

# **BIOPLASTICS: AN ITALIAN CASE STUDY OF BIOECONOMY IN ITALY**

*A Smart Chemistry for a Smarter Life in a Smarter Planet*

## **AN OCCASION TO DISCUSS ABOUT WHAT MODEL OF BIOECONOMY WE WANT IN EU**

**Catia Bastioli**  
President Kyoto Club

**“Bioplastics: A Case Study of Bioeconomy in Italy in the Light of Horizon 2020”  
Conference**

**Brussels, European Parliament, March the 6°, 2013**



***Kyoto Club – The Association***

## WASTE MANAGEMENT SITUATION



### ITALIAN POLICY ON BIOWASTE

- DL152/2006: 65% separate collection in 2012. Compost just from separate collection of organic waste. Organic waste to be collected either in biodegradable & compostable bags (EN13432) and paper bags or in bins

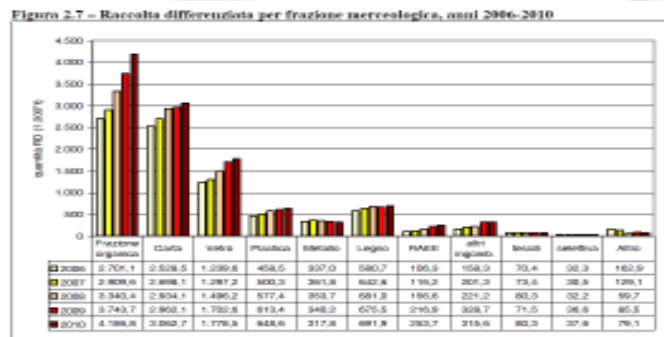


Figura 5. Scarti trattati (t/anno), Anno 2009



Figura 6. Produzione di ammendante, Anno 2009 (elaborazione CIC)



Marchio compost di qualità CIC



## CHEMICAL INDUSTRY SITUATION

- CASH COST ETHYLENE (2010)
  - Western Europe, nafta: 761€/ton
  - Middle East, ethane: 93€/ton
- DEINDUSTRIALIZED CHEMICAL SITES

### RESEARCH & DEVELOPMENT STEPS ON BIODEGRADABLE BIOPLASTICS

BIOPLASTICS INTEGRATED CHAIN

2004

DEDICATED PLURIENNIAL CROPS IN MARGINAL AREAS/SCRAPS FOR FEED/FOOD & CHEMICALS

2004

BUILDING BLOCKS FOR POLYESTERS AND BIO CHEMICALS

1997

POLYESTERS PROCESS

1989

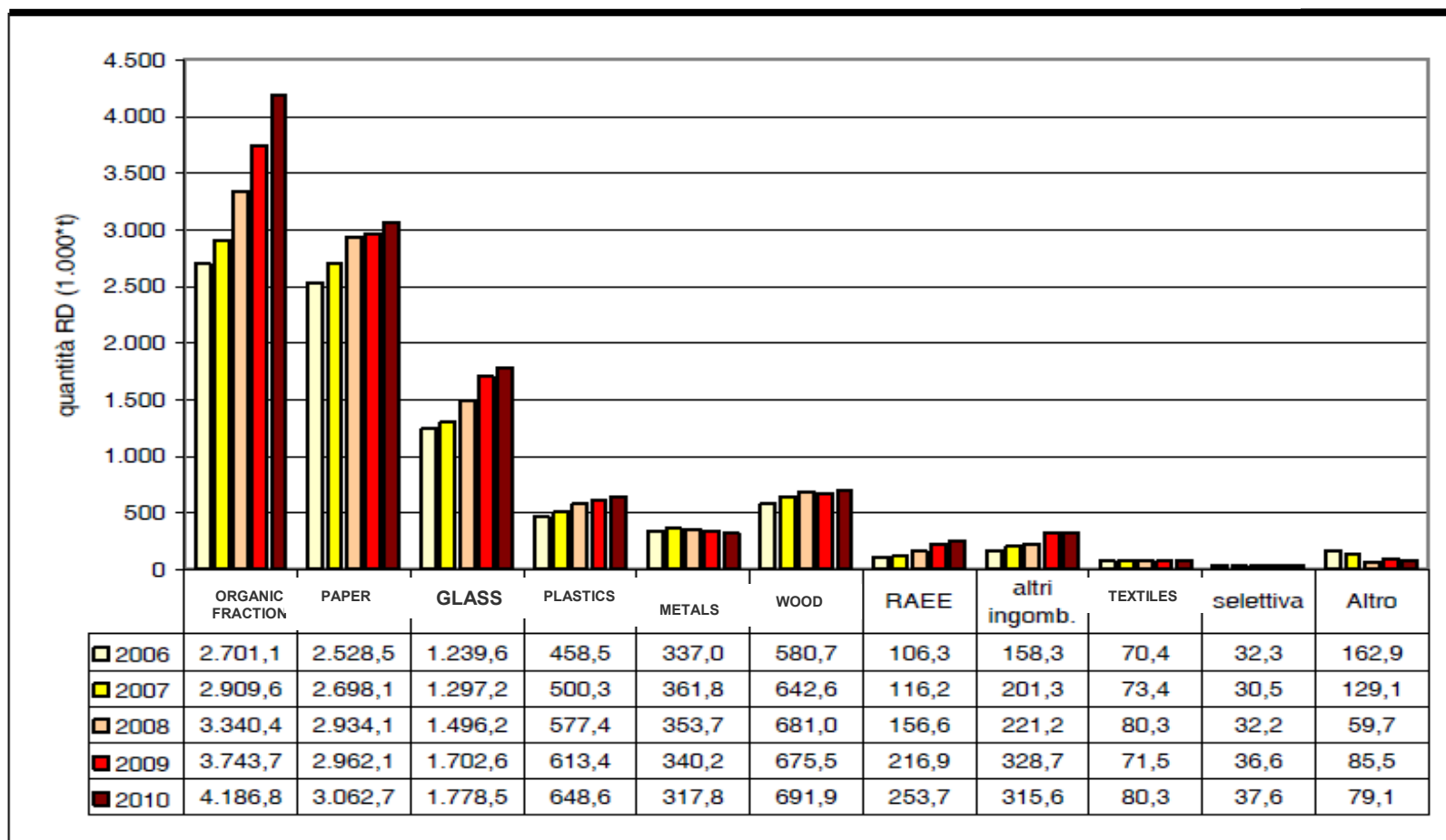
COMPLEXED STARCH PROCESS

INTEGRATED LOCAL BIOREFINERIES FOR ADDED VALUE PRODUCTS



Major pollutants >200000 ton plastics:  
 • Shopping bags; Other bags; Other plastic products

# ISPRA REPORT: Separate collection of different fractions (years 2006-2010)



## ITALIAN POLICY ON CARRIER BAGS

1. Financial law 2007: Shopping bags since January 2011 have to be either biodegradable and compostable or reusable
2. New law 28, 24/3/2012 : non reusable shopping bags have to be certified biodegradable & compostable according to the norm EN13432 by accredited bodies. Threshold thickness for reusable bags

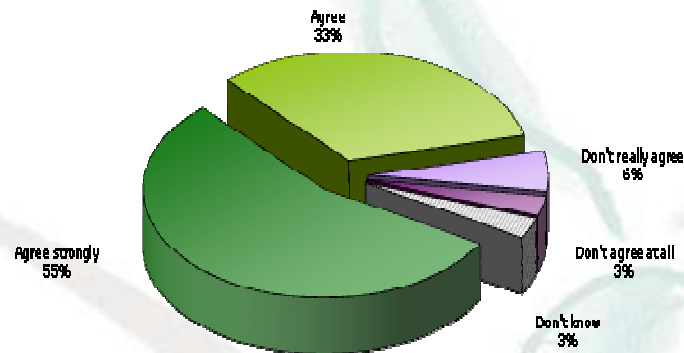


### DIRECT RESULTS

- 50% REDUCTION OF CARRIER BAGS USE IN RETAIL
- 50% OF BAGS FOR SEPARATE COLLECTION OF ORGANIC WASTE ARE SHOPPING BAGS – HIGHER QUALITY OF COMPOST
- .RECYCLING OF BIODEGRADABLE BAGS IN TRADITIONAL RECYCLING STREAM TESTED BY CONAI/ COREPLA (NATIONAL CONSORTIUM OF RECYCLING) – UP TO 10% NO PROBLEMS . REPORT AVAILABLE . NO BIODEGRADABLE PLASTIC BAGS IN THE PLASTICS STREAM WHERE SEPARATE COLLECTION OF ORGANIC WASTE IS IN PLACE
- MARINE BIODEGRADATION - RESULTS OF BIODEGRADATION TESTS: LESS THEN 1 YEAR FOR BIODEGRADATION
- MORE THAN 80% OF BAGS PRODUCERS ARE ABLE TO CONVERT BIODEGRADABLE BIOPLASTICS
- STILL 72% OF CARRIER BAGS ARE NON BIODEGRADABLE BECAUSE OF UNCERTAIN LEGISLATIVE FRAMEWORK

# OTHER RESULTS AFTER ONE YEAR FROM THE START-UP OF THE ITALIAN POLICY ON CARRIER BAGS

**Citizens:** improving sustainable consumption and promoting responsible attitudes towards the environment (ISPO Survey February 2012)



**Shopping bags sector: Trend 2010 vs 2011**

Data	2010	2011
Revenues	674,5	732,0
Production (tonnes)	145.000	115.000
Export	12%	14%
%production Biopolymers	8%	28%

Source: Plastic Consult study March 2012 commissioned by Assobioplastiche Association

- New capacity of biodegradable polyesters for more than 200.000 ton built in Europe and new monomers plants under development/construction
- In Italy two chemical sites have been converted in Lazio and Umbria
- Two fermentation plants in Piedmont (bio-succinic acid) and Veneto (bio-BDO) and an integrated biorefinery in Sardinia under construction (about 700 million euros expected to be invested between 2012-2015 in R&D, pilot and demo plants)
- In 2011 start-up of first dedicated cultivations by SINCRO (a J-V between Novamont and a cooperative of 600 farmers of COLDIRETTI Association) in Umbria for biolubricants in agriculture and by Novamont in Sardinia for feeding Matrica



# THE ITALIAN MAP OF INDUSTRIAL INITIATIVES RELATED TO BIOPLASTICS IN ACTION

**PIEDMONT: 3 RESEARCH CENTERS,  
1 FLAGSHIPS: SUCCINIC ACID (2013)  
About 300 employes**

**ADRIA (RO): 1 FLAGSHIP: 1,4 BDO/Mater-Biotech  
(beginning 2014) (65 employes)**

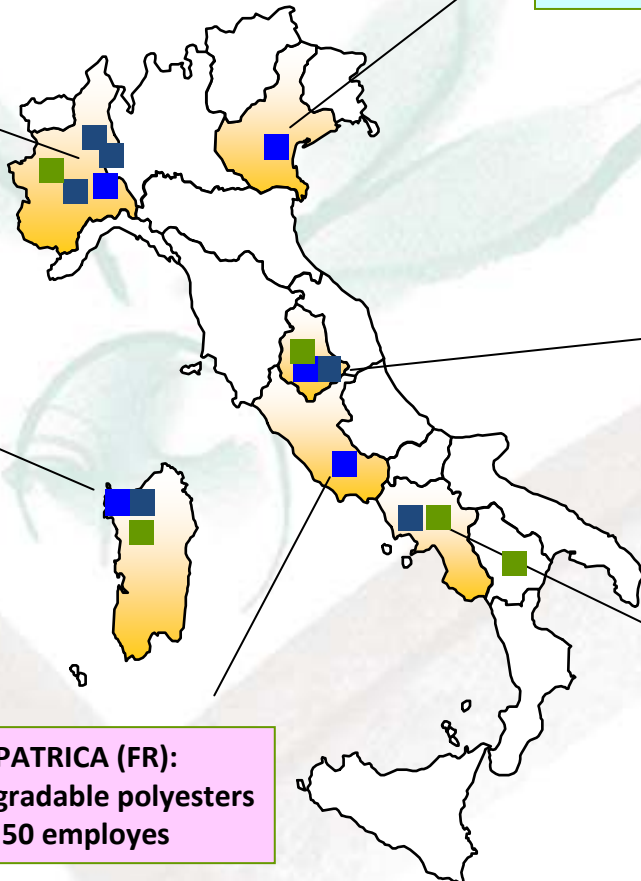
**TERNI : starch based bioplastics and  
vegetable oil based bioplastics  
PILOTS/DEMONSTRATION PLANTS  
R&D vegetable oil crops /  
biolubricants from  
local crops  
(200 employes)**

**PORTO TORRES (SS)  
Matrica Case  
Third generation Integrated biorefinery  
7 plants; 2 under construction (end  
2013);  
3 flagship: long chains diacids and  
monoacids; biolubricants and rubber  
additives; 450MI € private investment  
680 direct employes**

**SAN MARCO  
EVANGELISTA (CE)  
(Biotechnological center)**

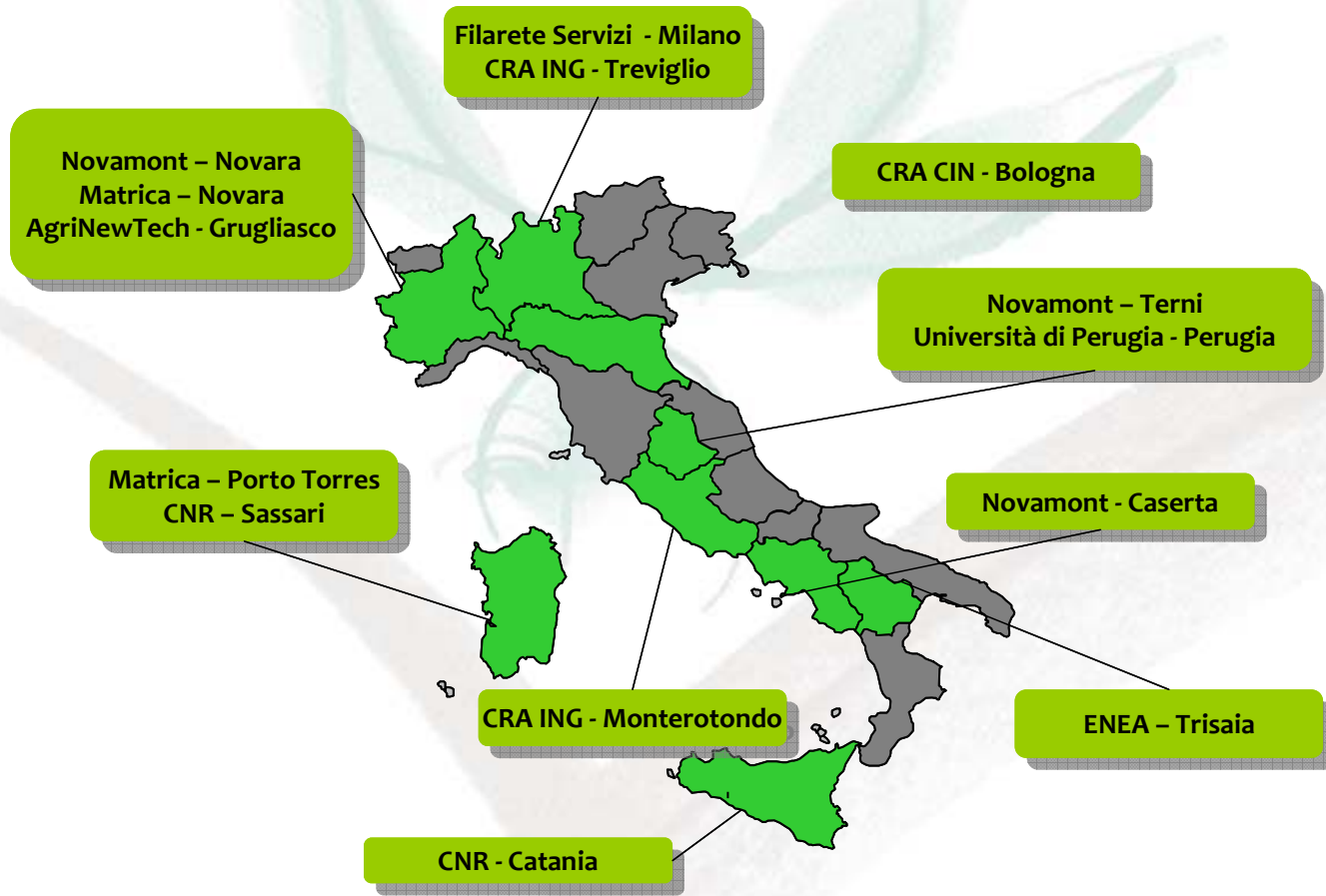
**PATRICA (FR):  
biodegradable polyesters  
50 employes**

- EXPERIMENTAL FIELDS
- HEADQUARTERS
- PRODUCTIVE SITES
- R&D CENTRES

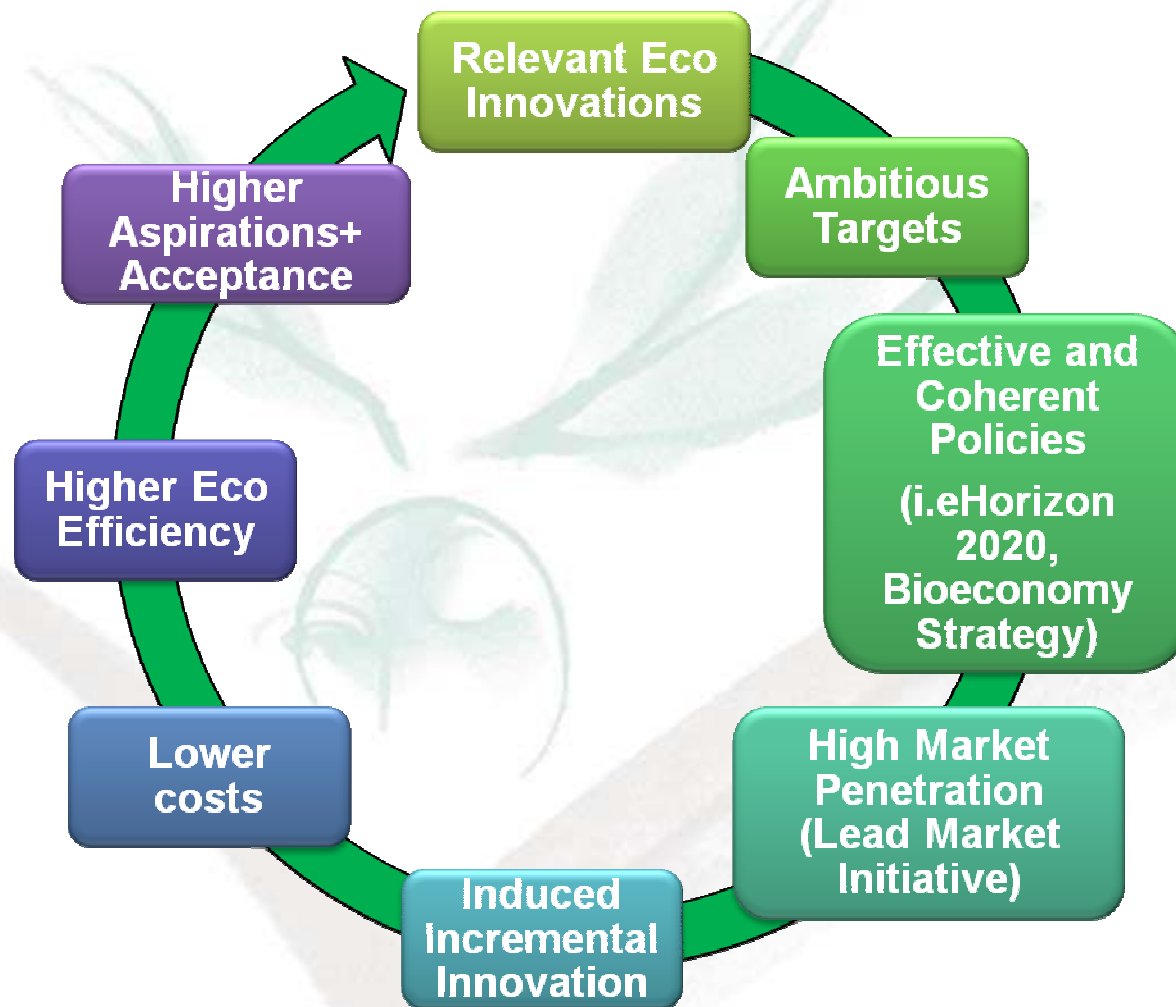




# MAP OF RESEARCH ON DRY CROPS



# THE INNOVATION CYCLE FOR BIOBASED PRODUCTS: SYSTEMIC APPROACH AND COHERENT POLICIES TO UNLEASH GROWTH



High innovation cycle speed: acceleration of policies able to stimulate secondary innovations reducing costs and improving eco-efficiency of products and services



Edited by Walter Ganapini  
**BIOPLASTICS:  
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*A smart chemistry  
for a smarter life in a smarter planet*

Foreword by **Corrado Clini**  
*Italian Minister of the Environment*

Introduction by **Catia Bastioli**  
*President of Kyoto Club*



# THE REPORTS TAKEN IN CONSIDERATION AND SUMMARIZED

- **IIP (Istituto Italiano Packaging):** Report on the Italian Packaging Industry: Packaging Statistics
- **Plastic Consult:** The Structure of the bubble film Extrusion Sector (Assobioplastiche)
- **ISPRA (The Italian National Institute for Environmental Protection and Research):** Urban Waste Report 2012
- **CIC: (The Italian Composters' Association):** Technical Report 2012
- **ISPO: Private Institute for Social, Economic and Opinion Research (Renato Mannheimer):** Green Chemistry Observatory: Attitude of the Italian Public towards the bio-carrier bags (Assobioplastiche)
- **CONAI (The Italian National Packaging Consortium):** Final Report of the Working Group "Biodegradable Packaging Recovery Projects)
- **GIONHA Project (Governance and Integrated Observation of Marine Natural Habit)** by the Regional Environmental Protection Agency of Tuscany, the Environmental Office of Corsica, the Regional Government of Liguria, the Autonomous Region of Sardinia and the Provincial Government of Livorno
- **ECOPEC/Novamont:**
  - Review on marine biodegradation of compostable carrier bags
  - Biobased and Biodegradable carrier bags. Is competition between bioplastics and food a real issue?



# KYOTO CLUB Association

- Not for profit organisation, funded in 1999,
- Members: 239 Companies, Associations and Local Bodies with the aim to achieve the objectives of greenhouse gas emissions reduction (Kyoto Protocol).

To this aim, the Association promotes information, sensibilisation and education initiatives and activities in the field of **energy efficiency, renewables, climate change and sustainability.**



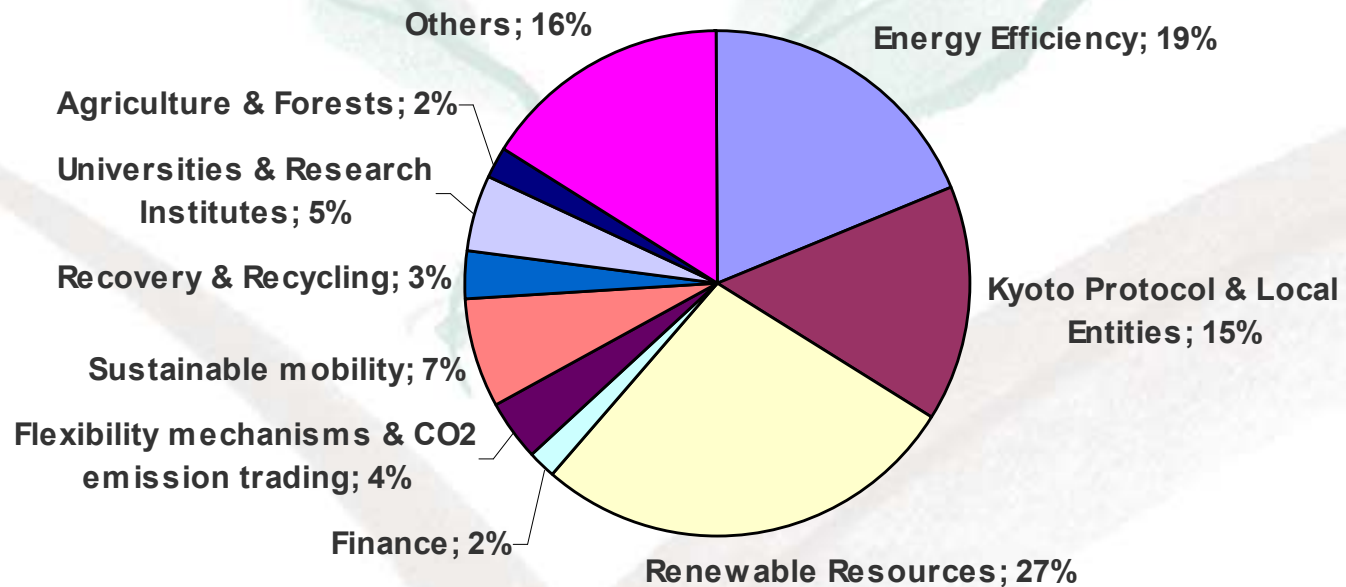
**“Contro i cambiamenti climatici con nuove energie”  
(Against climate changes with new energies)**



**Kyoto Club – The Association**

**2012:  
239 members**

# Kyoto Club Working Groups



# Kyoto Club Activities

- Institutional activities
- Support to Public Administrations
- Campaigns and promotion
- Education
  - *Scuole per Kyoto*
- Participation in other legal bodies
- Contracts with private companies
- Publications/books
- Communication/information





# Communication

Web site Kyoto Club: [www.kyotoclub.org](http://www.kyotoclub.org)  
with fortnightly newsletter: *KyotoClubNews*



*QualEnergia: the bimonthly magazine directed by Gianni Silvestrini on behalf of Kyoto Club and Legambiente, edited by "La Nuova Ecologia"*

[www.qualenergia.it](http://www.qualenergia.it)

*The portal of  
Kyoto Club and Legambiente  
to know and decide on the energy  
of today and tomorrow*



**Kyoto Club – The Association**



**Thank you!**







**“THE CHALLENGE OF OUR MILLENNIUM IS IN THE BALANCE BETWEEN THE TECHNICAL MEANS THAT HUMANITY POSSESSES AND THE WISDOM IN HOW WE WILL MAKE USE OF THEM”**



*Kyoto Club – The Association*

# THE ANNUAL BIOMASS POTENTIAL IN THE ITALIAN REGIONS

REGIONI	Paglie (kton)	Potature (kton)	Sanse + Vinaccia (kton)	Legno Foreste (kton)	Biogas FORSU, reflui allevamenti, scarti macellazione (milioni di Nm <sup>3</sup> )
Piemonte	2.478,63	110,21	48,47	256,57	337,87
Valle D'Aosta	0,20	1,70	0,30	1,09	12,16
Lombardia	3.616,85	40,01	16,98	242,13	723,31
Veneto	1.744,74	367,09	74,73	90,99	272,61
Trentino-Alto Adige	1,52	64,63	12,95	34,99	67,66
Friuli-Venezia Giulia	592,80	56,40	11,15	65,13	48,80
Liguria	4,23	19,36	5,38	96,47	43,91
Emilia-Romagna	1.556,55	398,46	62,62	236,54	318,05
Toscana	724,08	237,67	63,76	365,07	127,68
Marche	539,23	57,86	16,96	32,32	56,47
Lazio	436,80	247,85	56,70	112,33	229,43
Umbria	430,10	101,89	13,73	67,15	43,78
Abruzzo	229,23	290,35	54,99	60,13	55,05
Molise	163,45	31,48	29,04	43,75	18,83
Campania	316,88	286,58	65,85	119,83	260,19
Basilicata	452,10	49,96	11,58	65,28	35,95
Puglia	1.219,42	813,88	369,64	46,43	136,87
Calabria	212,11	1.012,21	189,92	153,80	85,23
Sicilia	731,97	597,92	186,35	25,58	210,50
Sardegna	260,00	120,90	28,78	65,01	122,43
<b>TOTALE ITALIA</b>	<b>15.710,90</b>	<b>4.906,40</b>	<b>1.319,90</b>	<b>2.180,58</b>	<b>3.206,77</b>

24 ML TONS OF BIOMASS → 7,2MLtons C5/C6 → about 3 MI tons CHEMICALS

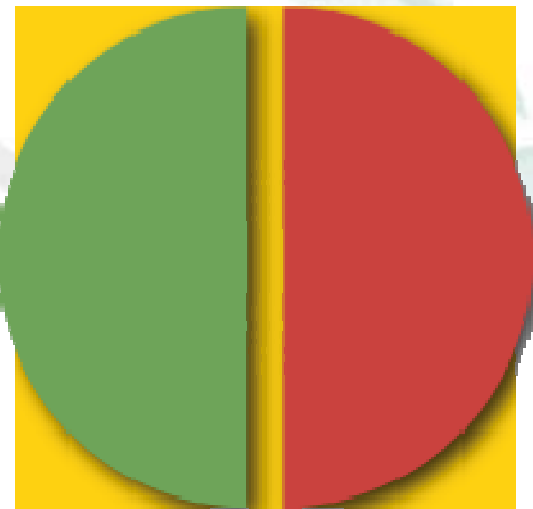


Living Chemistry for Quality of Life

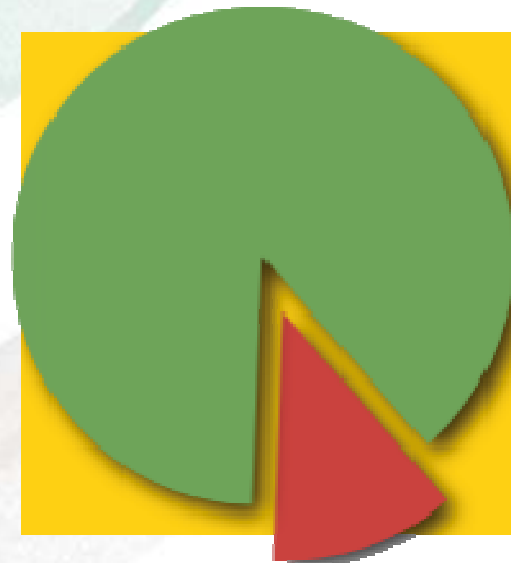
Source: Enea database 2010

# Use of biomass and corresponding added value and employment \*

**Biomass**



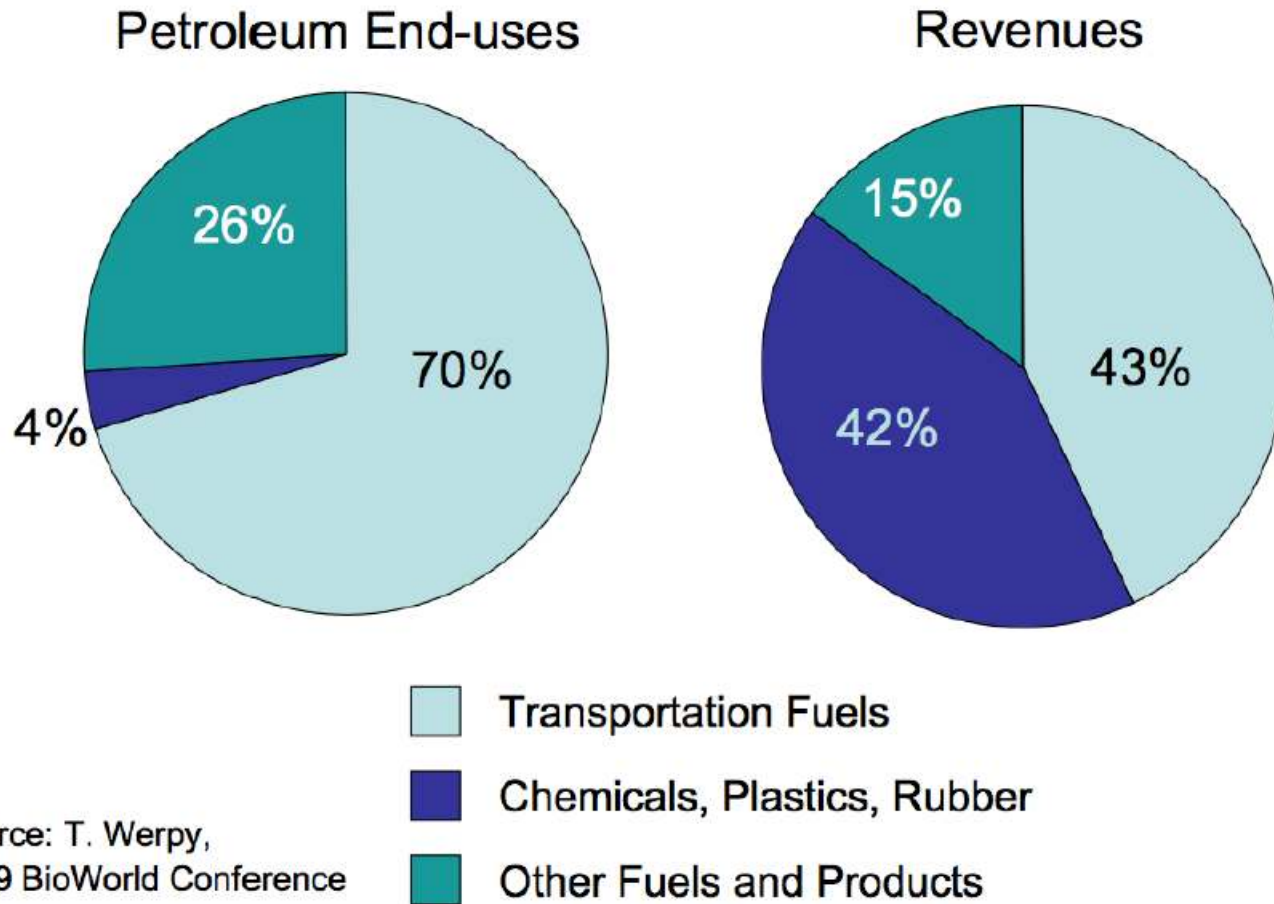
**Value added /  
Employment**



**green: Industrial Material Use**  
**red: Bioenergy / Biofuels**



# A Lesson from Petroleum Refineries \*



Source: T. Werpy,  
2009 BioWorld Conference

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*Ill. 2: Shares in use and revenues of different petro-chemical sectors in Canada. Only 4% of petroleum are used for “Chemicals, Plastics, Rubber”, but with these 4%, 42% of revenues are generated.*

\*Barrier for Material Use of Biomass Carus, Nova Institute

# The Opportunities of Bio Based Products

**BIO-BASED PRODUCTS CAN BECOME A POWERFUL DEMONSTRATIVE CASE OF RELEVANT DIMENSIONS FOR SUSTAINABLE DEVELOPMENT AND CULTURAL GROWTH**



- REDESIGN ENTIRE APPLICATION SECTORS
- AFFECT THE WAY RAW MATERIALS ARE PRODUCED THROUGH INTEGRATION OF ENTIRE AGRO-INDUSTRIAL CHAINS
- MODIFY USE AND DISPOSAL OF PRODUCTS
- EXTEND THE EXPERIMENTAL ACTIVITY OF RESEARCH LABS TO LOCAL AREAS
- DEFINE RELIABLE STANDARDS



**FROM A PRODUCT BASED ECONOMY TO A SYSTEM BASED ECONOMY**



Living Chemistry for Quality of Life.

# Integrated Third Generation Biorefineries For Biobased Products

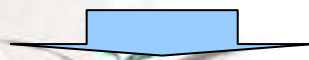
## - The Advantages-

- MAINLY DEDICATED TO ADDED VALUE PRODUCTS TAKING ADVANTAGE FROM THE LOCAL BIODIVERSITIES
- NON COMPETITION WITH FOOD  
(world consumption of fuel 1,5Bl ton, world production of corn 700Ml ton)
- INTEGRATION OF DIFFERENT TECHNOLOGIES
- CONVERSION OF DE-INDUSTRIALIZED SITES
- ENERGY FROM RESIDUES



Need for high investments in Research, New plants, market penetration, communication, dissemination

Holistic approach  
partnerships



**FROM A PRODUCT-BASED ECONOMY TO A SYSTEM-BASED ECONOMY**



# Kyoto Club – The Association

Bruxelles, 6th March 2013

