

Bio-refinery for the winery sector in France: a model of sustainable and circular Bioeconomy

Christophe BONNEMORT (CAVALE), Marine DINGREVILLE (CAVALE), Frédéric PELLENC (FNDCV)

Created in 1921

Ensure the
production,
processing,
sale and
conservation
of agricultural
products



5 business sectors

Supply
(fertilizer, animal feed,
compost ...)

Cereals
(Collection and sale)

Distribution
(5 Gamm Vert)

Oil mill
(Moulin du Sou)

Distillery

- 600 members (mostly winegrowers)
- 17 administrators
- 45 employees
- Turnover (sales): 10 M€

- 1921 : buyout of a private distillery
- 1930 : collection of cereals
- 1950 : supply stores
- 1980 : self-service agricultural stores
- 2008 : olive oil mill



Progressive hiring of employees

COOPERATIVE: GOVERNANCE PRINCIPLES AND BENEFITS

- 1 person = 1 vote
cooperative partner : holds partnership shares
- Sovereign general assembly

Administrators elected for 1 year

- Benefits
 - For the cooperative partner: pooling of resources
 - Storage, logistic
 - Distillery : collective waste management
 - Technical advice
 - For the cooperative :
 - Marketing unions (cereals, wine products,..)
 - SEO and purchasing unions (supply)
 - Pooling of resources

PRESENTATION OF DISTILLATION INDUSTRY

- ❑ Grape marc (between 800 000 and 1 000 000 tonnes/year in France) and wine lees (between 1,2 and 1,8 millions hl), are residues from grapes pressing and winemaking

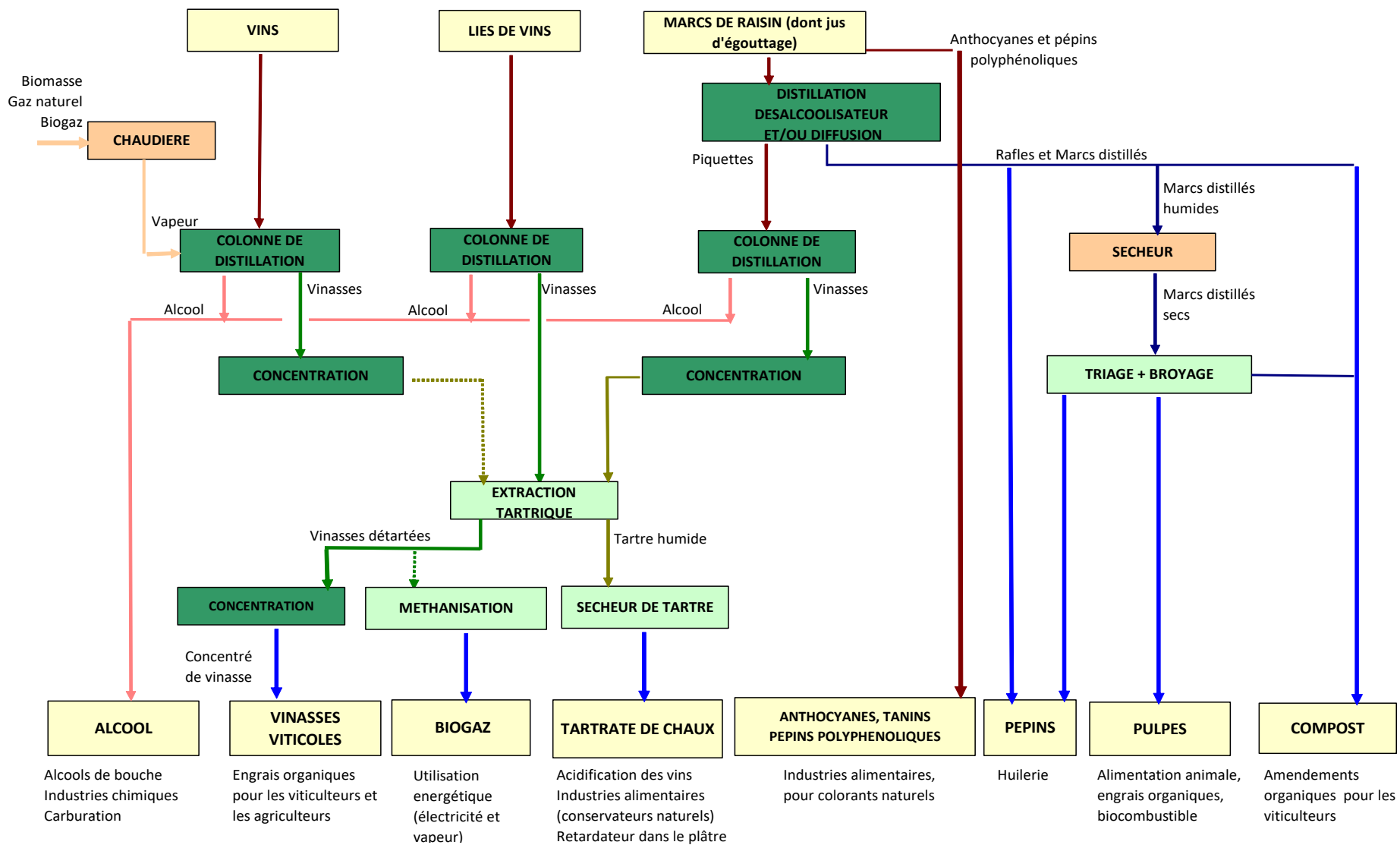
- ❑ Harmful residues for the environment if they are discharged in the natural environment as such :
 - ✓ emanation of Volatile Organic Compounds (VOC)
 - ✓ Release of Chemical Oxygen Demand (COD)
 - ✓ Free-run juices infiltration

- ❑ Almost the totality of grape marc and wine lees are processed by french distilleries. All of them are classified facilities subject to environmental safeguards.

WINE DISTILLERIES: BIO-REFINERIES ACTRESSES OF CIRCULAR BIOECONOMY

According to the plant chemistry roadmap (ADEME), a bio-refinery is « *a complete industrial plant located on the same site implementing processes intended to break down the components of biomass into its various components, in order to obtain intermediate food products and non-food products (chemistry, energy). According to the concept of bio-refinery, the entire bio-resource used must be valued.* »

The distillery processes are outlined below:



AGRICULTURAL OPPORTUNITIES:

- distilled grape marcs NFU 44051
- potassium liquid fertilizer NFU 42001 A11
- compost
- organic amendments
- etc...



FOOD OUTLETS :

- brandies
- tartaric acids (œnology, bread-making...)
- grape pips / oil
- colouring tannins polyphenols (œnology)
- pulp for animal feed
- extracts
- etc...



**COOPERATIVES WINE DISTILLERIES,
UNIONS and subsidiaries**

GRAPE MARCS/WINE LEES/ WINE



INDUSTRIAL OUTLETS :

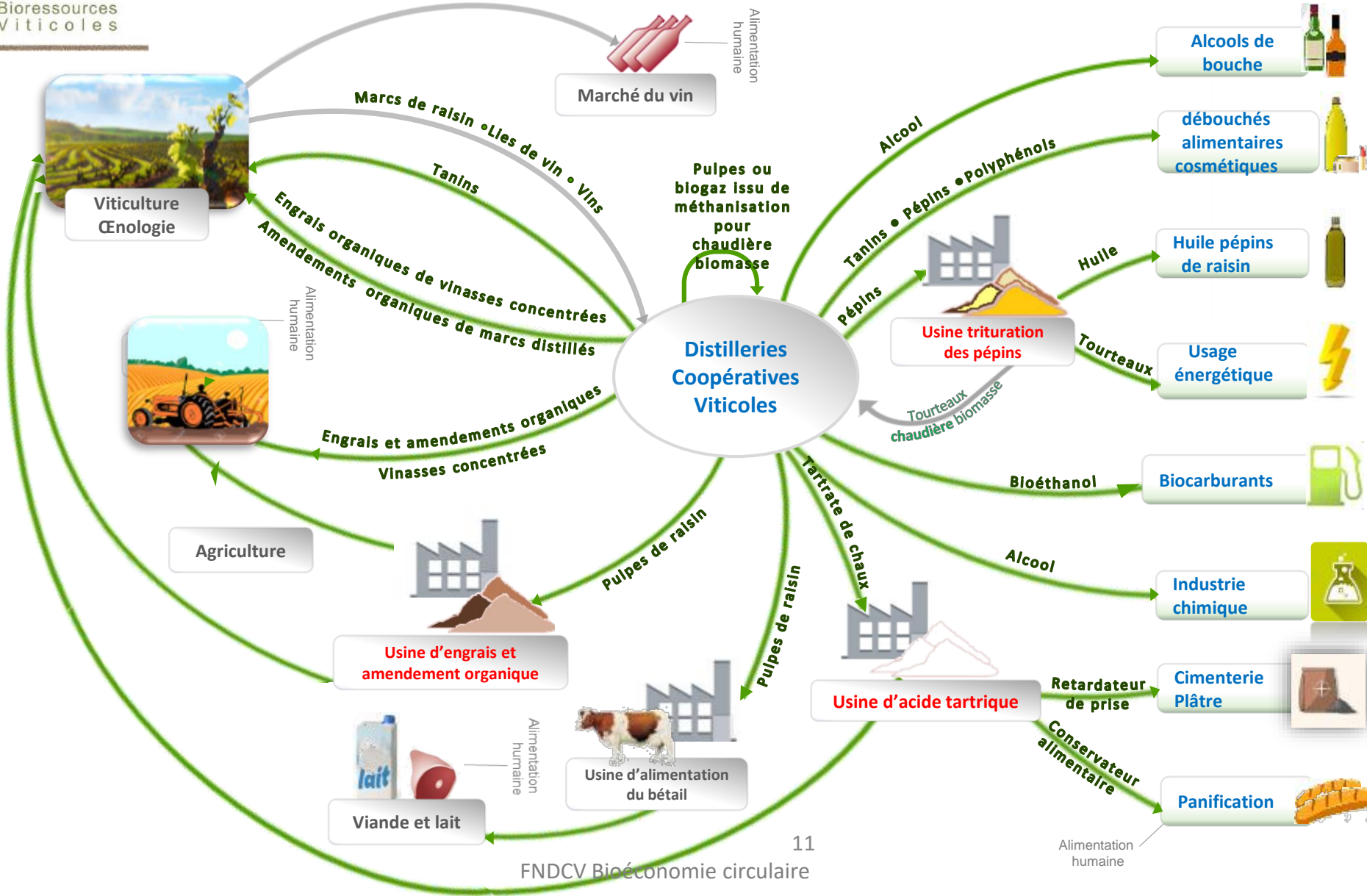
- industrial alcohol + 92°
- white grape pips /Pharmacy
- tartaric lime/retardant plaster
- MARCSIF : ecological glue
- etc...



ENERGETICAL OPPORTUNITIES :

- Methanization distillery residues
- alcohol + 92° → bioethanol
- pulps, pips, oil-cake → biomass boiler
- ED 95 : bioethanol 95% usable in diesel engines SCANIA
- etc...

Les distilleries coopératives viticoles actrices de la bioéconomie circulaire www.fndcv.fr



IV/ A VIRTUOUS SECTOR

A life cycle analysis led by FranceAgriMer and the French Institute of Wine showed that the distillation industry was the most virtuous compared to the other possible treatment pathways.

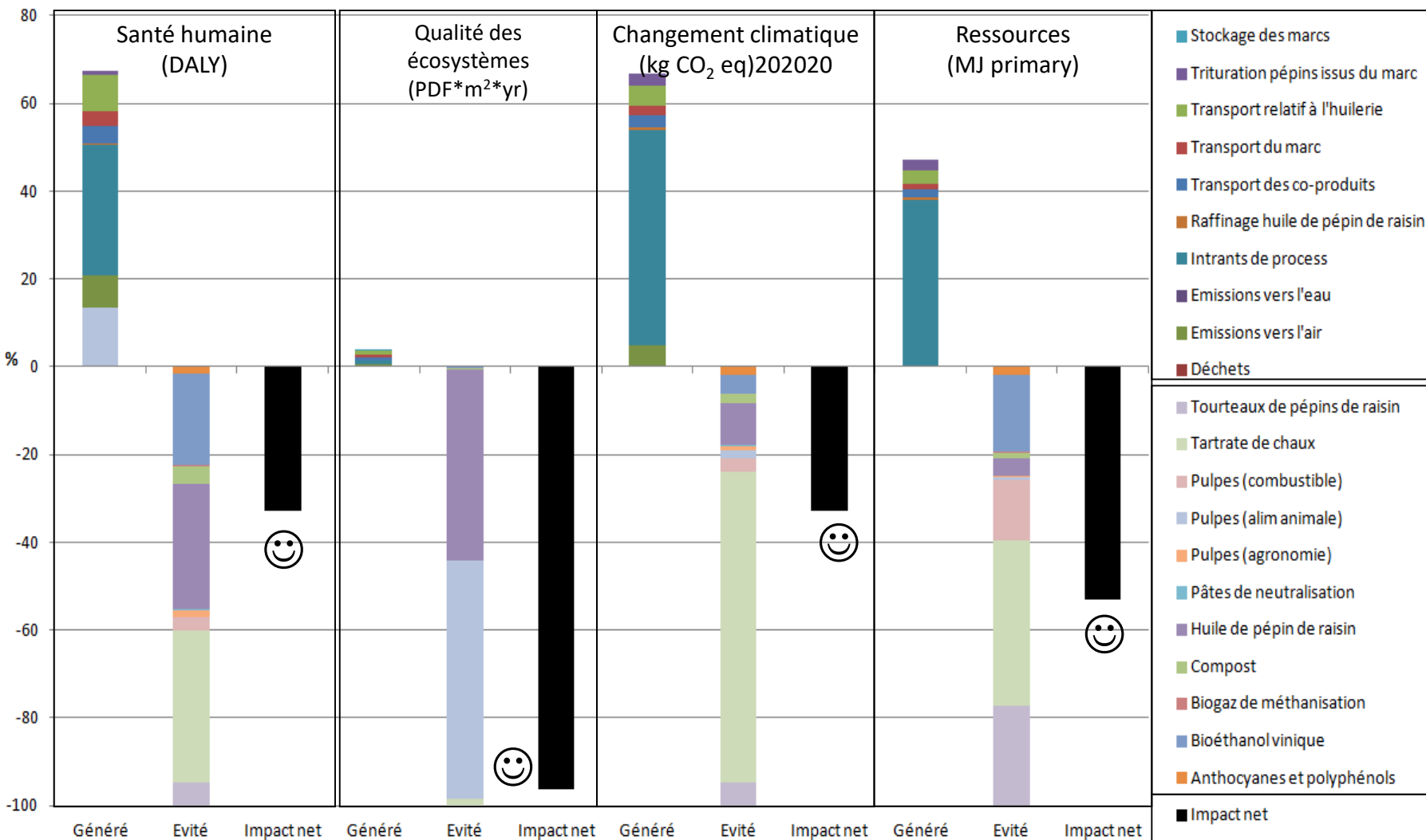
Indeed, distillation chain is the only one for which effects avoid are better than effects generated for 4 criteres : human health, ecosystems quality, resources, climate change, thanks to a lot of co products .

Environnement - Analyse de Cycle de vie

DISTILLATION

Scenario: Grape marc distillation

perimeters: farmers to coproducts sale



BIOETHANOLS VINIQUES AVANCES ISSUS DE RESIDUS

Bioethanol produced with grape marc and wine lees are named advanced bioethanol (annexe IX directive RED 2) which respects durability criteria of this guidance.

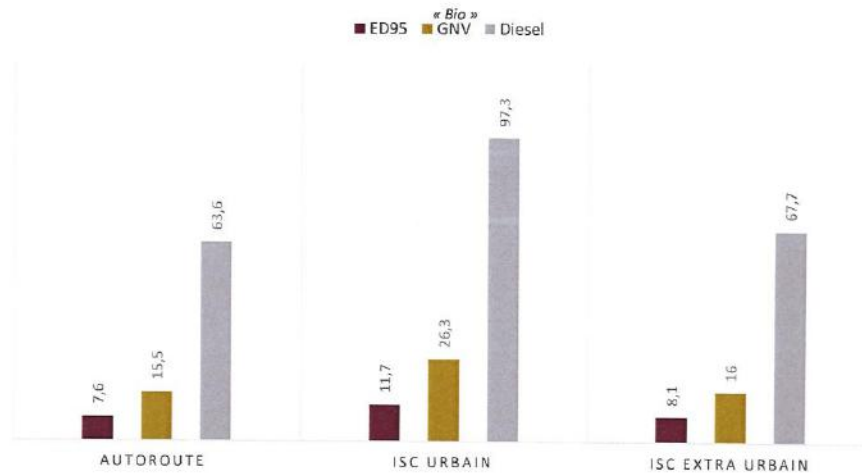
ED95, advanced ethanol, is a biofuel authorized in France in 2016 with specific characteristics :

- Ethanol made with fresh grape marc
- not dehydrated ethanol with additive renewable, used in captive fleets
- Sustainable alcohol.

Un carburant reconnu pour ses performances environnementales

Résultats des tests ADEME – Etude de mars 2018

CO2 KG/100KM DU PUIT À LA ROUE
(SOURCE ADEME POUR LES PONDÉRATIONS)



Carburants fossiles

- Relâchent le carbone depuis les gisements fossiles
- Augmentent le niveau de CO2 dans l'atmosphère

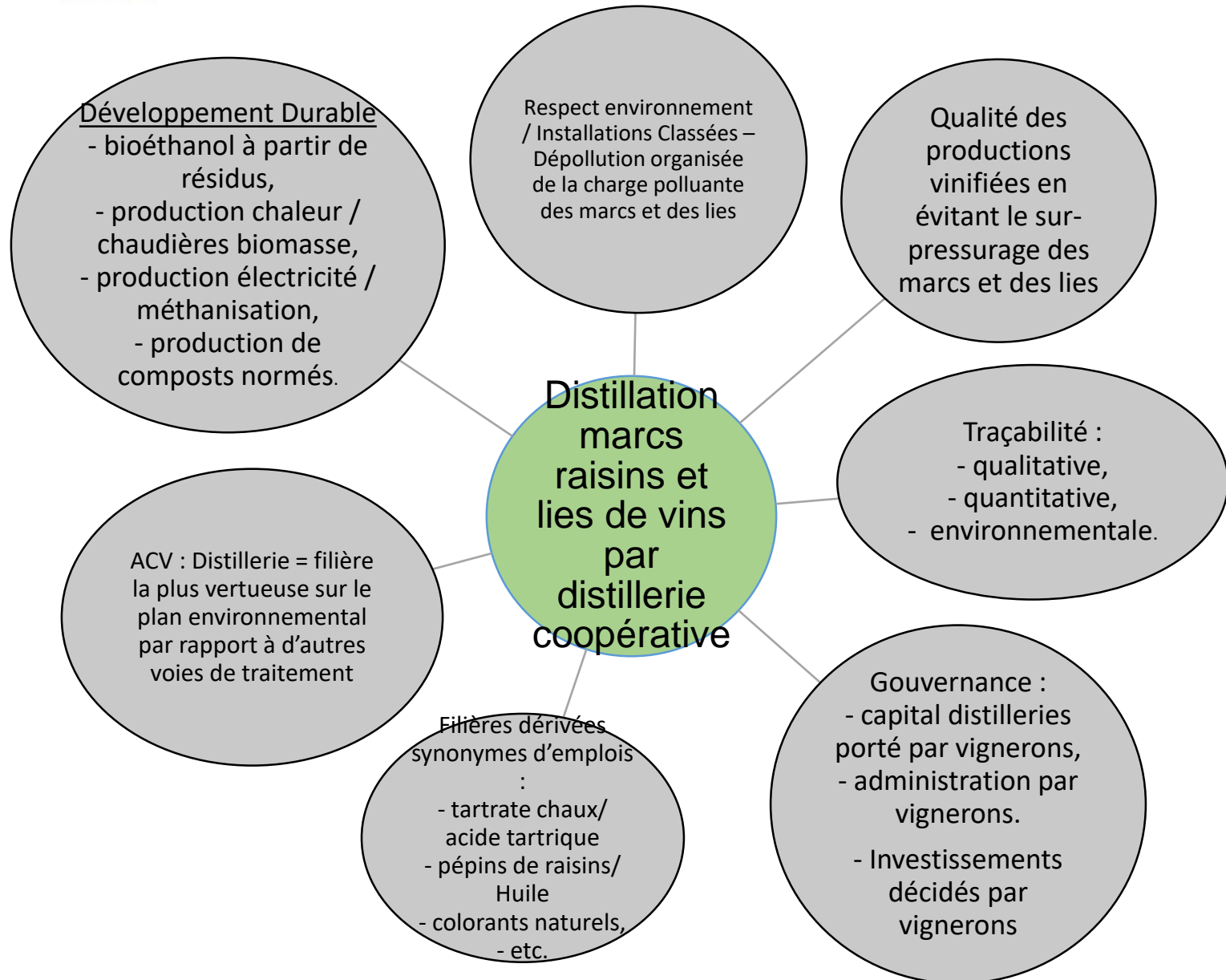


Bio carburants

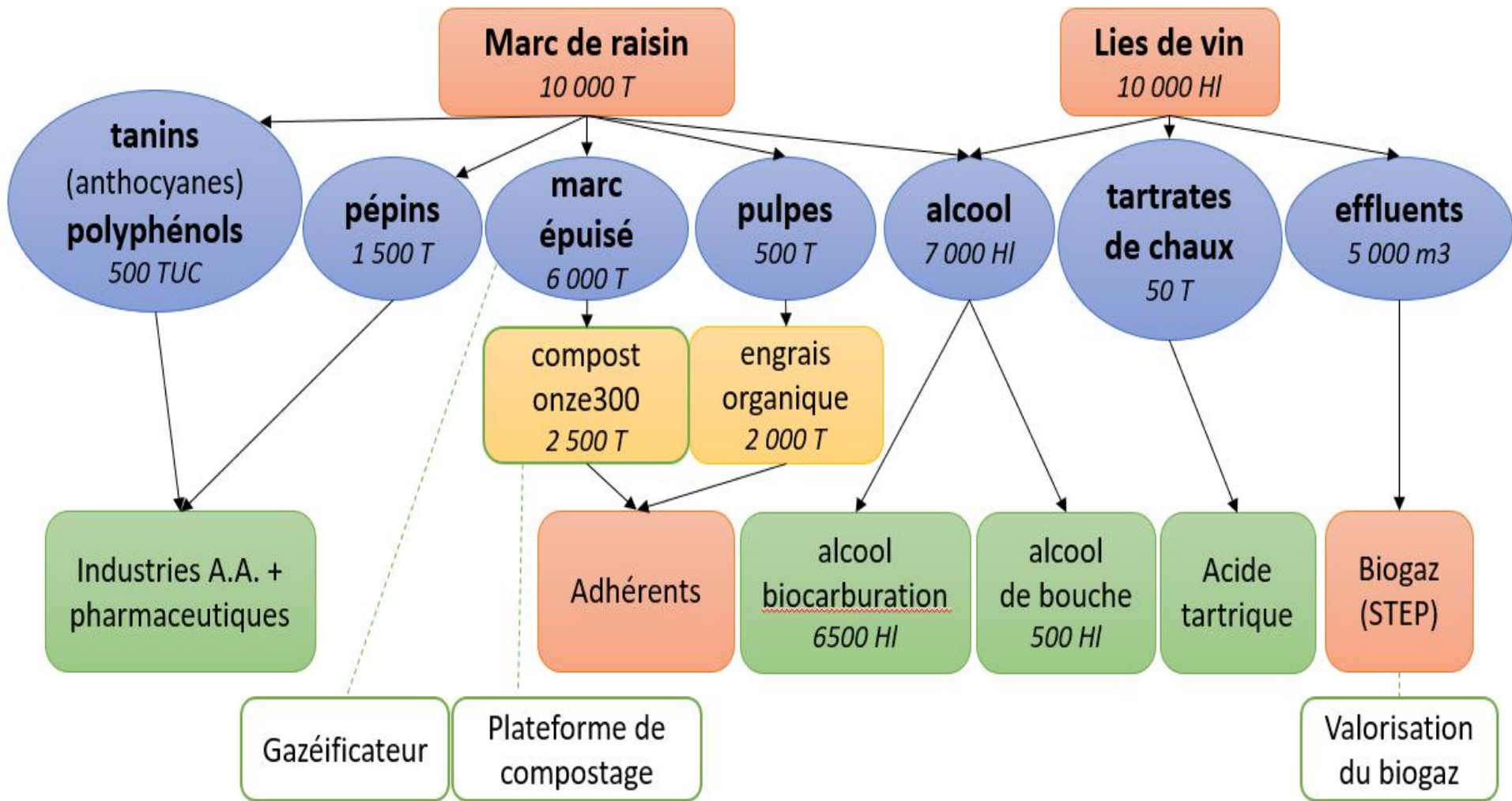
- Intégration au cycle naturel du carbone
- Ne contribuent pas à une augmentation nette de CO2 dans l'atmosphère

ED 95 - bioéthanol avancé
BY RAISINOR FRANCE

WINE DISTILLERY, A BIOECONOMY ACTOR



CAVALE WINE DISTILLERY: A CIRCULAR BIOECONOMY MODEL



HOW TO FACE CLIMATE CHANGE?

- facts:

- with global warming, grape harvest has to be done earlier than before, more or less one month early.
- the impact of climate change also with more extreme and frequent droughts, floods, and other weather events

- conséquences

- Change in wine's characteristics : farmers and winery mostly have to adapt their practices to the new climate
- farmers need to find new grape varieties, later harvesting and more resistant to drought (an also to diseases)

- OUR ACTS
- Today, we do work with local community in order to create the right incentives. Associated farmers bring grape marc and wine lees to the distillery. Those products are transformed into different other products that can be used elsewhere (i.e natural food colours, grape seed, compost...). We are also creating our own platform of composting, in order to give back to associated farmers the grape marc they gave us, in another form (ONZE 300). We are promoting this compost which is 100% grape marc, to nourish the ground which is essential today.

NEED IN TERMS OF R&I

- R&I
- Today, we try to be innovative in term of sustainability. For exemple, our project of grape marc gasifier is quite innovative. Also, other structures as Coop de France are helping us by creating working groups around sustainability and bioeconomy. We frequently participate to events on this theme.
- FINANCIAL RESOURCES
 - ADEME funding
 - Région Occitanie funding
 - European funding
- HUMAN RESOURCES
 - 1 agronomist (2016)
 - 1 process engineer (2018)
 - 2 production technician(2020)

CONCLUSION : HOW TO PROVIDE BIOMASS IN A SUSTAINABLE WAY?

- Agricultural value: 50% of the grape marc return to the soil (compost Onze 300)
- Energy recovery: 100% independant (gazeification, methanation, photovoltaic, energy saving,...)
- Industrial improvement
 - MECANIC CRACKING
 - THERMAL CRACKING
 - CHEMICAL CRACKING
 - MOLECULAR CRACKING
- « THINK GLOBALLY, ACT LOCALLY »

THANK YOU

c.bonnemort.cavale@orange.fr