

Biobased Initiatives Driving to Success

Biopolymers Symposium

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San Antonio, Texas

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Biobased is still an emerging market.

Who are the drivers?

Business and Government working together



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Procurement in an Market Driven by Business vs Government

Strictly Business

There is supply



There is demand



We have enough cash



If self supporting: continues



If its not self-supporting: good bye

Strictly Government

Political will mandates it



Charge regulators : “make it so”



“Work within the budget”



Continuance by Political will



Political will giveth & taketh away

Credit to those industrial 1st movers !!

NatureWorks (Cargill) : PLA

Dupont: Sorona

Braskem: Bio PE

Coke: Plant Bottle



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USDA BioPreferred Program



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US Government Mandates “BIOBASED”

1998 Executive Order 13101

Greening the government through

. . . **Federal Acquisition of environmentally friendly products**

BIOBASED PRODUCTS

Defined

Sec. 213. “Biobased product” means a commercial or industrial product (other than food or feed) that utilizes biological products or renewable domestic agricultural (plant, animal, or fish) or forestry materials.

NOT PETROLEUM

2002 Farm Security and Rural Investment Act (The “Farm Bill”)

Federal Agencies **must purchase** biobased products



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Great News . . . Manufacturers buy in . . .



BUT . . .

How do you verify?

By 2002, political will had charged regulators to implement a procurement program which had no way to validate the purchase!



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USDA turns to ASTM

American Society for Testing Materials

The independent technical body chartered by Federal and State agencies to define standardized technical procedures needed for broad-scale implementation of regulations.

Where industry and governmental experts in specific fields “hash out” practical procedures.

- ***Accuracy and Reliability : Technical expertise***
- ***Satisfaction of legislative/regulatory requirements***
- ***Competitive Balance***
- ***Economic Feasibility***



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Radiocarbon “dating” (^{14}C , carbon-14)

The tool used by archaeologists to age fossils

Radiocarbon is a naturally occurring isotope.

It's in all recent plant and animals.

It's absent in ancient fossils.

So isn't it also absent in petrochemicals? . . . YES

There you have it . . .



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More good news . . .radiocarbon dating is not something new

60 year old technology . . . and being a mature industry . . .

- Expertise
- Laboratories
- Well known sources of error
- Supply Lines
- Venders
- Instrumentation
- Raw materials



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US Government Mandates “BIOBASED”

1998 *Greening the government through **Federal Acquisition** (Executive Order 13101)*

2002 *Federal Agencies **must purchase** biobased products (FSRIA)*

2003 ***USDA funds study to validate radiocarbon analysis can determine biobased content***

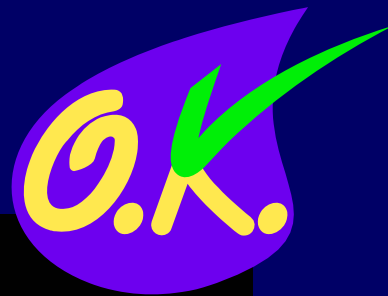
Enlists “radiocarbon dating laboratories”



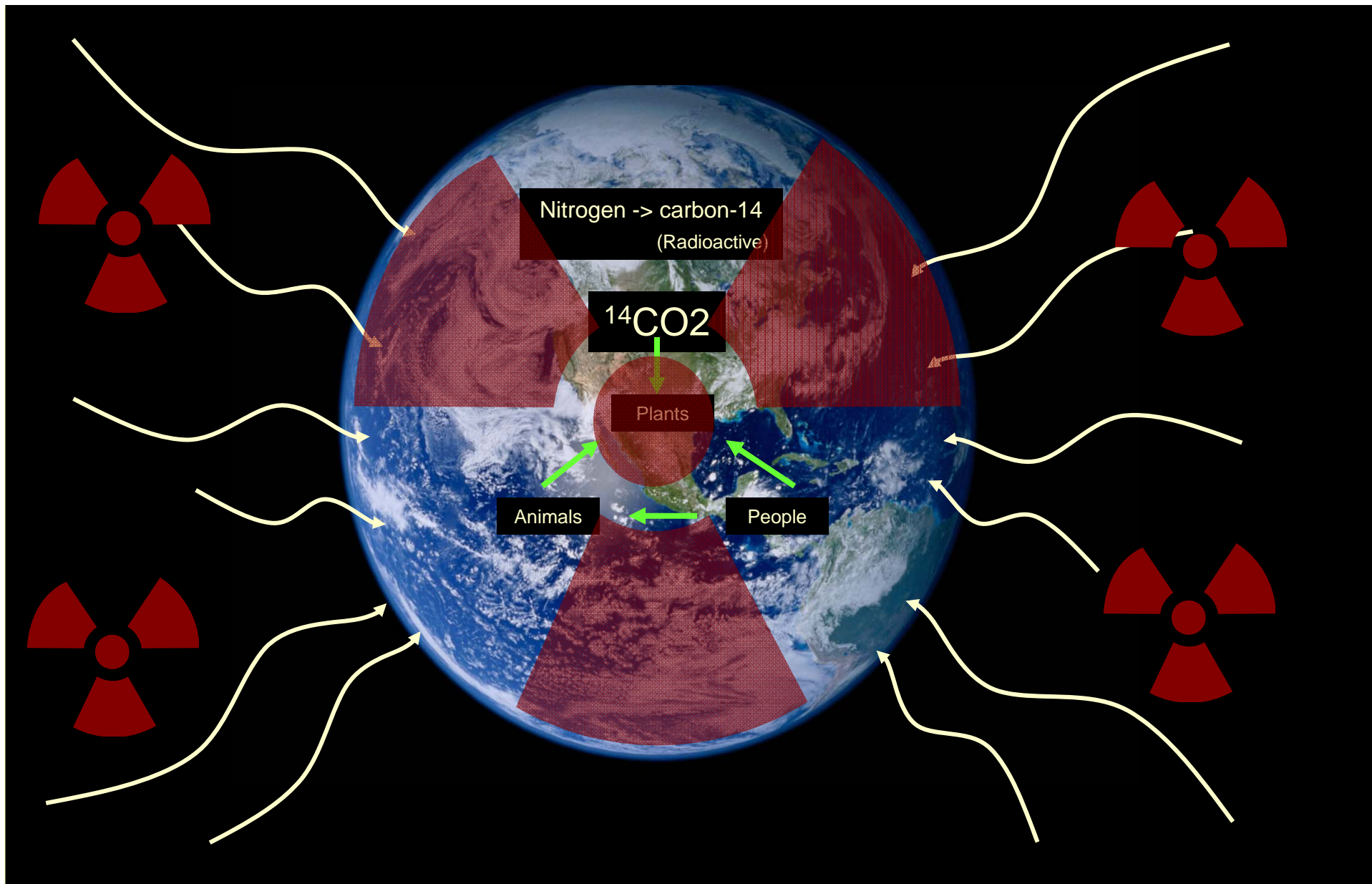
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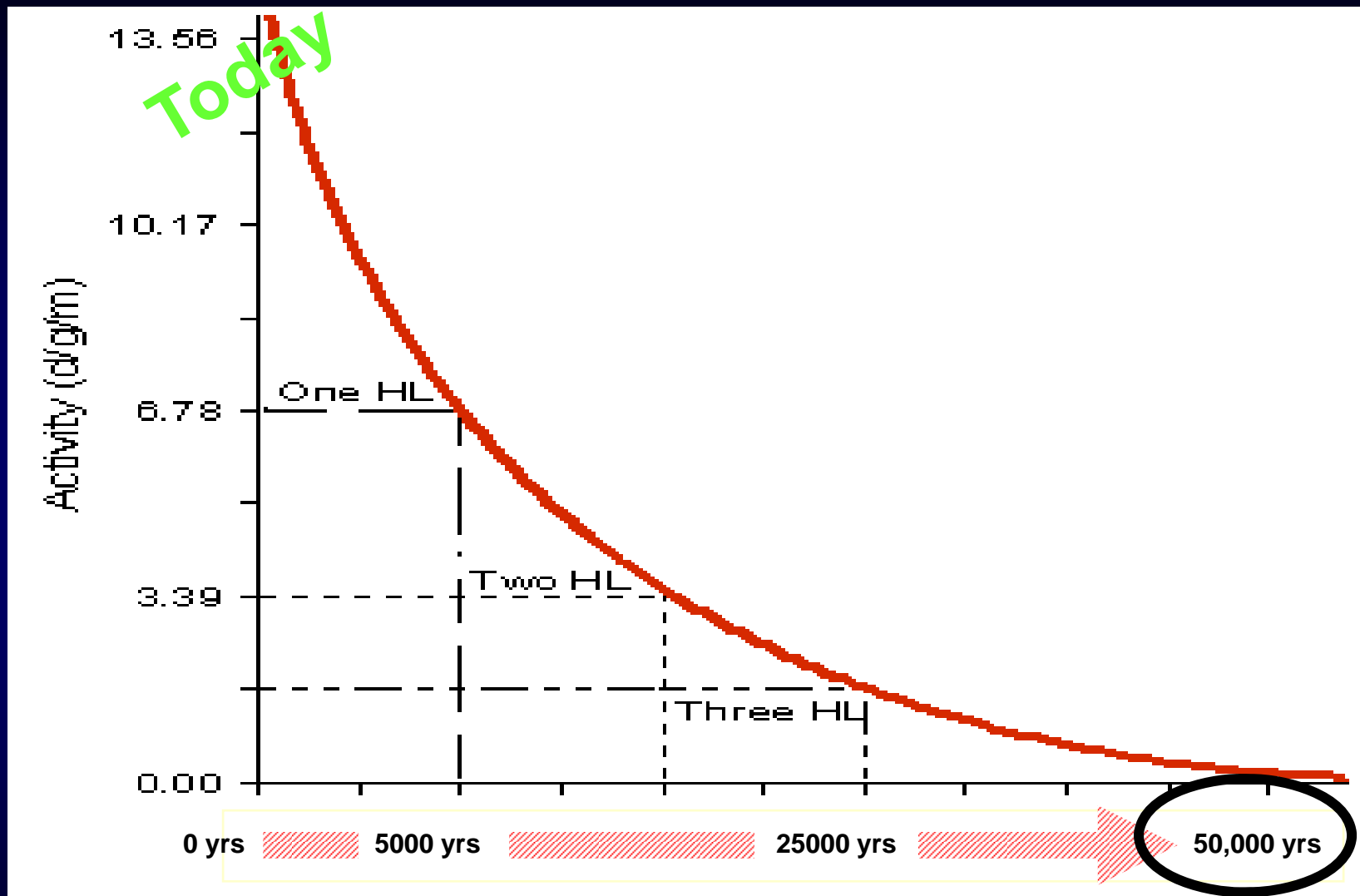


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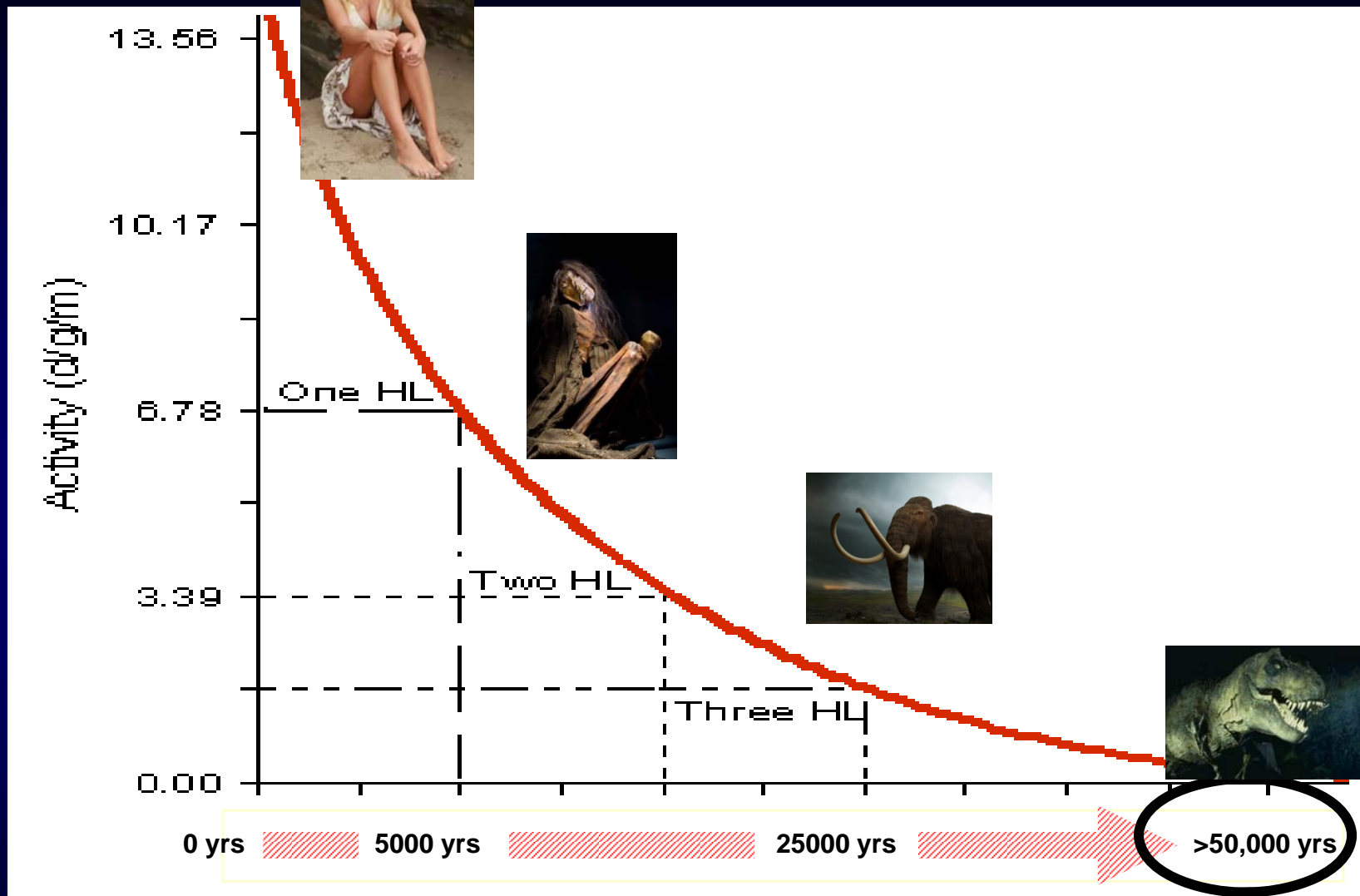


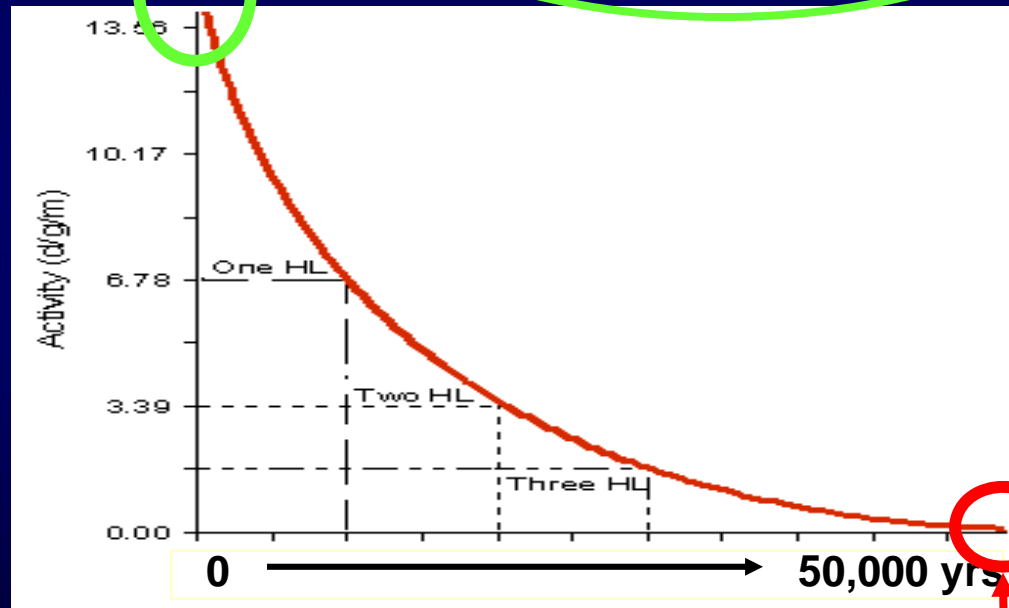


$^{14}\text{CO}_2$

~ 14 dpm/g







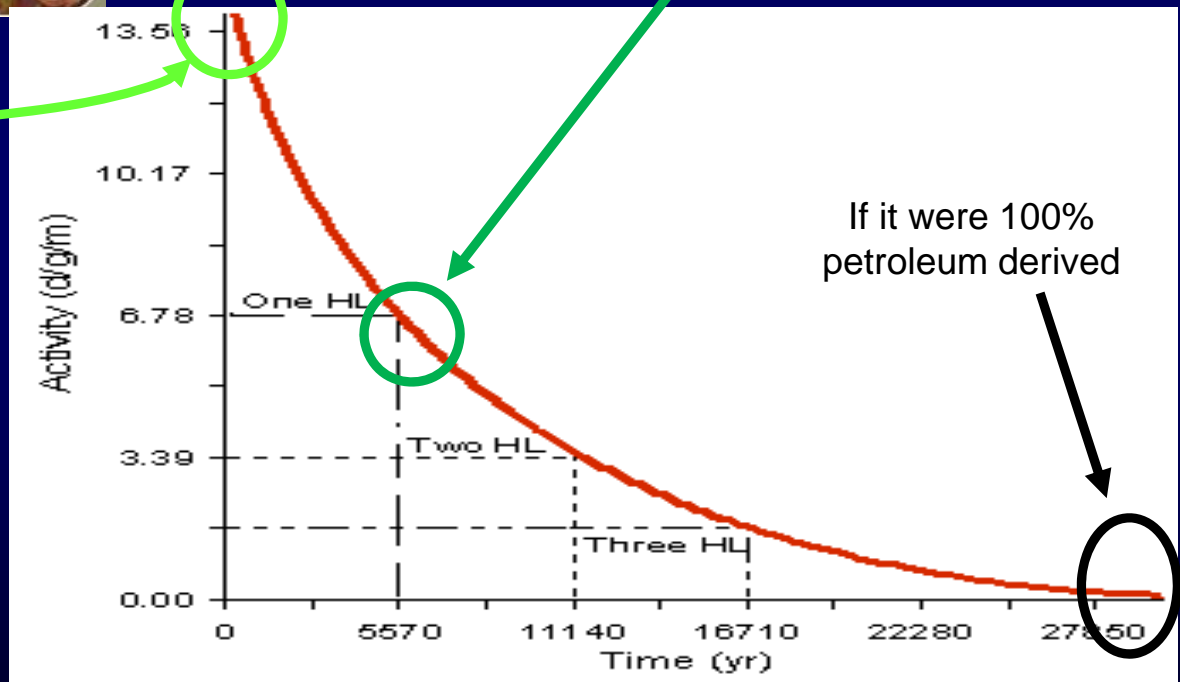
Why not the container?

bakery, meats and produce are
differentiated. 100% corn-based
traffic to high value areas,
strong and durable to reduce
visual display. Approved
in Canada and Europe.



Sourcing the origin of a plastic using radiocarbon

If it were 50 % corn-based &
50% petroleum derived



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2004 : ASTM-D6866-04

Standard Test Method for Determining the Biobased Content of Solid, Liquid, and Gaseous Samples using Radiocarbon Analysis

Standardizing methodology of radiocarbon dating so that it can applicable in the regulatory environment.



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7 CFR Part 2902 – “**Designated Items for Federal Biobased Purchase**”

Biobased content =
$$\frac{\text{Organic carbon from recently living plants (animals)}}{\text{Total organic carbon}}$$





(Per ASTM-D6866)



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Vinçotte OK Biobased

www.okbiobased.be

			
between 20 and 40 % Biobased	between 40 and 60 % Biobased	between 60 and 80 % Biobased	more than 80 % Biobased

OK biobased – since September 2009

Vinçotte in Belgium is an inspection, testing, and certification body. Its OK Biobased eco-label system uses a star system to indicate a product's biobased content – the more stars in the logo, the higher is a product's biobased content.

Products must have at least 30% organic carbon and be at least 20% biobased to obtain the OK Biobased logo. % Biobased content determined by ASTM-D6866.

We therefore don't use the C14 method to determine the age of the product (which would in fact be impossible because it is a mixture of different materials), but rather to determine the concentration of young (or renewable) materials in comparison with the concentration of old (or fossil) resources.

Example: If a product has a C14-activity of 20%, it means that the product consists of 80% renewable and 20% fossil carbon (C).



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DIN CERTCO DIN-Geprüft Biobased

www.dincertco.de

DIN CERTCO is a certification organization of TÜV Rheinland Group and DIN, the German Institute for Standardization. Its DIN-Geprüft Biobased certification scheme has three quality divisions based on the biobased carbon content: (a) Biobased 20-50%, (b) Biobased 50-85%, and (c) Biobased >85%.

All products that are at least 50% organic and at least 20% biobased can be certified, except medical and hazardous products and fuels with fossil components. The certification scheme applies to products which are wholly or partly produced from biobased raw materials.

Testing Basis

Based on [ASTM D 6866](#) Standard Test Methods for Determining the Biobased Content of Solid, Liquid, and Gaseous Samples Using Radiocarbon Analysis", the ^{14}C -method determines the activity of the carbon isotope with the chemical symbol ^{14}C . The standard [CEN/TR 15932](#) "Plastics Recommendation for terminology and characterisation of bioplastics", that is still in development shows the requirements for a standardised terminology.



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Japan BioPlastics Association BiomassPla

www.jbpaweb.net/english/english.htm

Launched in July 2006, Japan BioPlastics Association's BiomassPla certification and labeling system certifies biomass-based plastic products. Under this program, registered products carry a logo easily identifiable by consumers. The BiomassPla labeling program only applies to members of the JBPA.

Plastic products must contain biomass-derived components that can be measured using ASTM D6866

5. Biomass Carbon Measurement

ASTM D6866-5 Standard Test Methods for
Radiocarbon and Isotope Ratio Mass Spectrometry
Using the Testing Method for Determining
Radioactive Carbon and Isotope Ratio



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EcoLogo

www.ecologo.org



Founded by the Canadian government in 1988, the EcoLogo Program has evolved into one of North America's largest ecolabeling systems.

EcoLogo's standard for hand sanitizers [CCD-170](#) requires biobased content measurement. Under the standard, instant hand antiseptic products must be at least 73% biobased excluding the packaging.

EcoLogo Standard: CCD-170
Instant Hand Antiseptic Products



Product Specific Requirements

4. To be authorized to carry the EcoLogo, instant hand antiseptic products must:

Raw Materials

- a) be formulated or manufactured such that at least 73% of the total weight (or mass) of the organic carbon in the product formula be biobased as demonstrated by ASTM D6866-07, OR demonstrate compliance with the USDA BioPreferred Program;



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Braskem I'm Green™ Seal

www.braskem.com

Braskem, a petrochemical company in Brazil, has created the “I'm Green” seal to identify products that contain the Braskem green plastic in their composition. The seal is exclusive to Braskem clients.



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Sustainable Biomaterials Collaborative

www.sustainablebiomaterials.org

The Sustainable Biomaterials Collaborative (SBC) is a coalition of organizations that advances the introduction and use of biobased products.

It has released a list of purchasing specifications called BioSpecs. Manufacturers of food service ware can get Bronze, Silver, and Gold ratings if they meet certain criteria, one of which is organic carbon content.

Food service ware must be at least 95% biobased to get a Bronze rating.



Verification Requirements: Documentation must provide the radiocarbon data for the product (not resin) and explicitly reference **ASTM D6866**: Standard Test Methods for Determining the Biobased Content of Solid, Liquid, and Gaseous Samples Using Radiocarbon Analysis.



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Sustainable Packaging Coalition (SPC)

www.sustainablepackaging.org

The Sustainable Packaging Coalition® (SPC) is an industry working group dedicated to a more robust environmental vision for packaging. It is a project of GreenBlue®, a nonprofit that equips business with the science and resources to make products more sustainable.

The Sustainable Packaging Coalition's "Sustainable Packaging Indicators and Metrics Framework Version 1.0" includes "Renewable Material Use" as an important variable in their efforts.

Renewable Material Use

The SPC defines Renewable Material Use as the "ratio of renewable material (virgin and recycled) used to total material used in substrates, packaging components, or units of packaging." [ASTM D6866](#) is identified as a guide for measuring renewability of bioplastics.

ICC Evaluation Service, Inc. (ICC-ES)

Building Industry. ICC is a subsidiary of the International Codes Council, an organization dedicated to helping the building safety community and construction industry provide safe, sustainable and affordable construction through the development of codes and standards used in the design, build and compliance process.

They have a program that verifies manufacturer environmental claims and product attributes. The Evaluation Guideline for Determination of Biobased Material Content (EG102) was effective October 1, 2008.

1.4 Referenced Documents:

1.4.1 ASTM D6866-11, Standard Test Methods for Determining the Biobased Content of Solid, Liquid, and Gaseous Samples Using Radiocarbon Analysis, ASTM International.



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Green Electronics Council EPEAT Program

www.epeat.net



The EPEAT Program aims to aid purchasers assess and select electronic products based on their environmental attributes. Registered products are rated Gold, Silver or Bronze depending on the percentage of 28 optional criteria they meet on top of the baseline criteria.

As of March 2010, their program included declaration of renewable/biobased plastic materials content of desktop and laptop computers, thin clients, workstations and computer monitors,

❖ Verification Protocols

- | | |
|--|--|
| 1. Request for data submission to subscriber | <ol style="list-style-type: none">1. Identification of components containing renewable/biobased plastics and of the supplier of each component – Use EPEAT Plastics Materials Form2. A Supplier Letter for each component, or group of components, that contain renewable/biobased plastic, which provides a declaration of the percentage (by weight) of renewable/biobased plastic including a verification of biobased content using ASTM D6866-04a. |
|--|--|



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CAUTION! –
Still a lack of harmony



bio-based *carbon* content

The **bio-based *carbon* content** measures the ratio of carbon coming from renewable materials to the total carbon present in the material (ASTM 6866).

The **bio-based content** determines the part of renewable raw material present in the product (including carbon, oxygen, hydrogen and nitrogen).

bio-based content

Inconsistent with pre-existing application and use of “biobased”

Challenges the industry - - - counter productive

Biobased content
Biobased carbon content
Biogenic carbon content
Biocarbon content
Biomass carbon content

%

“Material”

ASTM-D6866

Fraction organic carbon from recent plants to
total organic carbon

Why? Single verifiable hard-number applicable to all
 & satisfied the requirements of biopreferred.



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CEN/TS 16137:2011

Plastics - Determination of bio-based carbon content

CEN/TR 16208:2011

Bio-based products – Overview of standards

ISO/CD 16620 (still under development)

Plastics -- Determination of biobased content -- Part 3:
Determination and reporting of biobased-plastic content

Status: Under development



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FprCEN/TS 16295: Plastics – Declaration of the bio-based carbon content

Approved (February 15, 2012)

“This document addresses the bio-based content of plastic items, expressed as a **fraction of the total organic carbon content**.”

Consistent with application thus far.



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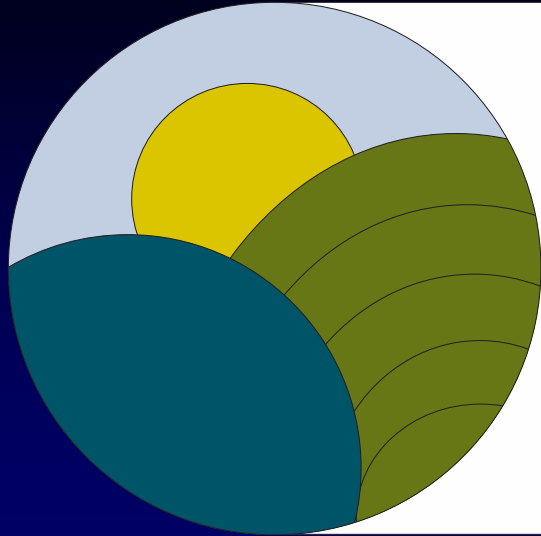
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2011 **2011 USDA Certified Biobased Product Label**



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**USDA
CERTIFIED
BIOBASED
PRODUCT**

PRODUCT 57%
PACKAGE 32%

**National Security
Using Less Petroleum
Creating Jobs**



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2011 **2011 USDA Certified Biobased Product Label**

2012 Presidential Order pressures Federal agencies to demonstrate their purchase of biobased products



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When the earth is
off balance, so are we.
Donate \$50 today and help preserve an acre.



 **treehugger**
A DISCOVERY COMPANY

ALL

DESIGN

TECHNOLOGY

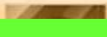
LIVING

TRANSPORTATION

ENERGY

SCIENCE

Seventh Generation Launches USDA-Certified Baby Skin Care Line



Melissa Brown

[Living / Organic Beauty](#)

April 23, 2012

BETA

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Green Matter: Bio-based plastics stand up to sustainability scrutiny

By Karen Laird

Published: April 27th, 2012

Press release
(Feel free to adopt it 1:1)

*nova-Institut GmbH (www.nova-institut.eu)
Hürth, 5 March 2012*



Bio-based plastics convince with high climate protection potential and low use of fossil resources

A meta-analysis of 30 life cycle assessments by the nova Institute for innovation and ecology on behalf of the Proganic company shows **unambiguously positive results** for the widespread bio-based plastics PLA and PHA/PHB.

Earth Day study: Most shoppers won't pay more for green packaging

Posted by Jenni Spinner, Senior Editor -- Packaging Digest, 4/20/2012 10:04:00 AM

Off the bottle: Town votes to ban plastic water bottles

By Heather Caliendo

Published: April 26th, 2012

Concord, Mass. is traditionally identified as a historic small town whose most prominent citizen was writer Ralph Waldo Emerson. now known as the first in the country to ban PET bottled water.

March 19, 2012, 5:33 PM

Slimmer Majority of Americans Champions Renewables, Poll Finds

By DIANE CARDWELL



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***National Security.
Using Less Petroleum.
Creating Jobs.***

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Look for the label



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Thank You.

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