 48 mln. of turnover, 45% Export

- The company is located in northern Italy.

  Bassano del Grappa,

  (70 Km from Venice)

Main areas of business

API's main activities are Research, Development and Production of sustainable plastic materials for innovative applications

PRODUCT RANGE

- TPE
- TPU - PU
- MASTER-BATCHES
- BIOPLASTICS

API is the Italian market leader in compounding of thermoplastic materials on the **specific requirements** of the client, based on Elastomers, Polyurethanes and Bioplastics

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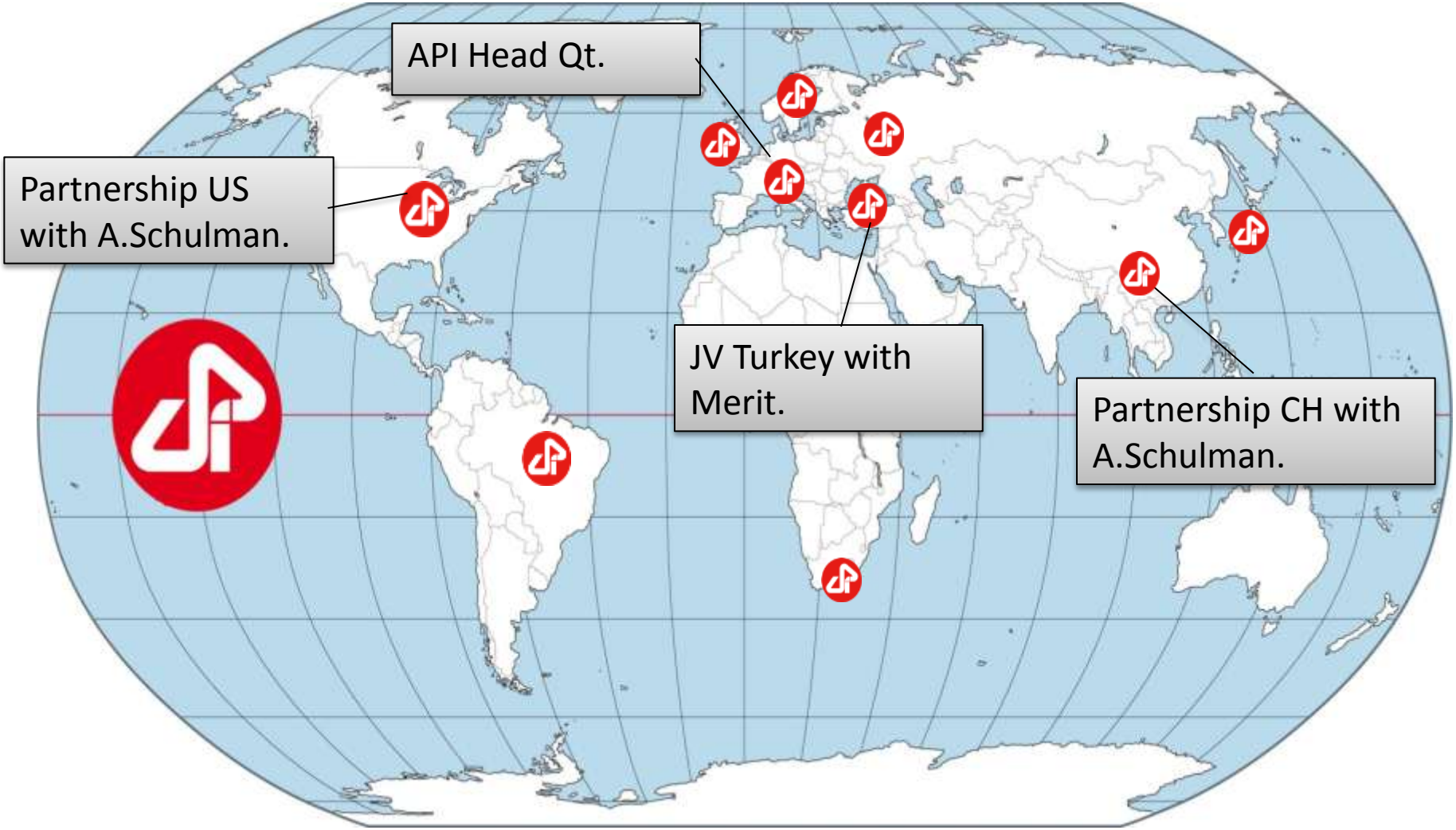
Global presence & production footprint

API production footprint



QUALITY, ENVIROMENTAND SAFETY

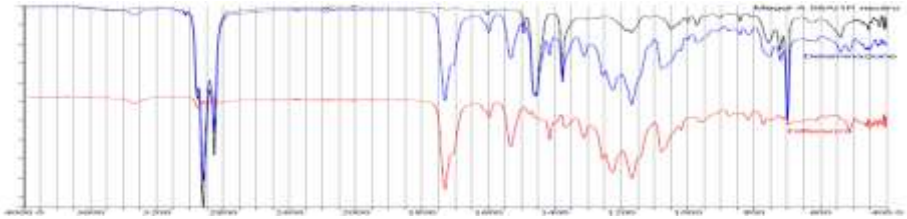
Certifications:

- Quality - ISO 9001
- Enviromental Management - ISO 14001
- Safety – OHSAS 18001

LABORATORY

Tests that we can perform

IR-Analysis/DSC thermo analysis (chemical definition)
Chemical resistance to certain chem. solutions
Xenon weatherometer
Emissions - fogging
Heat ageing tests
Tensile tests
Flexural test
Impact strength -30°C/ -40°C/ 23°C
Hardness Sh A – Sh D
Density
Ash content
Compression set
Abrasion tests
Melt flow test
Scratch resistance
Capillar rheometer
Heat deflection temperature
Vicat softening temperature
Shrinkage
Flammability



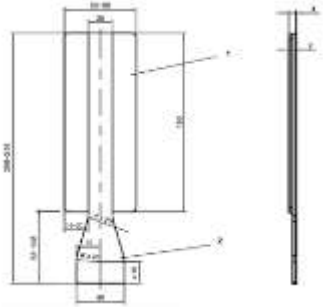
Overmolding – R&D Center

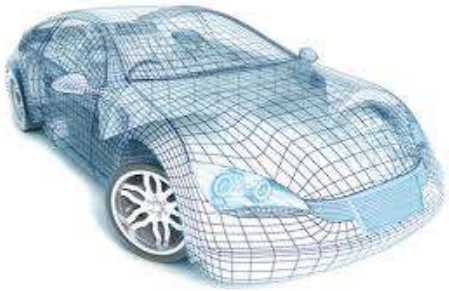
Overmoulding Centre

- Mapping/increasing the product family for overmoulding .
- Knowledge, Products, Testing activities.

The Association of German Engineers

VDI 2019 Standard



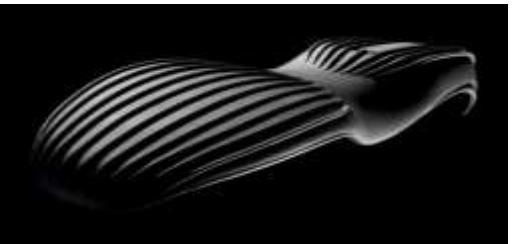


VDI 2019

The standard describes a testing method for the adhesion of thermoplastic elastomers (TPE) on thermoplastic substrates. The specimens used for the described testing method were produced with a 2-component-injection-moulding technology. The standard describes a peeling test to determine the peeling resistance, which is a characteristic value for the adhesion.

PRODUCTS

- TPE
- TPU
- PU
- MASTERBATCHES
- BIOPLASTICS



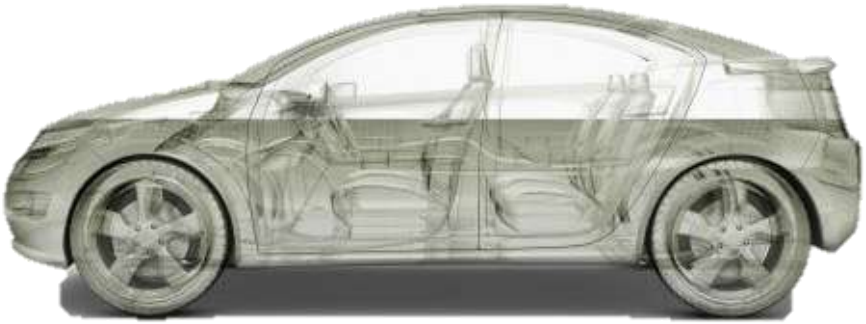
BUSINESS UNITS

Footwear & Sporting Goods

Automotive & Engineering

Healthcare & Packaging

BUSINESS UNIT AUTOMOTIVE & ENGINEERING



BU AUTOMOTIVE & ENGINEERING

ORGANIZATION & CONTACTS MARKETS AND APPLICATION

ORGANISATION & CONTACT

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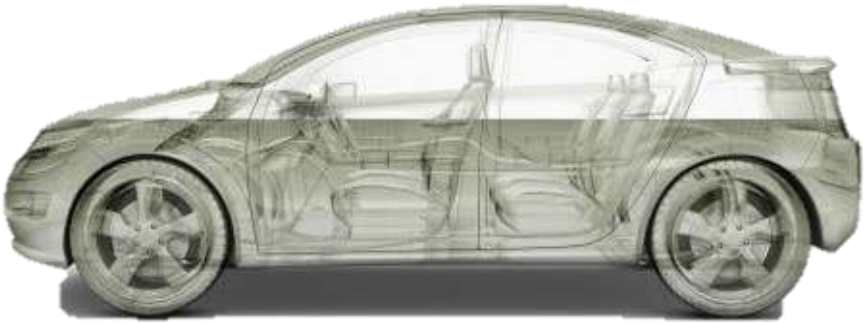
BUSINESS UNIT AUTOMOTIVE & ENGINEERING

- AUTOMOTIVE
  - ✓ INTERIOR
  - ✓ EXTERIOR
  - ✓ UNDER THE HOOD
- ENGINEERING
  - ✓ INDUSTRIAL MACHINERY
  - ✓ CONVEYOR AND TIMING BELTS
  - ✓ WHITE GOODS
  - ✓ ELECTRIC & ELECTRONICS
- BUILDING & CONSTRUCTION
  - ✓ WINDOW & DOOR GASKETS
  - ✓ PIPE FITTINGS
  - ✓ SYNTHETIC TURF INFILL

AUTOMOTIVE



AUTOMOTIVE APPLICATION – Interior

AUTOMOTIVE APPLICATION – Exterior

AUTOMOTIVE APPLICATION – Under the hood - Chassis

ENGINEERING

ENGINEERING APPLICATIONS

APPLIANCES APPLICATIONS

E&E APPLICATIONS

Wires and cables

Electric plugs and devices

BU AUTOMOTIVE & ENGINEERING

BUILDING & CONSTRUCTION

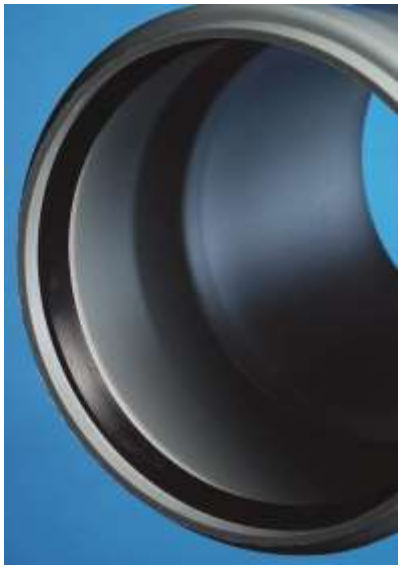
- WINDOW & DOOR GASKETS
- PIPE FITTINGS
- SYNTHETIC TURF INFILL

API

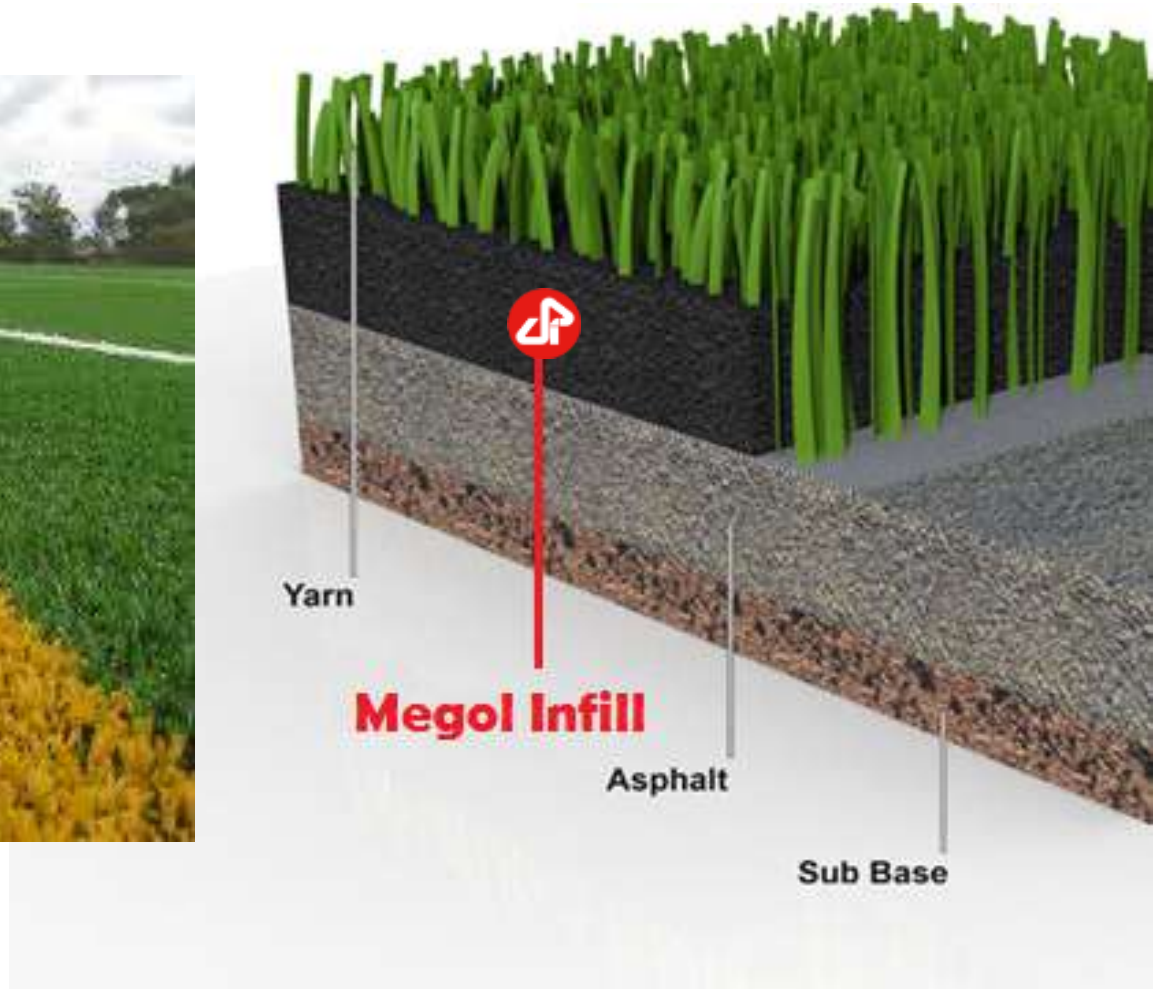
BULDING & CONSTRUCTION

Window and door profiles

Pipe fittings and sealings



Megol Infill for **synthetic turf**



API

- Political,
- Economic
- Social
- Technological
- Environmental

changes.

Unwrap and throw away?

API

API

2006
2015

API

BIOPLASTICS ?

API

BIOPLASTICS

API

Bioplastics drive the evolution of plastic

The European Bioplastics Association defines bioplastics as:

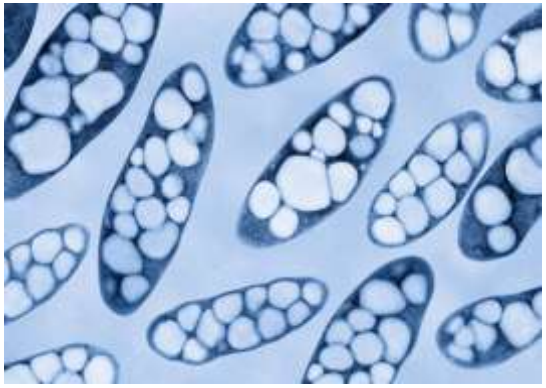
- **Biodegradable plastics** that respect all the criteria on the scientifically recognized standards for the biodegradability and compostability of plastic products (EU13432/EN 14995 and US ASTM D6400 standards)
- **Bio-based plastics** (Plastics from renewable raw materials even if not biodegradable)

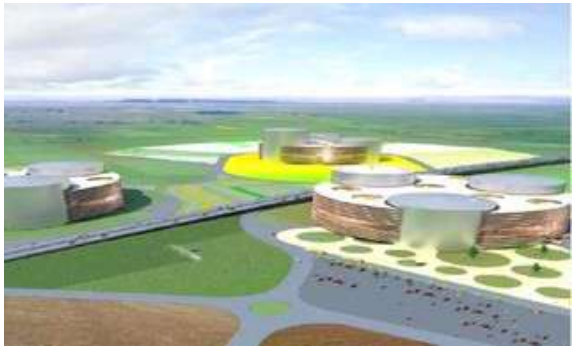
API is a member of European Bioplastics since 2009.

BIOBASED BIOPLASTICS

What are biobased plastics?

With the term bio-based reference is made to the "renewable origin" of the raw materials.
Bb-plastics are polymers which the carbon is derived derived from renewable BIOMASS SOURCES e.g. vegetables fats and oils, sugar, starch or from the activity of microorganisms.





Bio-refinery

Greenhouse Gases

Costs of climatic change

Global warming

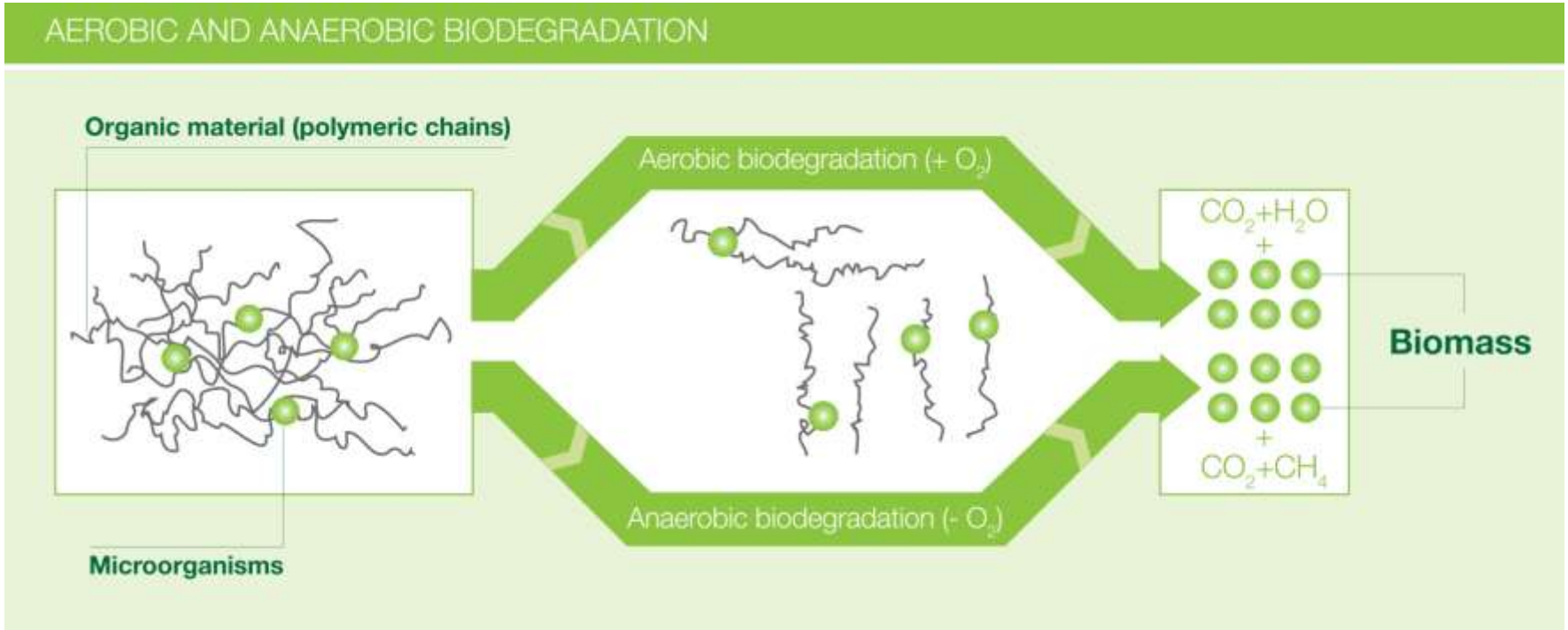
API

Water and soil pollution

BIODEGRADABLE BIOPLASTICS

The **biodegradability** refers to the **end of life** of the material

Biodegradation occurs as a result of the activity of microorganisms (bacteria, fungi, algae), which disintegrate and assimilate macromolecules of the plastic. These are transformed into carbon dioxide (and / or natural gas), water, minerals and biomass.



The speed of the biodegradation process can vary as a function of temperature, humidity and the type of microorganisms.

Biodegradable means that the material meets all the criteria for biodegradation of plastic products (EU 13432/EN 14995 and US ASTM D6400).

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THE WORLD'S LEADING SOFT BIODEGRADABLE BIOPLASTIC

API

BIODEGRADABLE BIOPLASTICS

BACK TO NATURE

The effect of the biodegradation of an APINAT fragmented plate under controlled composting conditions, complying to the standard EN 13432:2000, ASTM D6400:2004 e EN 14995:2006

apinat® BIO

The resulting compost is tested in the lab to verify the characteristics of phytotoxicity

API

Why use bioplastics instead of plastics?

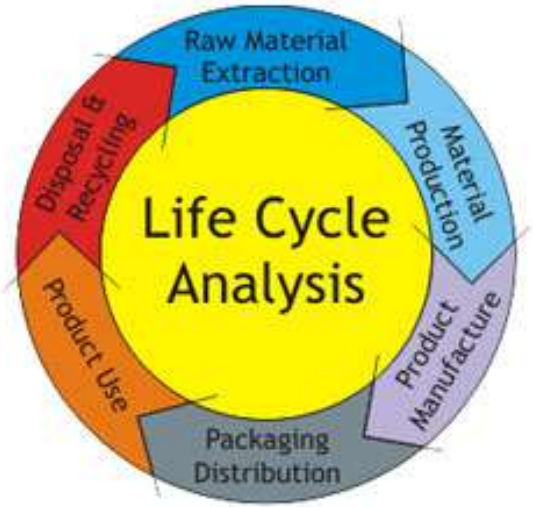
There are two major advantages of bio-based plastic products compared to their conventional versions:

- save fossil resources for future generation,
- reduce GHG-emissions.

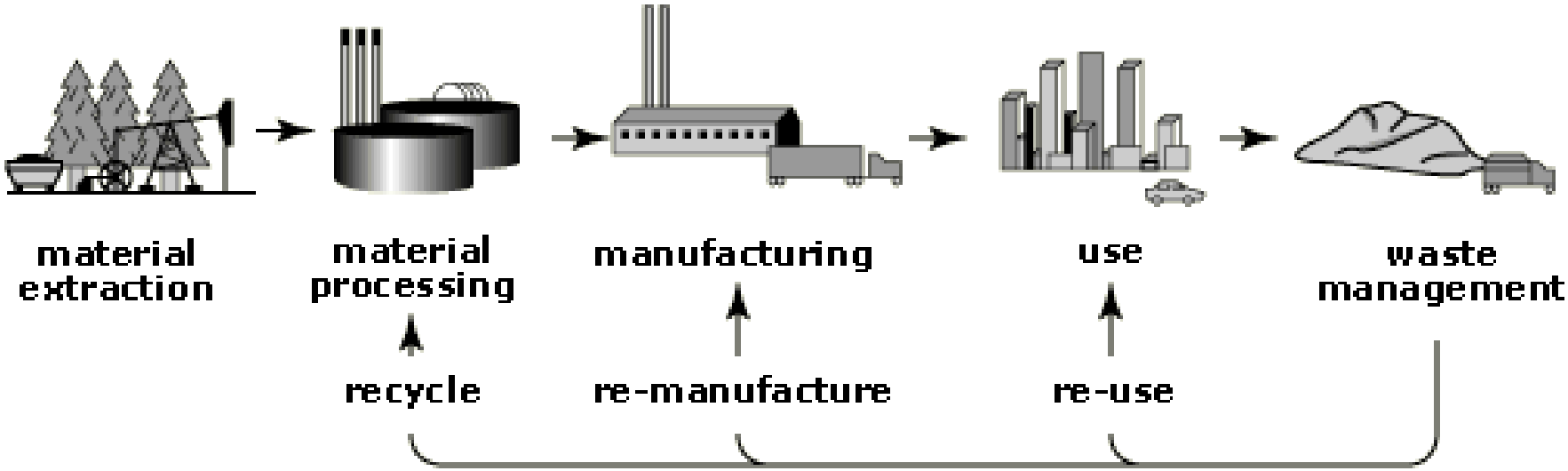
Biodegradability is an add-on property of certain types of bioplastics, which offers additional ways for recovery at the end of a product's life.

How to measure?

LCA



Life Cycle Assessment (LCA) is a methodology for evaluating all the **environmental impacts** associated with a product, considering its entire life cycle from the extraction of raw materials to its final disposal.



LCA

The International Organisation for Standardisation (ISO), provides guidelines for conducting an LCA within the series ISO 14040 and 14044.

The main phases of an LCA are:

1. Goal Definition and Scoping

Define and describe the product, process or activity. Establish the context in which the assessment is to be made and identify the boundaries and environmental effects to be reviewed for the assessment.

2. Inventory Analysis

Identify and quantify energy, water and materials usage and environmental releases (e.g., air emissions, solid waste disposal, waste water discharges).

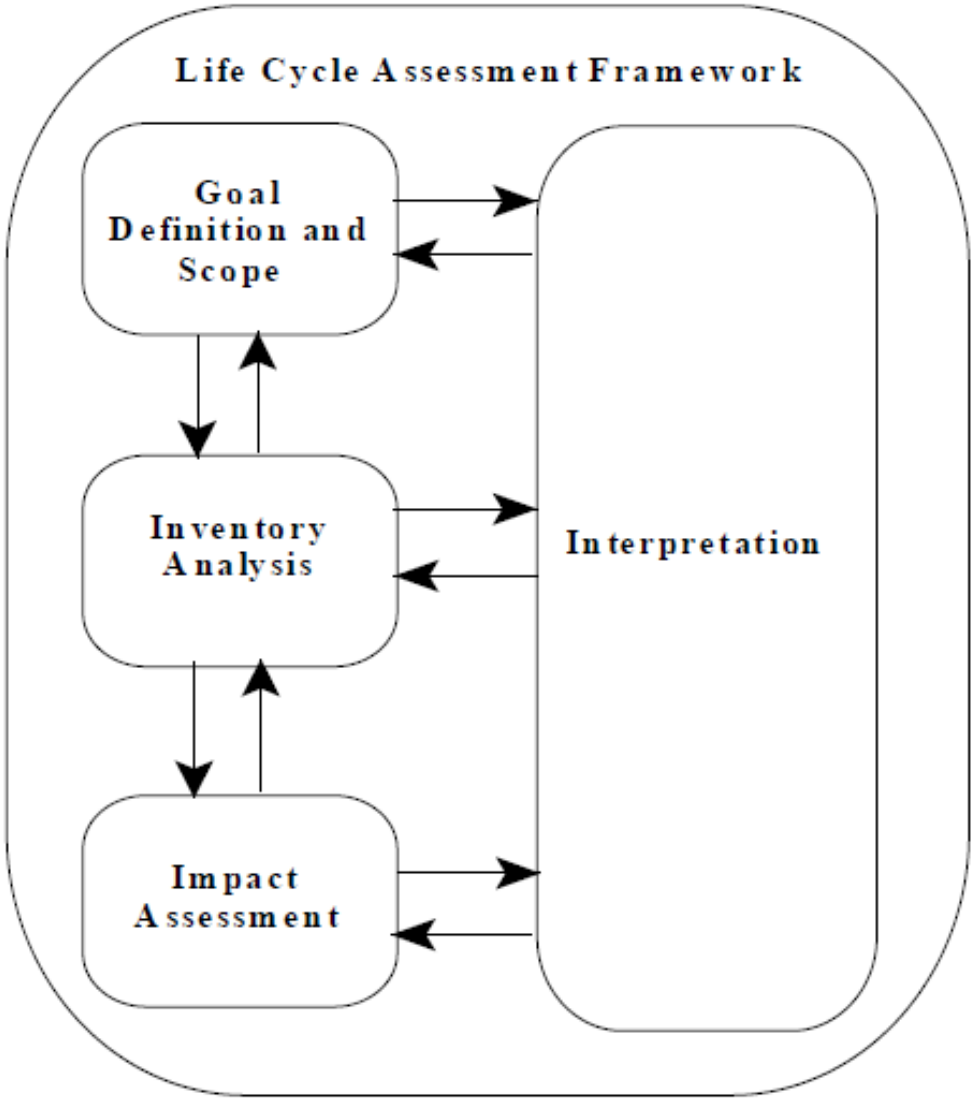
3. Impact Assessment

Assess the potential human and ecological effects of energy, water, and material usage and the environmental releases identified in the inventory analysis.

4. Interpretation

Evaluate the results of the inventory analysis and impact assessment to select the preferred product, process or service with a clear understanding of the uncertainty and the assumptions used to generate the results.

LCA


Life Cycle Assessment Framework
Goal Definition and Scope
Inventory Analysis
Impact Assessment
Interpretation

LCA

Life Cycle Assessment (LCA), based on ISO 14040-14044 standards, analyzes **environmental impact**.

Impact Category	Description of Impacts
Global Warming	Contributes to atmospheric absorption of infrared radiation
Acidification	Contributes to acid deposition
Eutrophication	Provision of nutrients contributes to biological oxygen demand
Photochemical Oxidant Formation	Contributes to photochemical smog
Aquatic/Terrestrial Ecotoxicity	Contributes to conditions toxic to flora and fauna
Human Toxicty	Contributes to conditions toxic to humans
Energy Use	Contributes to depletion of non-renewable energy resources
Abiotic Resource Use	Contributes to depletion of non-renewable resources
Biotic Resource Use	Contributes to depletion of renewable resources
Ozone Depletion	Contributes to depletion of stratospheric ozone

Global Warming Potential 100 (GWP 100)

a measure of the **greenhouse effect** ("heating of the earth") calculated over 100 years. It 's also known as "carbon footprint".

Potential Consequences:
polar melt, soil moisture loss, longer seasons, forest loss/change, change in wind and ocean patterns.

Non-renewable Energy

the **consumption of non-renewable primary energy** (oil, coal, natural gas, natural uranium).

Potential:
fossil saving for future generations

What are the benefits of conducting an LCA?

An LCA can help decision-makers to select the product or process that results in the least impact to the environment.

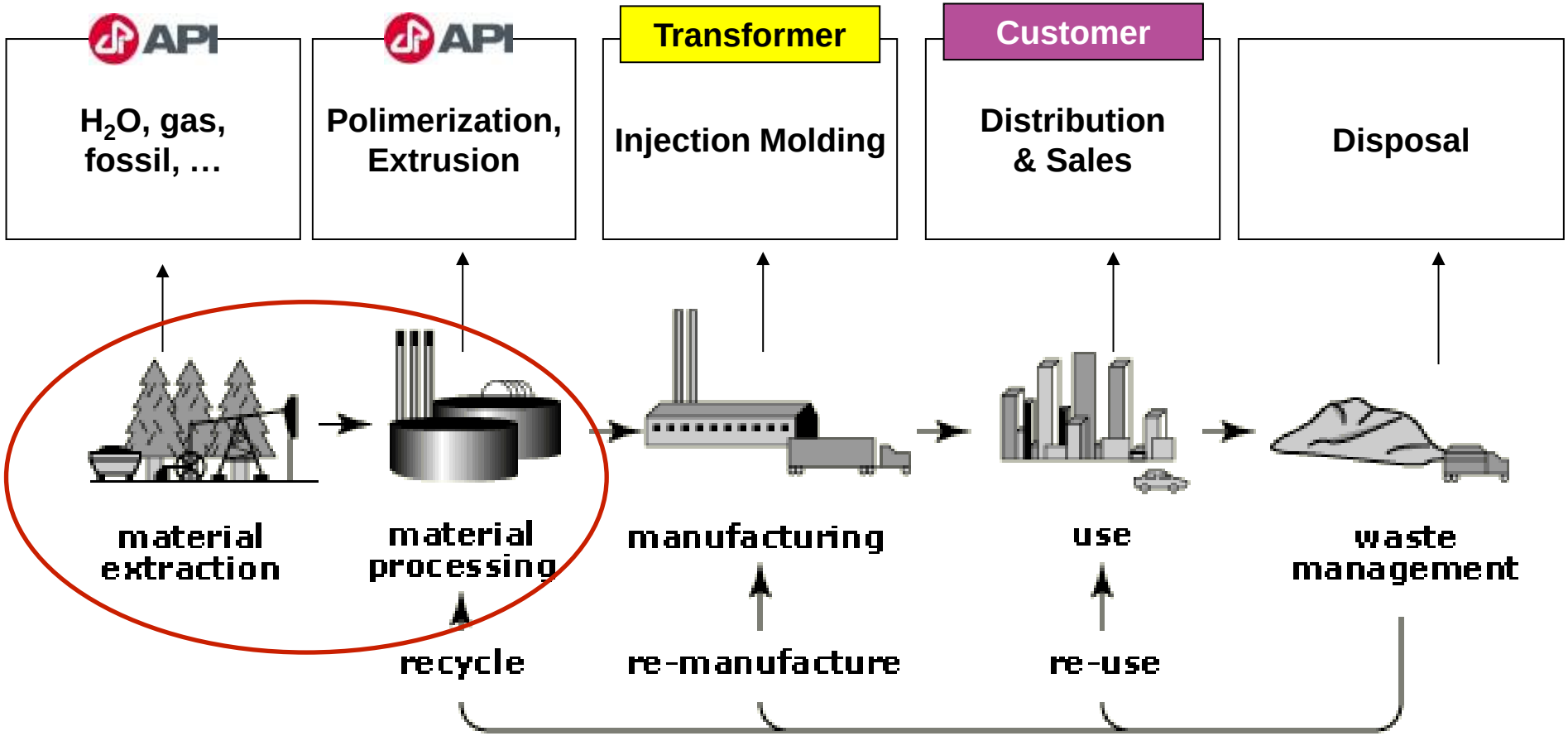
This information can be used with other factors, such as cost and performance data to select a product or process.

What are the benefits of conducting an LCA?

- Strategic re-positioning of the product
- Communicate environmental information that can be used to enhance the product
- Get eco-labeling (es. Ecolabel, Carbo footprint)
- Release Environmental Product Declarations (EPD)
- Do technology strategies

LCA – SOME EXAMPLES

WHERE IS API?


API
H_2O, gas, fossil, …
API
Polimerization, Extrusion
Transformer
Injection Molding
Customer
Distribution & Sales
Disposal
material extraction
material processing
manufacturing
use
waste management
recycle
re-manufacture
re-use

apilon52bio®

GREEN TPU
BIOBASED BIOPLASTICS

API

GREEN PROJECT

ROLLERBLADE
rollerblade.com

- ✓Completely disassemblable
- ✓PVC free
- ✓TPU from renewable origin
- ✓ECO packaging

TECNICA GROUP

API

Shell: apilon52bio

Cuff: apilon52bio

Frame: Alu 6060 extruded

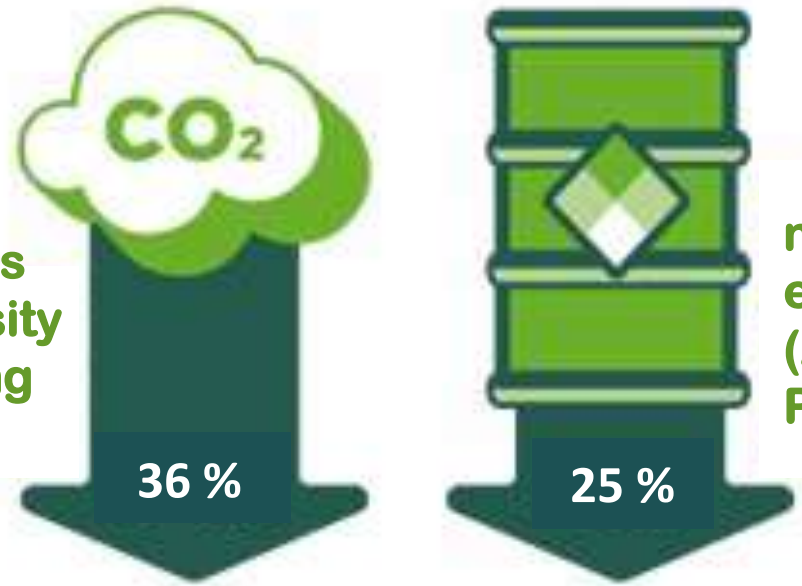
In line with nature.

LCA Study

according to the **LIFE CYCLE ASSESSMENT** based on ISO 14040 -14043 : 2006

apilon52bio®

REDUCES



Greenhouse gas emission intensity (Global Warming Potential) GWP

nonrenewable energy (Abiotic Depletion Potential) ADP

API

apinat® BIO

APINAT BIO® in **PUMA InCycle ”Basket”** Sneaker**.**

API

apinat® BIO

•Soles

•Back insert

•Eyelets

API

PUMA InCycle Basket shoe

apinat® BIO

Cradle-to-Cradle Basic CertifiedCM

cradle to cradle

apinat® BIO

THE WORLD'S LEADING SOFT BIODEGRADABLE BIOPLASTIC

Biodegradable iPhone Covers

- SOFT GRADES

Winner of the Innovation Design and Engineering Award 2012 in Las Vegas

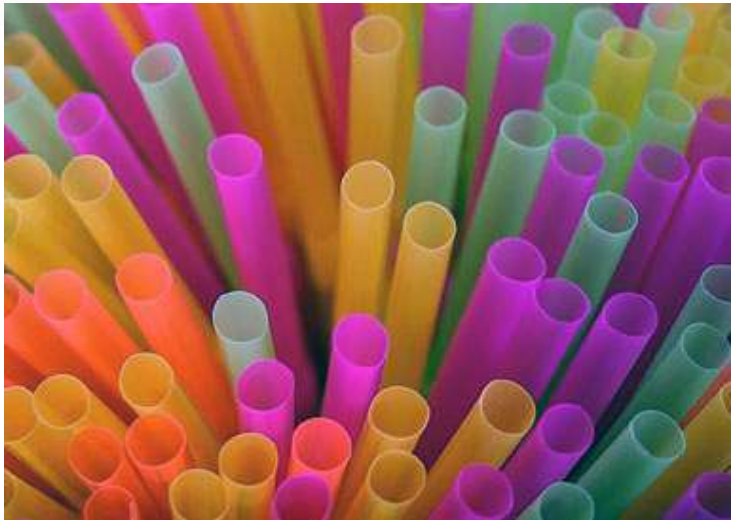
- HARD GRADES

API

apinat® BIO

THE WORLD'S LEADING SOFT BIODEGRADABLE BIOPLASTIC

Flexibility and Softness



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THE WORLD'S LEADING SOFT BIODEGRADABLE BIOPLASTIC

Canvas and leather - perfect appearance and texture

API

apinat® BIO

THE WORLD'S LEADING SOFT BIODEGRADABLE BIOPLASTIC

Extremely versatile and easily colourable

OAT Shoe - NL wins at the Amsterdam International Fashion Week in 2011

API

apinat® BIO

THE WORLD'S LEADING SOFT BIODEGRADABLE BIOPLASTIC

Film, blown or cast extrusion

OK compost S331 VINÇOTTE

compostable EN13432

API

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PLASTIC?
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BIOPLASTICS
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API

european bioplastics

CHIMICA VERDE bionet

assoBIOplastiche

LEGAMBIENTE