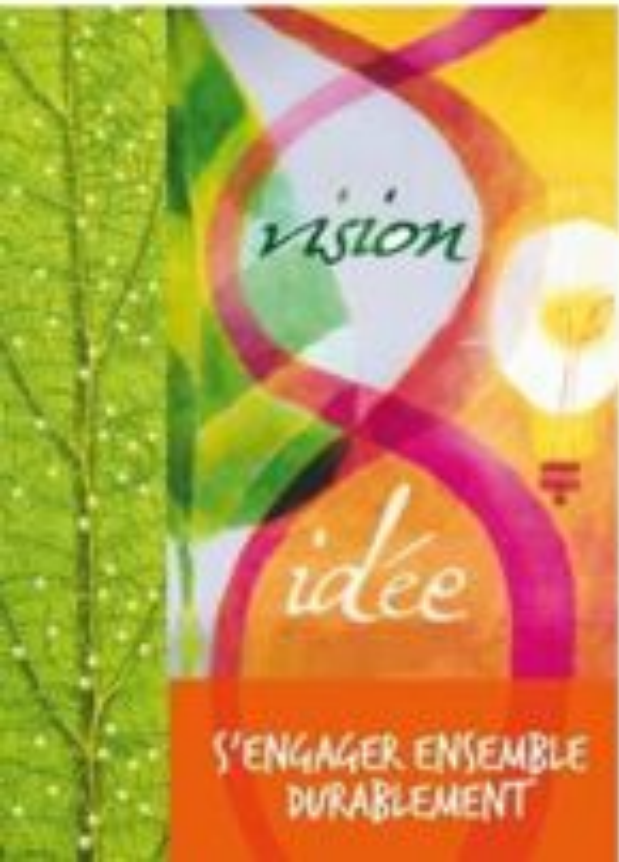


Plant based chemistry

A key stone in the chemical industry mutation



6th of June 2012

Journées Chevreul

1 Chemical industry overview



France : the 5th chemical industry worldwide behind massive countries like China or US



Global chemistry production 2010 = 2 353,4 billion €

RANKING

1 China

2 USA

3 Japan

4 Germany

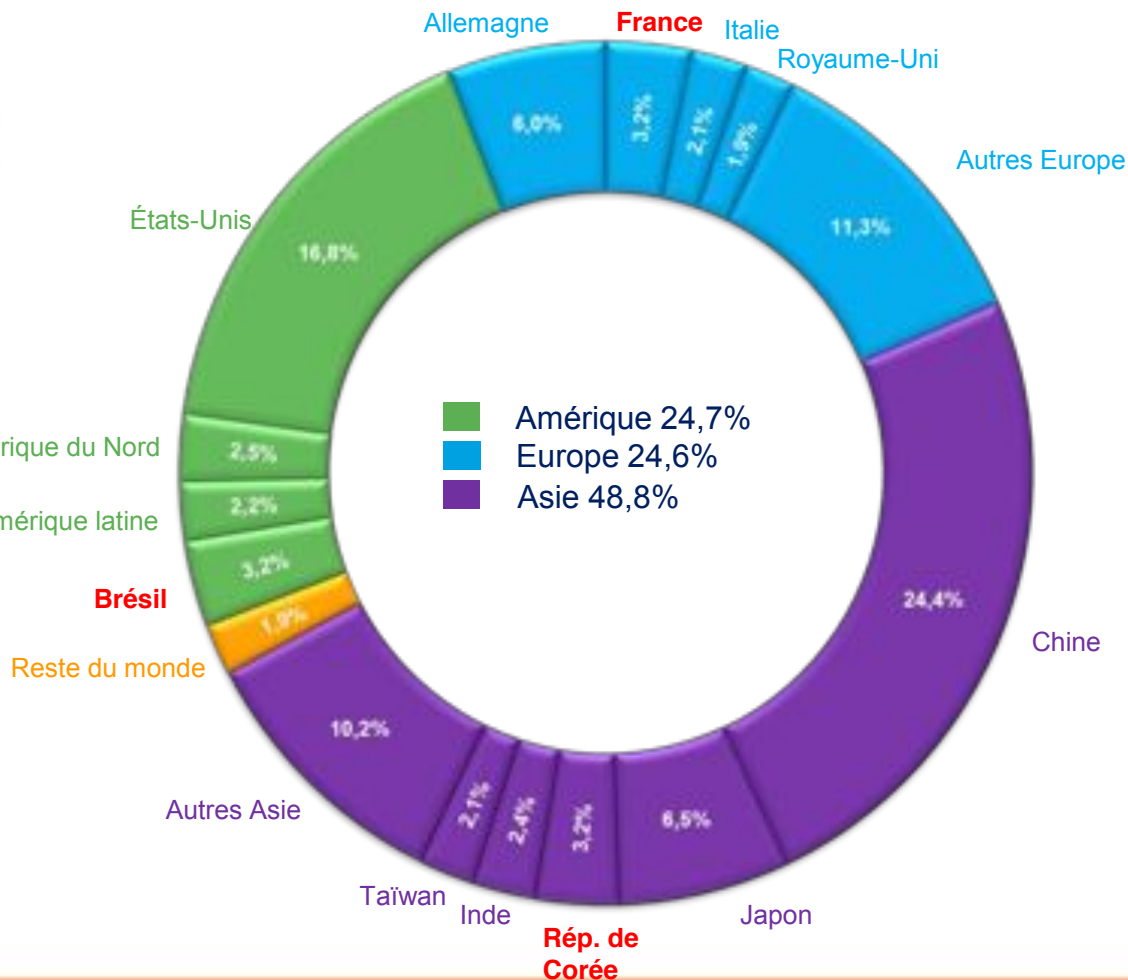
5 **France**

5 **Brazil**

5 **Corea**



But challenged by
dynamic competitors
such as Brazil and
Corea

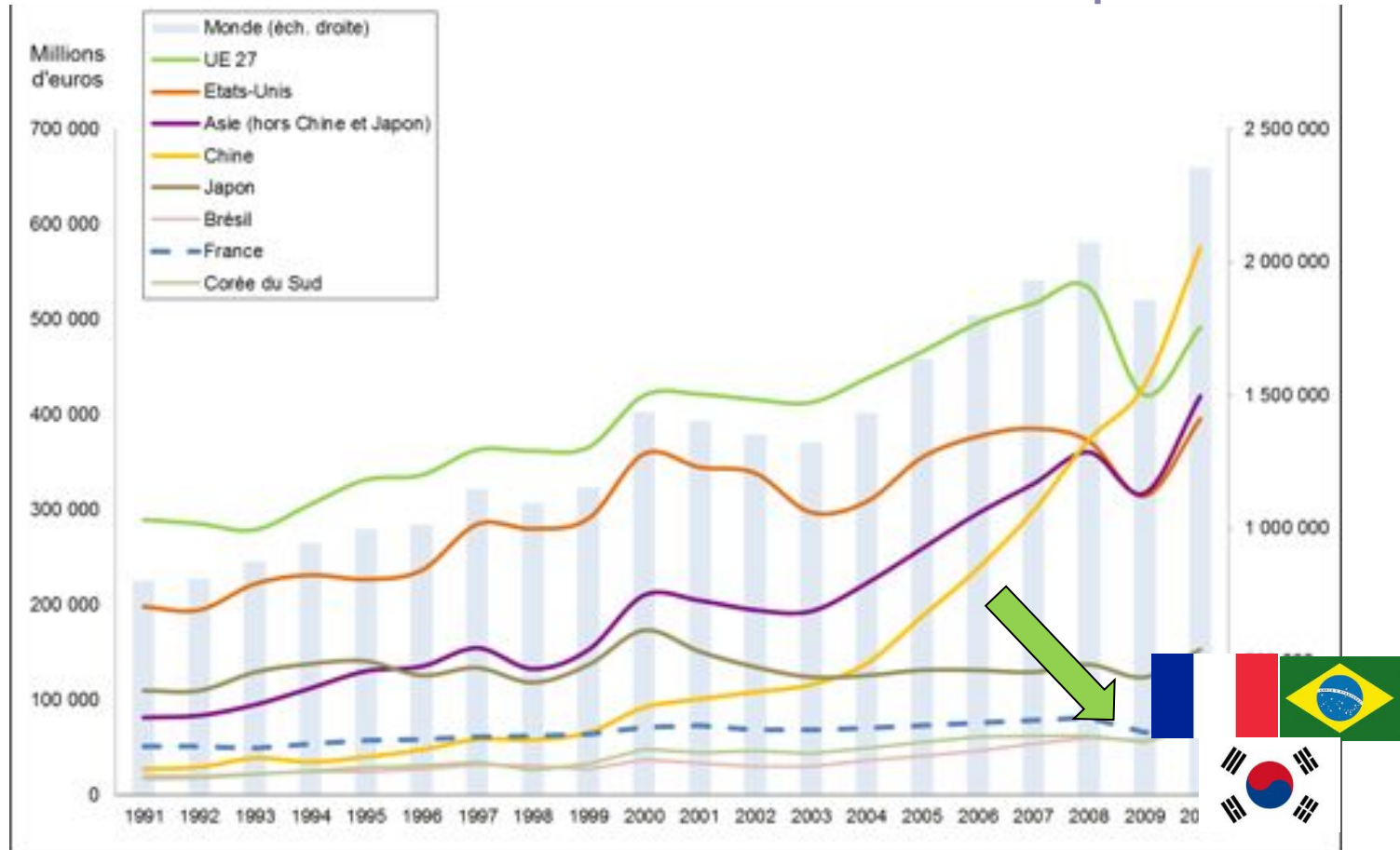


Brazil & Korea has been “slowly” growing to catch up with France in 2010...

Évolution des ventes de l'industrie chimique

Av. growth
rate
2000-2010

Monde	5,1%
Chine	20,1%
Brésil	7,4%
Allemagne	2,2%
UE27	1,6%
Etats-Unis	1%
France	0,7%
Japon	-1,2%



Brazil : a major player in plant based chemistry

Upon what drivers shall we bet ?

Threats

- Competition from emerging countries in Asia-China
- Economic background
- Strong dependance of energy and raw materials costs
- environnemental regulations burden and fiscal pressure
- The important of scattering industrial sites in France

Key Challenges

To strenghten investment and innovation in France

The improvement of logistical infrastructures

Development of SME's

Societal acceptance and chemistry image

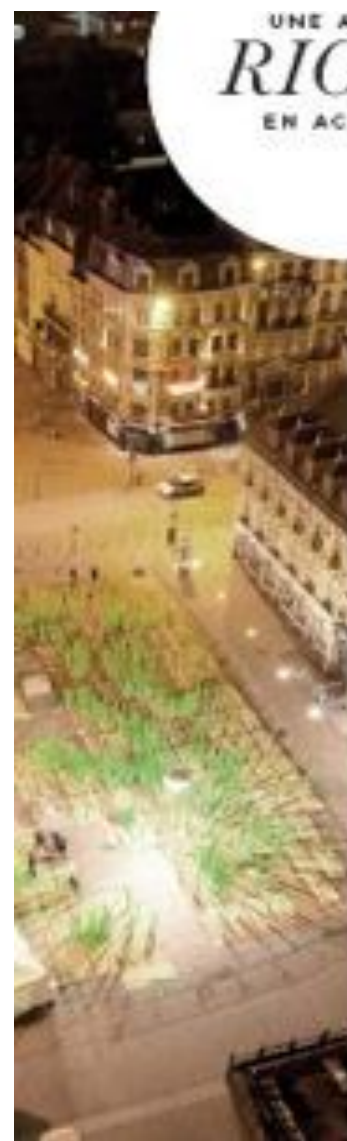
Increased training effort

Opportunities

- The capacity to innovate
- Availability of agricultural resources and nuclear energy
- chemical industry still an important sector in Europe to support the growth
- strong downstream industrial sectors with worldwide leaders: energy, transportation, ...



2011 : international year of the chemical industry, <http://www.chemistry2011.org/>



S'ENGAGER ENSEMBLE DURABLEMENT

Four main mutations for the chemical industry in France in the 10 next years



Mutation

+

Integration with the future
downstream chains of value

Recycling of plastics and rare
metals

Bio-based chemistry

Sustainability of the chemical
industry

➤ The biobased chemistry is a key-stone
to continue developing the chemical
industry in Europe.

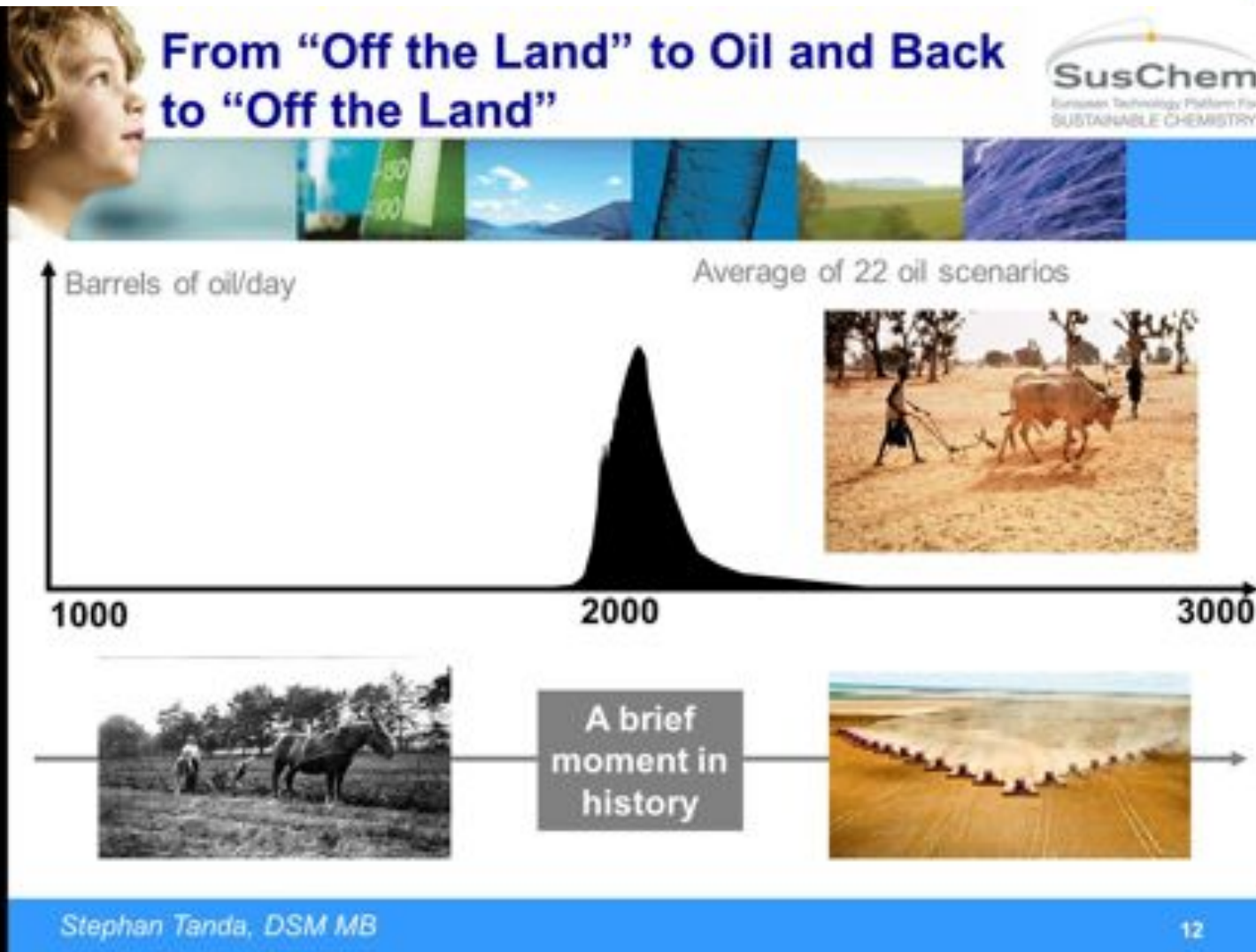
Impact on the
chemical
industry

+



S'ENGAGER ENSEMBLE DURABLEMENT

It is an answer to fossil resources reduction



Biobased sourcing : an answer that reduce environmental impact and dependence to fossil resources

RENEWABLE



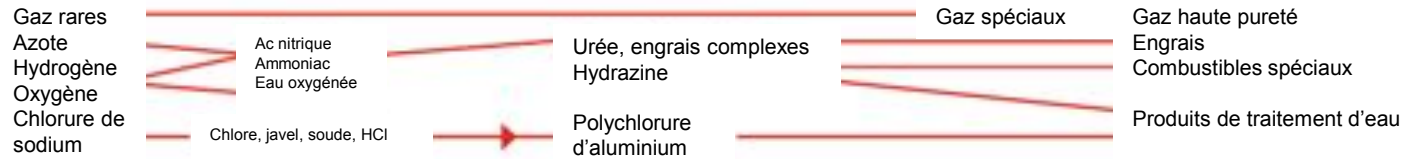
COMPLEMENTARY



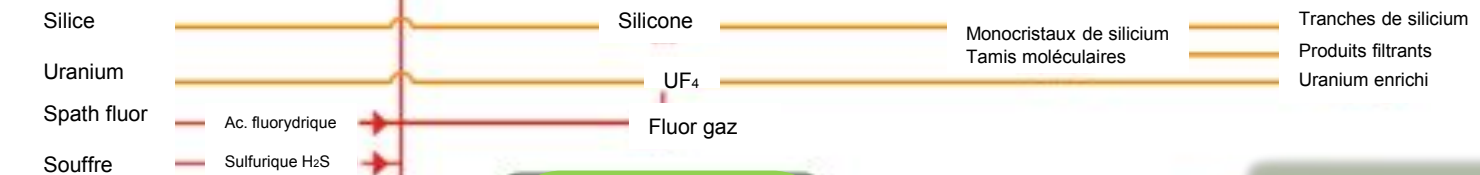
Strategic sourcing for industry



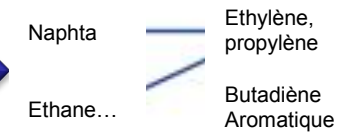
Eau, Air



Terre
Minéraux
Minerais



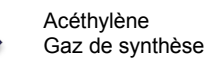
Pétrole
hydrocarbures



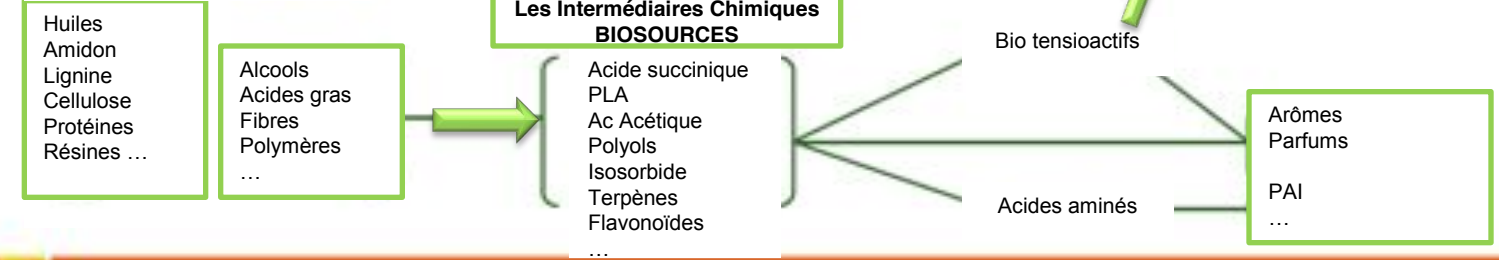
Gaz



Charbon



Biomasse



2 Bio-economy, « a megatrend » in US as well as in Europe

http://ec.europa.eu/research/horizon2020/index_en.cfm?pg=press



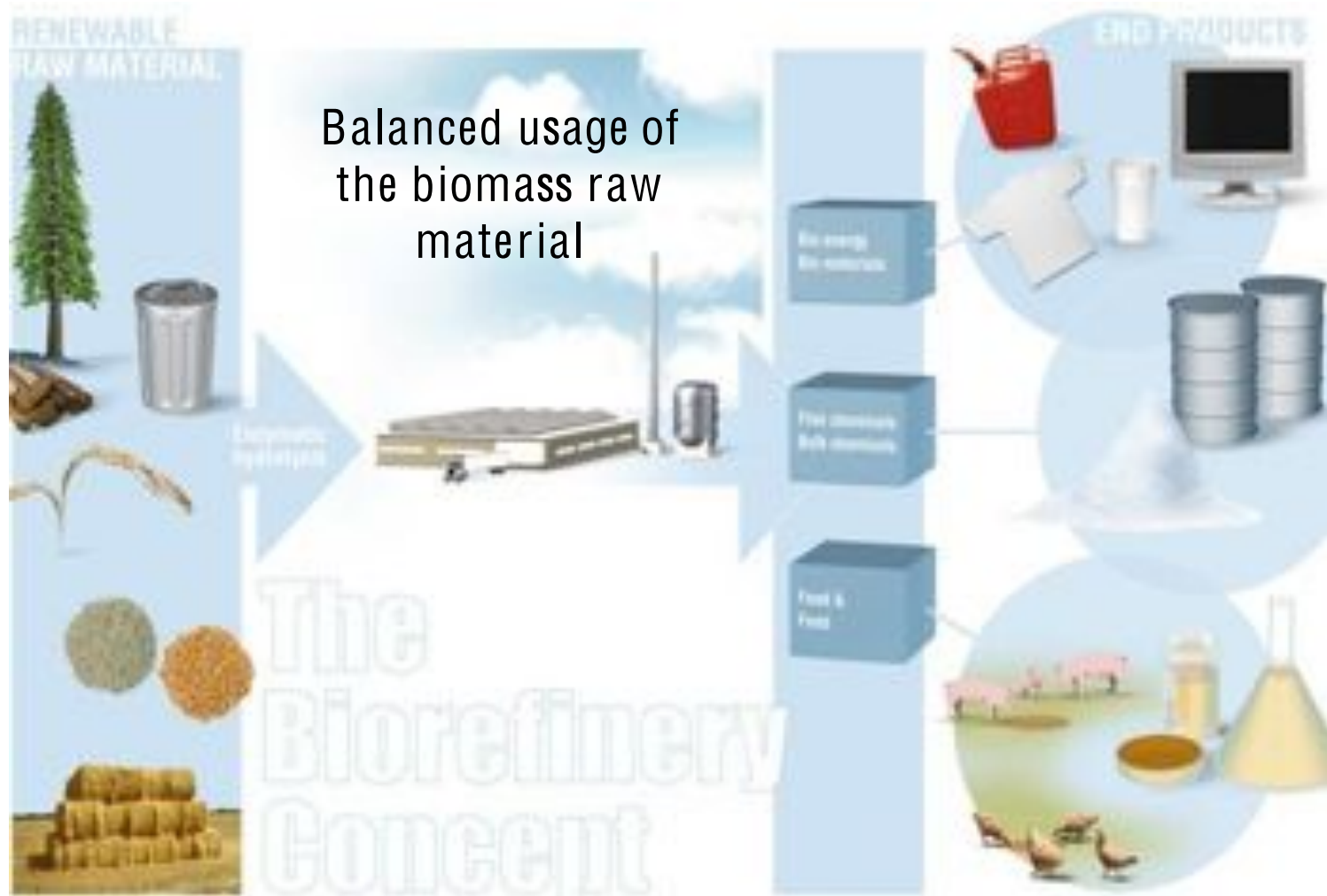
Bio-economy

- The bioeconomy refers to the **sustainable production and conversion of biomass** into a range of food, health, industrial products.
- The sustainable bioeconomy will help deliver global food security, improve health products, create smart bio-based products and help agriculture, forestry and other ecosystems **to adapt to climate change**.
- A global subject over the past 5 years

BECOTEP programme led to the final report upon the bioeconomy in 2030 :
http://www.plantetp.org/images/stories/stories/documents_pdf/brochure_web.pdf



Bio-economy illustration



Cross fertilisation, brands are driving the business...

- Renewable ressources
- Carbon foot print reduction



Body care



Coatings



Sport



Bolle

Materials



Un bioplastique pour des étuis d'iPhone



Automotive



Packaging



Oil extraction



Du bioplastique dans le yaourt

Danone est passé au bioplastique PLA Ingeo pour les pots de ses yaourts Activia en Allemagne. Cet emballage est le résultat d'une étroite collaboration entre Danone et Nature/Works, producteur d'Ingeo. Cette substitution va permettre d'améliorer l'empreinte carbone de ce produit de 25 % et de réduire de 43 %

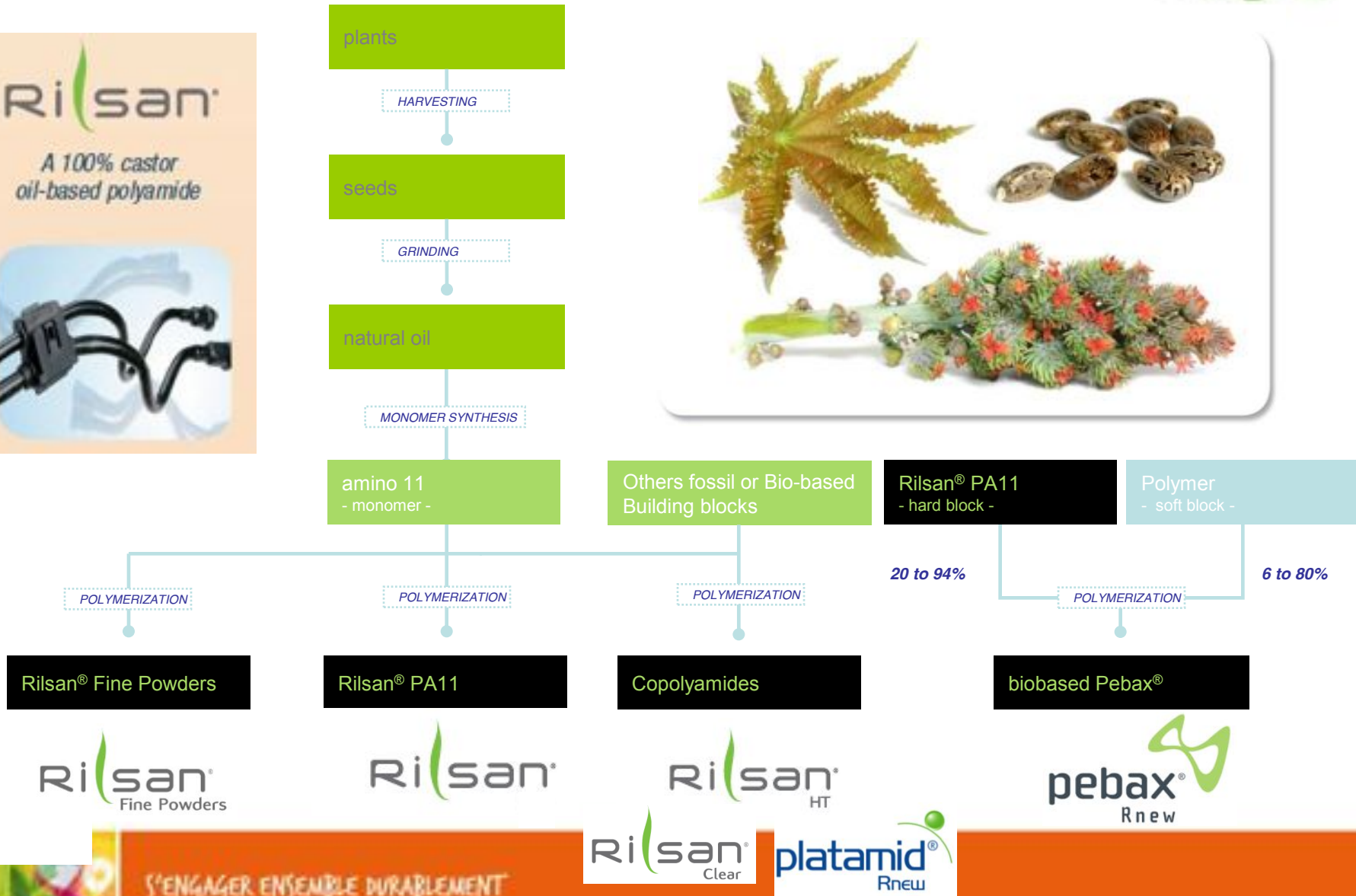
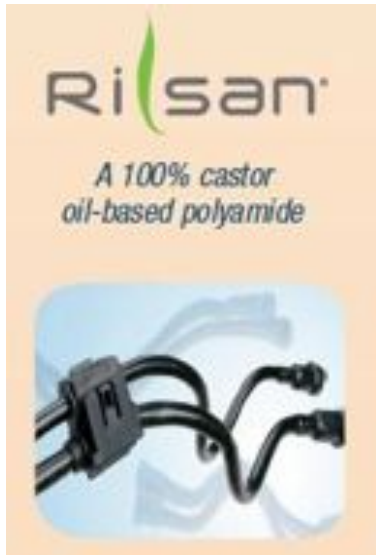


l'utilisation de ressources fossiles pour ce type d'emballage, selon une analyse du cycle de vie (ACV) menée par l'Institut pour l'énergie et la recherche environnementale d'Incidéo (IFEU).

S'ENGAGER ENSEMBLE DURABLEMENT

Credit Photo : Magazine Formule verte

Arkema castor oil chain for Rnew



Oleochemistry function

Surfactants



Fonctions des tensioactifs

- Le tensioactif ou l'obsession des interfaces...
- **La capacité des tensioactifs à diminuer les tensions de surface ouvre la voie à une multitude de fonctions:**
 - *détergents : ils facilitent l'élimination des salissures et leur dispersion dans l'eau*
 - *dispersants : ils augmentent la stabilité de suspensions de petites molécules solides dans un liquide*
 - *émulsionnants : facilitent la dispersion sous la forme de fines gouttelettes d'un liquide dans un autre et en augmentent la stabilité*
 - *mouillants : favorisent l'étalement d'un liquide sur une surface solide ou augmentent sa vitesse de pénétration dans des corps poreux (coton, cuir, papier...)*
 - *moussants ou antimousses : provoquent ou empêchent la formation de mousse*
 - *solubilisants : augment la solubilité apparente dans l'eau de corps peu solubles*

D 11



La tension de surface empêche l'huile et l'eau de se mélanger



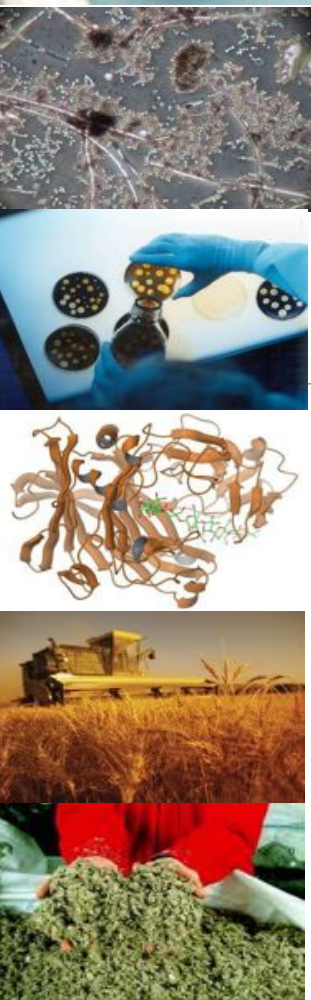
A structuring environment toward more and more biobased products



- France is a cutting edge country for biobased chemistry : ACDV, CSF, ADEME bio-based chemistry roadmap, PIPAME...
- European approach : LMI, Horizon 2020, KBBE, PPP ...
- Worldwide investments



Resources: OK✓



- Europe has a huge potential for biomass (arable land, excellent agricultural sector)
- Europe has a highly educated and skilled population
- Europe has excellent R&D facilities and universities

Infrastructure: OK ✓

- Chemical industry in Europe is well organized
- Logistics are in place:
 - harbors
 - river & railway transport
 - pipelines

⇒ We need to find a way to optimize transport of biomass and build refineries that can process biomass



Bio-Based Economy has a lot to offer to the EU!

Benefits for rural areas:

- New markets for farmers
- New, green jobs in bio-refineries
- New opportunities for rural economies

Benefits for the EU:

- Securing high level jobs, R&D capital in EU
- Lower dependency on oil-producing countries
- Opportunities for new member states

Benefit for the planet:

- Renewable substitutes for fossil feed stocks
- Opportunities to slow down climate change



What's The Opportunity? e.g. Europe's Rural Areas



- Number of farms in France decrease
- Economic perspective not promising
- Farmers forced to seek alternative sources of income



We have advantages, but we are not alone...

Brazil, China and the US are making significant public investments in bringing biorefineries to commercial scale

US

- High targets for the replacement of fossil transportation fuels
- Wide range of support schemes including grants, tax credits, loan guarantees, etc
- Focus: bioethanol
- Public support last 5 years: ~ € 1.2 billion

EU

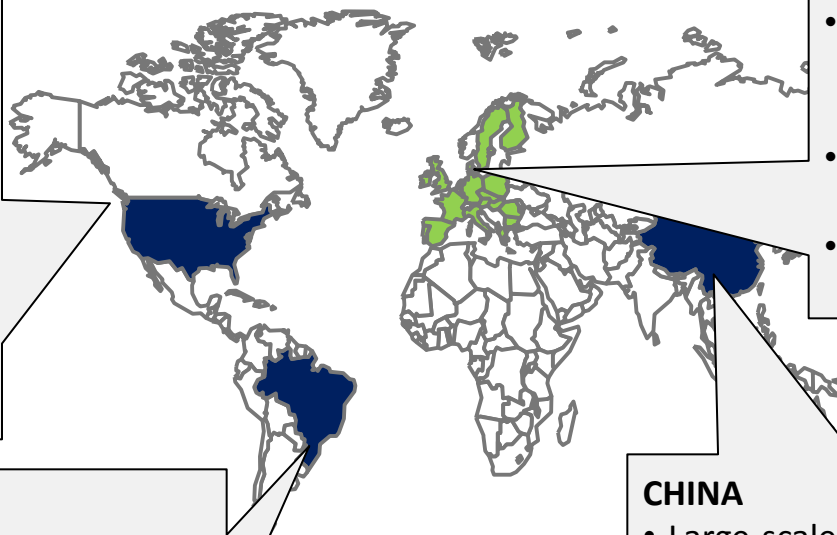
- High targets for the replacement of fossil transportation fuels
- Focus: biodiesel/ biochemicals
- Public support last 5 years¹: ~€ 200 million

BRAZIL

- World leading first generation biofuel production
- Some commercial 2G bagasse refineries in operation
- Aggressive government growth targets for bioethanol by 2025

CHINA

- Large-scale investment in biorefineries
- Plan to substitute 20% of crude oil imports by 2020
- Target of 1.7bgly ethanol by 2010



The recommendations developed by the Ad-hoc Advisory Group for Bio-based Products in the framework of the EC's LMI

- Legislation promoting market development
- Encourage GPP for bio-based products
- Standards, labels and certification
- Financing and funding of research

A 2007 report still under implementation



Innovating for Sustainable Growth: A Bio-Economy for Europe



- ▶ Time frame 2014 – 2020
- ▶ Overall amount for Horizon 2020: € 80,2 billion
- ▶ Bio-Economy and agri-food research the only area with an already allocated amount of € 4.5 billion



S'ENGAGER ENSEMBLE DURABLEMENT

The French vegetal based chemistry Association



The ACDV, a cutting-edge structure which for the first time brings together industrial companies in the chemical and agro-resources sectors.

Players in the chemical and agro-resource fields have become aware of the benefits of pooling skills, know-how and resources in the same structure to give bio-based chemistry every opportunity to develop successfully in Europe.



ACDV Members in May 2012



AJINOMOTO



Made in
Chimex



SOFINNOVA



usipa



S'ENGAGER ENSEMBLE DURABLEMENT

Our project

C ommunication &

L obby at a

E uropean level to

A dministrations and

R egulatory affairs



Bio-Economy

Turnover and Employment 2009



~ 3 % of the global chemistry sales are biobased
Global biobased products market is estimated to roughly 50-70 billion €,

Sector	Annual turnover (billion Euro)	Employment (thousand)	Data source
Agriculture	381	12000	COPA-COGECA, Eurostat
Food	965	4400	CIAA
Paper/Pulp	375	1800	CEPI
Forestry/Wood ind.	269	3000	CEI-BOIS
Fisheries / Aquaculture	32 (2005)	400 (2005)	EUROSTAT
Bio-based products			
• Chemicals and plastics	50 (estimation*)	150 (estimation*)	USDA, Arthur D Little , Festel, McKinsey , CEFIC
• Enzymes	0.8 (estimation*)	5 (estimation*)	Amfep, Novozymes, Danisco/Genencor, DSM
• Biofuels	6	150	EBB, eBio
Total	2046	21505	



France is ahead with 10 % of biobased products in the chemical industry



- **French and European targets**

2007: Grenelle de l'environnement : The chemical industry in France was using 7% of renewable raw material and decided to target 15 % in 2017

2008 : Europe target to reduce from 20 % the greenhouse gaz (GHG) emission in 2020

➤ This ambitious target will be reached thanks to industrial investments and strenghteness of public support for innovation policy



ACDV estimates a 16% penetration of biobased chemistry in 2025



- 20 % of the polymers, commodity and specialty (38 Mt de carbone par an) ;
- 6 % of platform molecules (6,6 Mt de carbone par an) ;
- 20 % of the specialties and fine chemistry (20 Mt de carbone par an).

Thus, a total penetration rate for biobased products of 16 % overall (upon the 400 Mt of carbon used today globally by the chemical industry)

Depending on the following factors :

- ✓ Radical innovation
- ✓ Investments support
- ✓ Biobased and fossil chemistry partnership



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Source : La chimie du végétal, fer de lance de la chimie durable, ACDV

L'Association Chimie du Végétal

Various working group to build a favorable frame



GE Standards

GE Life Cycle Analysis

GE Economic intelligence

GE Advocacy

GE Communication

GE Biopolymers



S'ENGAGER ENSEMBLE DURABLEMENT

To accelerate the biobased chemistry growth, And to reduce the time-to-market

Thanks to public authorities support

INNOVATION

① In progress

➤ Major Financial Initiatives:

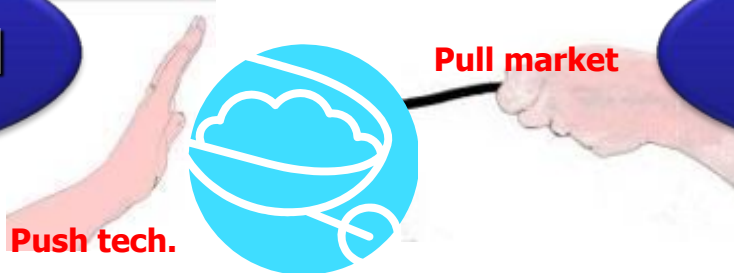
- IEED: IFMAS, INDEED and PIVERT
- ADEME industrial demonstrators

➤ Technical centers

➤ FP7, Horizon 2020, ppp

② To create

- European support for the first industrial units



MARKETS

① In progress

- Implementation of an acknowledged bio-based product indicator

② To create

- Rapidly adopt LMI recommendations
- Tax incentive mechanisms (e.g.: Tax Credit Production under discussion in the US)



Actions phares en 2011



450 personnes
30% d'étranger (18 nationalités)
50% d'industriels

Ouvrage collaboratif : Chimie du végétal,
Fer de lance de la chimie durable



Représentation de l'ACDV
au niveau international

(BIO, RRB...)

Animation du
Groupe chimie du
végétal du CSF
chimie et
matériaux

Contribution à la
rédaction de la
Feuille de route
R&D de la filière
Chimie du végétal
de l'ADEME



ACHEMA 2012

18-22 juin 2012

Joint event :

DECHEMA, ACDV, FNR, ERRMA, IAR, UIC

“European Innovation Partnership Bioeconomy: From Knowledge via Demonstration to Products and Markets”

- Towards a European Bioeconomy and Horizon 2020: the framework
- Agricultural Perspectives of BioEconomy
- Industrial perspectives
- Etc...

ACHEMA 2009 Exhibition in review

3,800 exhibitors from 50 countries
175,000 visitors from 100 countries
30,000 executives

ACHEMA Congress 2009 in review

27,000 participants
900 lectures



Retrouver le programme provisoire sur www.chimieduvegetal.com



Exhibition and
congress

May 2012

PLANT BASED SUMMIT

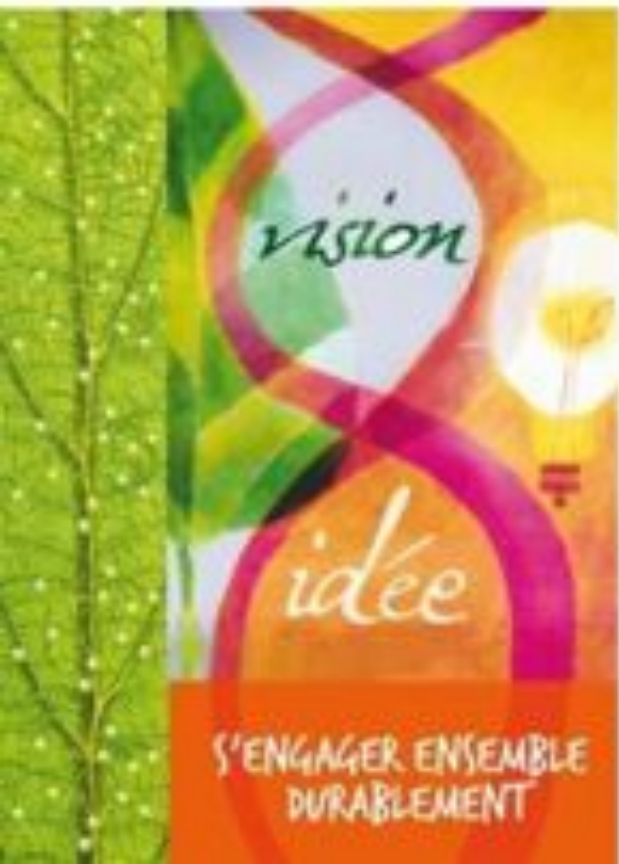
25-26 SEPTEMBRE 2013

Grande Halle de la Villette



Plant based chemistry

A key stone in the chemical industry mutation



Merci de votre attention

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