Mapping of EU Member States' / regions' Research and Innovation plans & Strategies for Smart Specialisation (RIS3) on Bioeconomy

Task 3

Case Study Report Hauts-de-France (former regions Nord-Pas-de-Calais and Picardie), France

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1. Short Regional Bioeconomy Profile

Name of the case region/country	Hauts-de-France	
	Nord-Pas-de-Calais	Picardie
Member State	France	France
GDP – Euro per capita (2014)*	25 700	23 700
Total ESIF Research & Innovation per capita per year*	6.51	8.05
Total H2020 per capita per year*	3.02	2.47
Value Chain Approach to the Bioeconomy**	Bio-based products Bioeconomy R+I and Technology Support Biomass processing and conversion	Biomass supply and Waste
Thematic Focus of the Bioeconomy Approach**	Agro-Food Other bio-based Industries	Bio-based Fuel and Energy
Research and Innovation Fields highlighted for the Bioeconomy**	Biology, Biotechnology, Chemistry, Life Sciences, Nano Technologies Logistics and Packaging, Processing	Biology, Biotechnology, Chemistry, Life Sciences, Nano Technologies Primary Production with quality Advanced Manufacturing, Machineries
Bioeconomy Activity Level**	High	
CASE STUDY SUMMARY		
Bioeconomy Approach	Complementary approaches between the two regions: primary transformation in Picardie and creation of advanced products from chemistry in Nord-Pas-de-Calais (NPdC)	
Bioeconomy Ecosystem	Important network of stakeholders structuring the territory and involved since 30 years in bioeconomy activities.	
Bioeconomy Policy Support	Bioeconomy strategy is still under development but two main clusters (IAR and MATIKEM) are driving the economic activities in the region. They are supported by ESI funds (ERDF and EAFRD) and national contribution.	
Successful initiatives and Good Practices	Two main facilities: IFMAS and PIVERT platforms and the Bio-based Plant Summit	
Main Needs, Gaps and Bottlenecks	Three main factors influencing bioeconomy development: competitiveness with fuel-based products, dependency on private sector activities and international contexts driving, as external factors, the local development conditions.	

* Source of the data: S3 – Regional Viewer: http://s3platform.jrc.ec.europa.eu/synergies-tool

** Data collected by this Study project in Task 1.

2. Regional Bioeconomy Ecosystem

2.1 Origin of Interest of the region in the Bioeconomy

Hauts-de-France (HdF) region is the new region encompassing the former regions Nord-Pas-de-Calais (NPdC) and Picardie, merged in the last national territorial reform[1]. These two ex-regions have a long cooperation experience notably in bioeconomy sector. Their common strategy on bioeconomy is explained by inner factors, as well as the national and international economic and policy context.

2.1.1 Inner assets and characteristics of the territory structuring bioeconomy at local context

By observing the typology of land use, we can clearly identify an important agricultural holding in the region which is confirmed by the first place in France in the production of potatoes soft wheat, industrial beet and fresh vegetables and the third producer in cereal. Moreover, the territory is already endowed with 28% of the national bio-based related workforce. Then, 6,500 direct jobs in the region are working for chemical sector that demonstrate the potential of bioeconomy in research and innovation[2].

A network of stakeholders and structures connecting the territory to bioeconomy complete these basic agriculture assets. Two significant clusters are present in the region "the Industries & Agro-Resources" (IAR) performing in agro-resources and the cluster "Materials, innovation and green chemistry pole" (MATIKEM) focusing on green chemistry.

The bioeconomy is perceived in the regional master plan[3] of NPdC as 'The third industrial revolution'.

2.1.2 An economic development based on zero fuel economy influenced by international and national contexts

Beside the important involvement of private and industrial partners in bioeconomy, the common regional vision for the development of this sector is related to a broader national objective[4] of reduction of fuel-based materials used in all sectors:

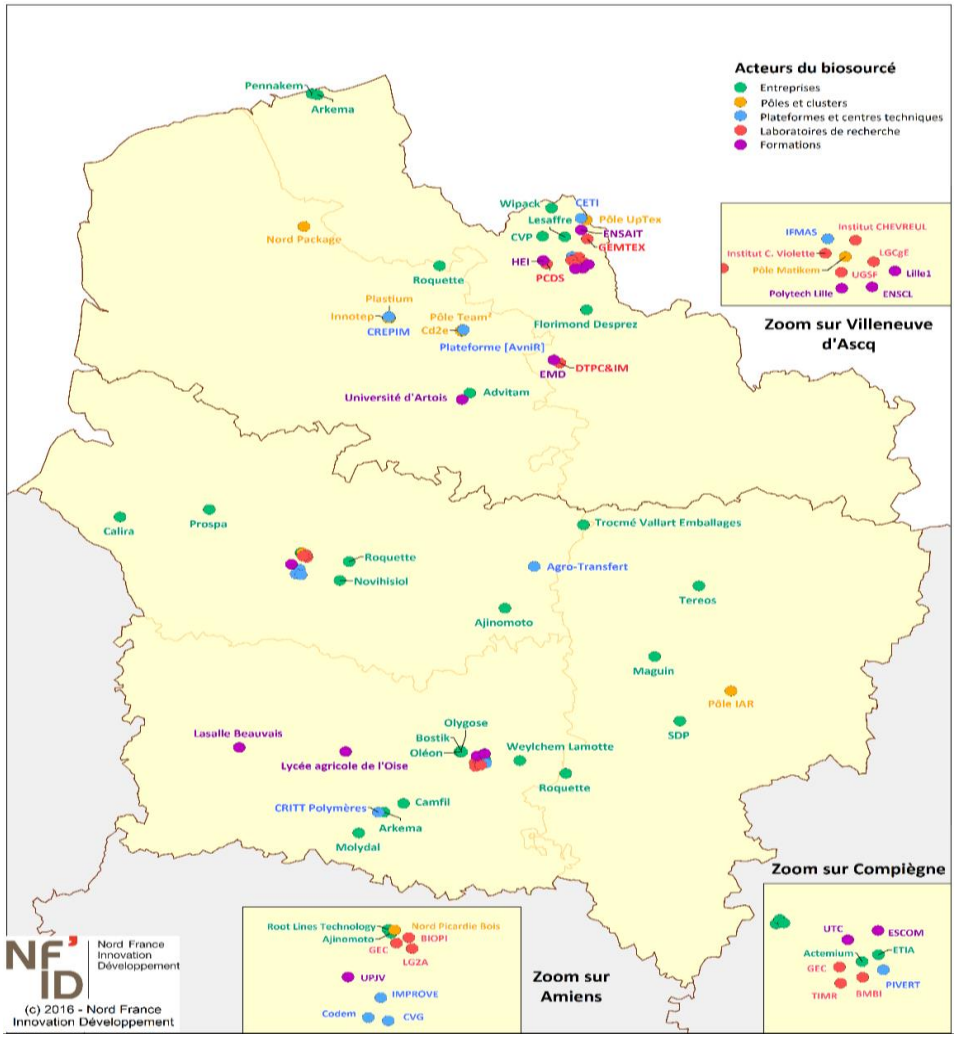
[1] Law 2015-29 of 16 January 2016 laying down the new delimitation of regions in France.
[2] Région Nord-Pas-de-Calais - Picardie - Powerpoint presentation 'Le Biosourcé en Nord Pas de Calais - Picardie' (Bio-resource in Nord-Pas-de-Calais - Picardie) only in French
[3] TIR Consulting Group LLC (2013), 'Nord-Pas-de-Calais - La troisième révolution industrielle - Master Plan' (The third industrial revolution in Nord-Pas-de-Calais)
[4] Ministère de l'Agriculture de l'Agroalimentaire et de la Foret (2016), 'Construire une stratégie nationale pour la bioéconomie ('Build a national strategy for bioeconomy) French only

textile, energy, packaging, construction, transport… this vision is part of the Paris Agreement of the COP21 conference[5].

2.2 Bioeconomy Stakeholders

The bio-economy stakeholders are spread all around the regional territory.

Figure 1 - Map of stakeholders involved in agro-based field of Hauts-de-France region



Source : Nord France Innovation Développement - 2016

We can identify five types of partners working in bioeconomic activities mostly from the private sector which is the most active typology of actor in the sector. One type refers to educational centres. The other four types are described below.

[5] http://www.cop21.gouv.fr/en/les-mots-de-laccord/

2.2.1 Industrial companies

The region HdF counts 28 private players with a worldwide relevance working in bioeconomy sector. The main international groups with regional settlements are Ajinomoto[6] (production of amino acids), Arkema[7] (ink, painting and coating production) and Roquette[8] (biorefinery activities).

Ajinomoto reuses the fermented raw materials from agriculture to produce fertilizers; while Arkema is specialised in adhesives, coatings and resins; developing alternative products based on vegetable and renewable materials. So far, the group developed techniques and products related to biobased polymers, substances and additives used for varnishes, inks, coatings and adhesives. The latter, Roquette, transforms starch, as raw material, to produce food, pharmaceutics, paper and packaging, chemicals and products related to animal nutrition.

2.2.2 Technological centres and platforms

There are 10 relevant specialized technological centres and platforms in the region, providing a technical support for the development of innovative bioeconomy-related products. The most significant ones are the following:

- IFMAS[9] (French Institute of agro-based materials) a public-private R&D organisation specialised in chemistry and materials (academics working together with private partners). The structure works on bio-material sources, synthesising molecules (polymers) to produce bio-based additives, as well as developing new environmental-friendly materials (e.g. thermoplastic and coating).
- I.M.P.R.O.V.E.[10] (Mutualized Institute for Plant-Based Proteins) is dedicated to the proteins valorisation in a European context.
- PIVERT[11] (Picardie Plant Innovations Teaching and Technological Research) works on renewable raw materials, produced from oleaginous seeds principally.

2.2.3 Research laboratory and education structures

13 research laboratories are distributed in the region; one out of them, Institut Chevreul, is a federation of laboratories (CNRS, University of Lille, National Academy

[6] http://www.ajinomoto.com/en/
[7] http://www.arkema.com/en/
[8] http://www.roquette.com/
[9] https://www.ifmas.eu/
[10] http://www.improve-innov.com/
[11] http://www.institut-pivert.com/

of Chemistry, INRA) gathering 330 researchers around materials and molecular chemistry research activities.

The academic network is well distributed among the 15 institutions of the region. The offer of education related to bioeconomy concerns either short education term or master degree and engineering diplomas. Most of the universities are regrouped in the surrounding of Lille where masters and engineering educations related to chemistry are proposed.

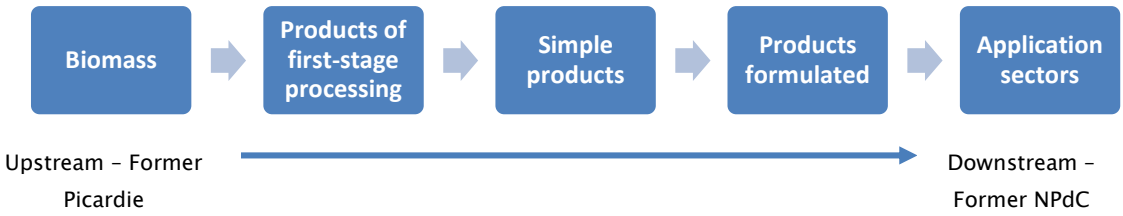
2.2.4 Clusters

The regional players in the bioeconomy sector listed above are structured in competitiveness clusters. These clusters group in a specific area private companies, research laboratories and universities working on a specific R&D field. The main regional clusters are the following:

- IAR Cluster (The Industries & Agro-Ressources), one of the European reference for industrial transformations of agri-resources, as well as biorefinery activities;
- MATIKEM Cluster (the former Materials and Applications for Sustainable Use Cluster (MAUD)) is specialised in material, chemical and green chemical industries. The developed materials are used principally for eight industrial sectors: tableware, packaging, graphical industry, plastics processes, agri-food, transport, construction and medical;
- UP TEX Cluster works on textile eco-materials;
- Pole team^2 Cluster develops bio-based materials, from recycling, for the construction sector;
- Other clusters are: Cd2e, Innotep, Nord Package, Nord-Picardie bois and Plastium.

2.3 Bioeconomy – strategies, plans and projects

The early collaboration in the field of bioeconomy between the two previous regions forming the newly HdF has led in the field to a complementarity of their actions and strategies. Upstream the supply chain, territories in Picardie are oriented toward the transformation of raw products from agriculture into fibre, cellulose and resins and other primary products, while NPdC has focused on more sophisticated processes of production, introducing a second level of transformation, leading to the development of more complex molecules or materials in packaging, transport and cosmetics sectors.


Biomass
Products of first-stage processing
Simple products
Products formulated
Application sectors
Upstream – Former Picardie
Downstream – Former NPdC

3. Bioeconomy Policy Support

3.1 General support framework

In the region, despite the favourable socio-economic context as described previously, there is no official strategy in bioeconomy. However, it is worth noting that bioeconomy is part of some priority axis of the RIS3 strategies approved in the two former regions Picardie and NPdC.

RIS3 strategy of Picardy region dedicates a specific axis to bioeconomy 'Bioeconomy and territorial biorefinery', split in two specific objectives. The first specific objective plans to develop agro-industry and vegetal-based chemistry, supporting R&D activities, industrial demonstrators and promoting start-ups (in their early development phases). The second specific objective is dedicated to biorefinery and methanisation technologies. In Picardie, the key structures driving the strategy in bioeconomy are IAR Cluster, PIVERT and I.M.P.R.O.V.E. research centres.

In NPdC, there is no specific priority axis dedicated to bioeconomy in RIS3 strategy, however bioeconomy is mentioned in the document within the sections related to materials and chemistry and indirectly when considering textile, polymers and composite materials. Two axis address more specifically the issues related bioeconomy, i.e. the "Chemical, Materials and Recycling" axis and the axis "Energy". The first axis focuses on the product life-cycle and promotes the development of more sustainable materials and associated processes. Three orientations are contributing to the axis: R&I in chemistry and materials, innovation in advanced textile materials, and recycling and valorisation of materials. The second axis "Energy" considers bio-based renewable materials - biomass, wood and marine elements- as potential sources of future energy.

3.2 Bioeconomy Policy Support

The bioeconomy policy in HdF region is mainly developed through two national clusters "Pôles de compétitivité"[12] located in the region, i.e. IAR and MATIKEM, both with European-scale ambitions though with different stages of development. The two clusters support either the development of new technologies and joint related projects and provide their members with financial supports. Sources of financing are mainly Horizon 2020 and ERDF. The specificities of the clusters are described in the table below.

[12] Launched in 2004, the French industrial policy aimed to identify the key factors of the territory that prone innovation, employment growth and lead market. (http://competitivite.gouv.fr/politique-des-poles-471.html)

Table 1: description of IAR and MATIKEM clusters

	IAR	MATIKEM
Date of creation	2005	2014 (former MAUD cluster created in 2005)
Number of members	200 members	87 members
Financing figures	Since 2005, 183 projects were financed and €1.417 billion were unblocked	Since 2005, 80 projects were financed by €130 million (the total budget was €273 million)
Level of influence	- European reference (especially for biorefinery activities) - Collaboration for the development of a European intercluster with UK, NL and DE	- National reference - Involved in European projects (TANDEM, SYNAMERA, ERICA, ADPACK)
Field of bioeconomy	Biorefinery	Materials, Chemistry and vegetal-based chemistry
Strategic activities	- Agro-materials - Bio-molecules - Biofuel - Ingredient (from biomass and agro-industries) with a specific focus on biorefinery or vegetal refinery	- Master of new properties and functions of materials - Eco-conception of products - Vegetal-based chemistry - Advanced and performing process

Source: http://matikem.matikem.com/ and http://www.iar-pole.com/

3.3 ESIF and H2020 resources for the Bioeconomy

Both Picardy and NPdC apply ERDF funding to implement bioeconomy-related objectives envisaged by their 2014-2020 RIS3 strategies. In both cases, TO 1 'Strengthening research, technological development and innovation' is combined with TO 4 'Supporting the shift towards a low-carbon economy in all sectors' to support RIS3 strategy bioeconomic projects.

Furthermore, for Picardie region, EAFRD is financing bioeconomy by supporting the wood production and exploitation related to renewable energy transformation.

4. Successful Initiatives and Good Practices

In the region HdF several projects, initiatives and instruments have been already undertaken in the last years to boost the bioeconomy sector. Among them, the establishment of the IFMAS Institute focussing vegetal-based chemistry and of the SAS PIVERT company strengthening the regional green chemistry value chain are probably the most remarkable initiatives. A further initiative hosted by the region, producing significant impacts on the regional bioeconomy sector, is the biannual Plant-based Summit. In the chapters below these successful initiatives are detailed

4.1 IFMAS (French Institute of Agro-based Materials)

The IFMAS institute[13] (French Institute of Agro-based Materials) was created in 2012 thanks to an initiative originated from MATIKEM. The idea was to boost French competitiveness in the field of vegetal-based chemistry. In total, 26 stakeholders – universities and industries of the territory – are currently members of the institute.

Its main objective is to develop substitutes to fuel-based materials using vegetal products, especially in painting and plastic sectors.

Different activities are undertaken by the institute contributing to this objective:

- Proposing expertise in vegetal-based chemistry and bio-based materials. The fields of intervention of IFMAS deal with the optimisation of bio-resources (e.g. valorisation of vegetal resins), the synthesis of new molecules and the development of materials such as technical polymers;
- Providing specialised training courses, in collaboration with the university of Lille;
- Taking out patents to exploit the innovation realized by the institute.

Among the main results expected from the institute, note the decrease in time needed for the development of new technologies related to bioeconomy and job creation (5,000 expected over the next coming 10 years).

The initiative was initially funded by the French government under the "*Programme Investissements d'Avenir*" (Investments programme for future)[14]. A first national provision of €30.8 million was disbursed, then completed by €43.65 million euro from EC and regional funds.

[13] https://www.ifmas.eu/en/

[14] This is a programme dedicated to the competitiveness, the growth and the employment in France. http://www.gouvernement.fr/le-commissariat-general-a-l-investissement

4.2 Plant based summit

The 4th edition of the event "Plant based Summit" [15] will be organised in 2017 in Lille. This unique biannual event dedicated to bio-based chemical products will gather for two days more than 700 regional and international stakeholders from the entire plant-based chemical industry value-chain. The industries participating to the event will be mainly related to: cosmetics, plastics, painting, detergents, energy, automotive, civil engineering, agri-foodstuffs, paper, adhesives, lubricants and consumer goods. The main objective of this event is to speed-up the development of bioeconomy activities by gathering companies at the same place working in similar value chains, thus creating the conditions to uptake the technologies presented during the days. Moreover, plant-based summit represents the occasion to explore business opportunities and share information.

4.3 PIVERT (Picardy Plant Innovations, Teaching and Technological Research)

The Energy Transition Institute "ITE P.I.V.E.R.T." [16] aims at developing competitive plant-based chemical products from oilseed biomass, a renewable promising and competitive raw material. The value chain can be illustrated as following:

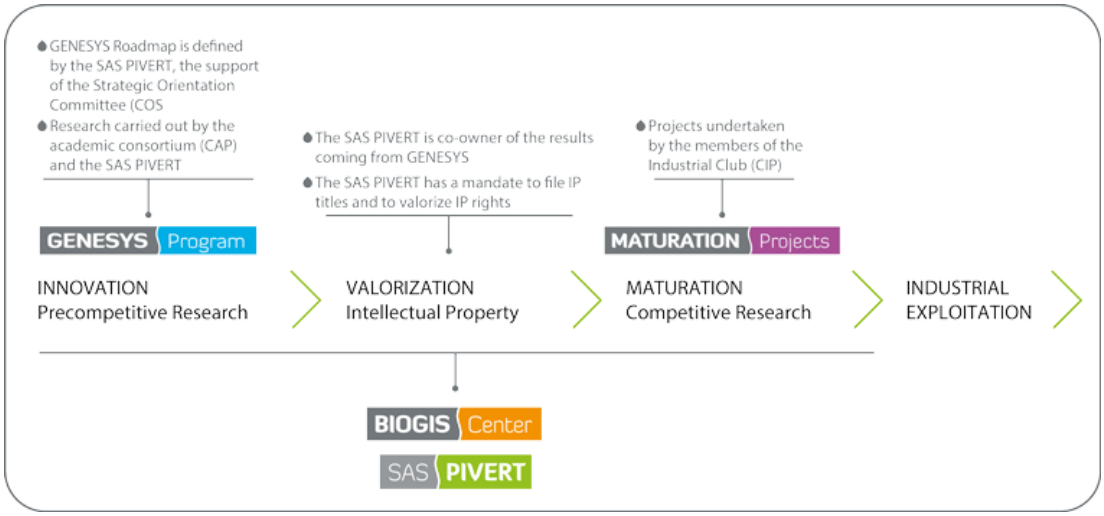
In a first stage, the agro-industrial sector harvests the local oleaginous organisms and plants. In a second phase, the bio-resources are transformed in oil through biorefinery processes. Then additional transformations are performed based on chemistry activities to supply bio-based products. The final products are used in different sectors such as health, chemistry and biofuel.

SAS PIVERT created in 2012 was funded initially by the National government under the "Programme Investissements d'Avenir" for a total of 63.9 million EUR over eight years. The PIVERT strategy includes 4 axes. Local authorities are also financing the equipment for a total of 8 million EUR. 39.8 million EUR of funding is dedicated to the precompetitive Research Programme GENESYS[17], first step of the technological

[15] http://www.bioeconomy.de/ai1ec_event/plant-based-summit-2017/?instance_id=
[16] Picardy Plant Innovations, Teaching and Technological Research http://www.picardie.fr/P-I-V-E-R-T
[17] http://www.institut-pivert.com/genesys/?lang=en

development. A description of the fours axis of the SAS PIVERT strategy is illustrated below.

Figure 2 - Strategic axis of SAS PIVERT



Source: http://www.institut-pivert.com/axes-strategiques-2/?lang=en

5. Needs, Gaps and Bottlenecks to Deploy the Bioeconomy

The future development of bioeconomy in HdF region will depend on a combination of different factors.

Actually the HdF bioeconomy development model is mainly based on private initiatives (i.e. a panel of industries, research centres and clusters from private sector). In a medium term, a more in depth involvement of the public sector, through Public-Private Partnership for example, will have to be promoted to secure the long-term development of the supply-chain.

In a long-term outline, the development of bioeconomy depends mainly on the world fossil-fuel prices. The vegetal-based products are currently much more expensive than the fuel-based products, which prevents the full development of the supply chain. To be competitive, bio-based products need to be turned into high-quality materials with important added value to compensate the large price gap.

Moreover, bioeconomy industries are directly in competition with food industries, to the extent that it is using the same primary agricultural resources (e.g. potatoes and beetroot). It is not unlike that a conflict in the resource use arises in a next future, as the supply cannot be developed on an unrestricted basis, limiting then the development and benefits expected from bioeconomy.

6. Information Sources

Literature and Documents:

- Région Nord-Pas-de-Calais – Picardie – Powerpoint presentation 'Le Biosourcé en Nord Pas de Calais – Picardie' (Bio-resource in Nord-Pas-de-Calais – Picardie) only in French
- Région Nord-Pas-de-Calais – Picardie (2015) – Repères pour la nouvelle région (Points of reference for the new region) only in French
- Région Nord-Pas-de-Calais – 'Stratégie Recherche Innovation pour une Spécialisation Intelligente (SRI-SI) Nord-Pas de Calais 2014-2020' (RIS strategy for a smart specialisation in Nord-Pas-de-Calais 2014-2020) only in French
- Région Nord-Pas-de-Calais – 'Programme opérationnel au titre de l'objectif "investissement pour la croissance et l'emploi"' 2014-2020 (Operational programme under 'Investment for growth and jobs' 2014-2020) only in French
- Région Picardie – 'Stratégie de spécialisation intelligente' 2014-2020 (Smart Specialisation Strategy 2014-2020) only in French
- Région Picardie – 'Programme opérationnel de la région Picardie pour la période 2014-2020 (FEDER et FSE)' (Operational programme for Picardie region for 2014-2020 period ERDF and ESF) only in French
- Région Picardie – 'France – Rural Development Programme (Regional) – Picardie' 2014-2020 only french
- TIR Consulting Group LLC (2013), 'Nord-Pas-de-Calais – La troisième révolution industrielle – Master Plan' (The third industrial revolution in Nord-Pas-de-Calais) only in French
- IFMAS (2015) – 'Rapport annuel d'activité' (Annual activity report) only in French
- MATIKEM (2014) – 'Rapport annuel d'activité' (Annual activity report) only in French
- PlantBasedSummit – 'The biobased Solutions international conference and exhibition – 25-26 April 2017 Lille Grand Palais – France'
- IAR (2014) – 'Rapport annuel d'activité – 2005-2015 10 ans de compétitivité à vos côtés' (Annual activity report – 2005-2015 10 competitiveness years with you) only in French

Relevant websites:

- MATIKEM
  http://matikem.matikem.com/

- IAR
  http://www.iar-pole.com/
- PIVERT
  http://www.institut-pivert.com/
- IFMAS
  https://www.ifmas.eu/
- Plant Based Summit
  http://www.plantbasedsummit.com/?lang=en

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