Reducing the impact of greenhouse gases on wine sector : situation in France and the OIV approach

Joël ROCHARD

French Institute of the Vine and the Wine

National Department in France for the Sustainable Wine sector

+Management of effluents , waste and by-products

+Studying and promoting viticultural landscapes and biodiversity

+Viticultural adaptation to climate change

+Impact of viticultural management on greenhouse gas effect

+Eco-design of cellars/Wineries

Leonardo European proje

www.eviticlimate.eu

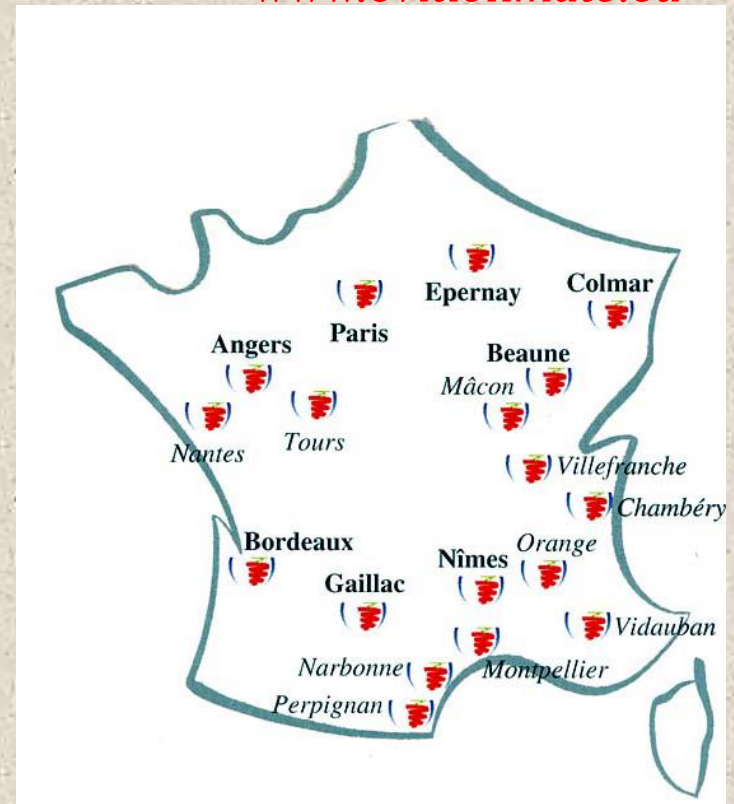
French Institute for Vine and Wine is applied research

+National coordination

+Interface

Research / Professionals

www.vignevin.com



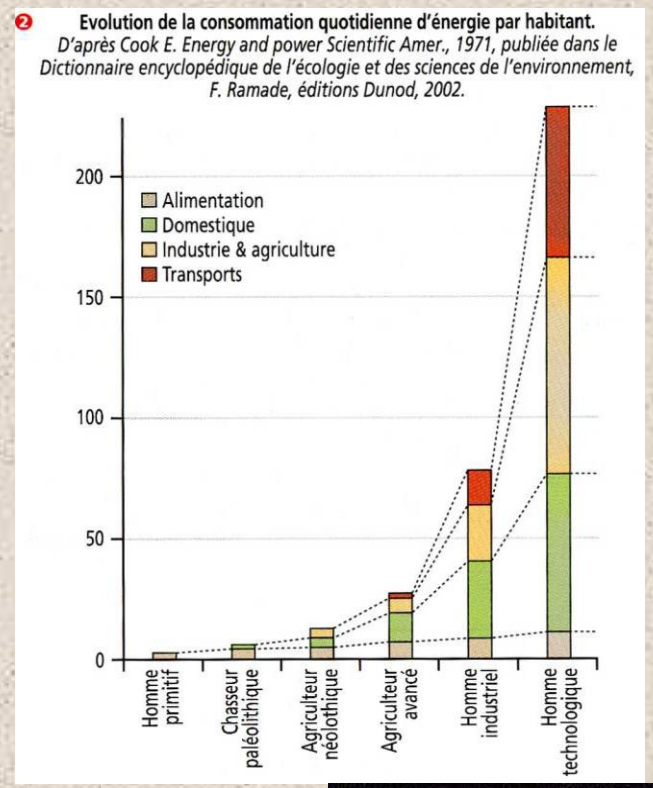
LIFE-ADVICLIM (2014-2019)

- **Adaptation of Viticulture to Climate change :**
- **High resolution study of viticultural adaptation and mitigation scenarios**

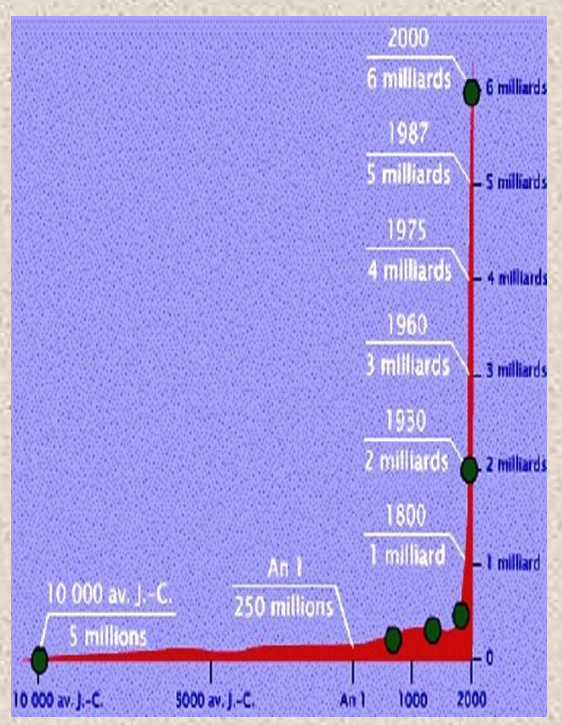
- **Action B2** - Cultural practices GHG mitigation according to climate change scenario
  - These will be assessed using environmental life cycle assessment, in order to integrate the mitigation strategies into the climate change scenarios

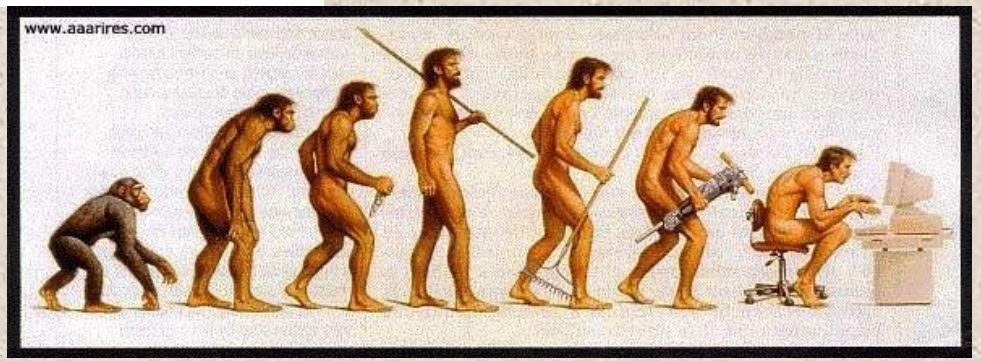
HUMAN 'S IMPACT ON THE PLANET

Evolution of daily energy consumption per capita

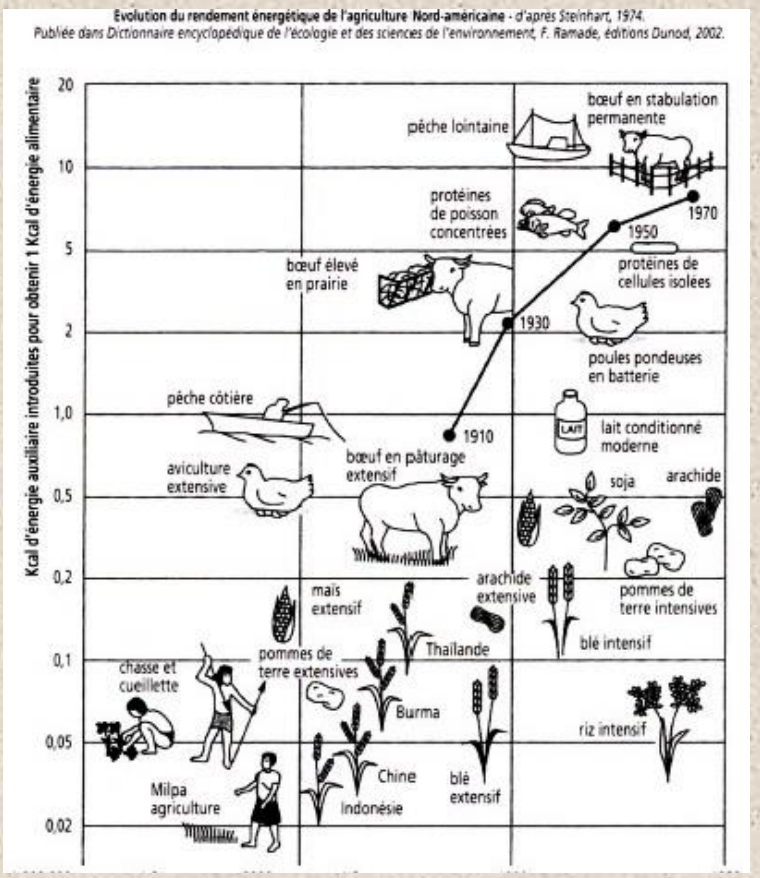


Demographic trends since the discovery of agriculture.





Evolution of energy consumption agriculture/viticulture



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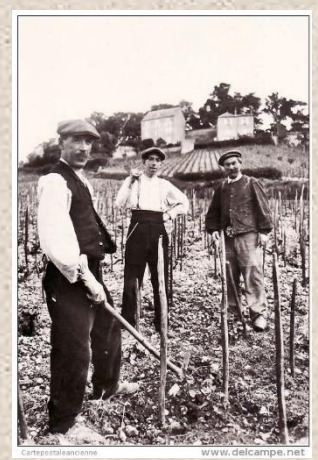
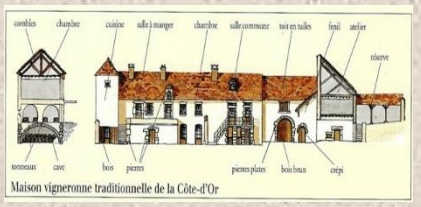




Maison vigneronne traditionnelle de la Côte-d'Or

SUSTAINABLE GRAPE GROWING AT DIFFERENT LEVELS

VINEYARD/PLOT

- Resistance
- Residues

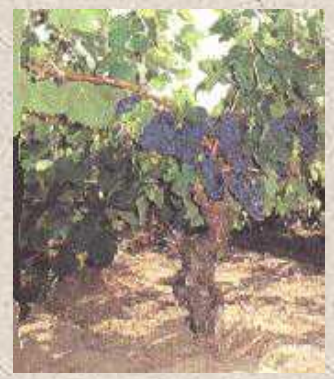
REGIONAL /TERROIR

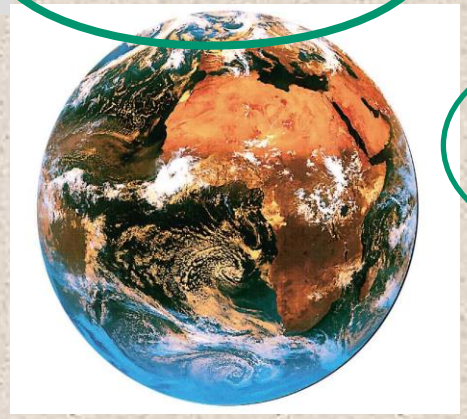
- Effect of beneficial Insects in relation to biodiversity
- Water management
- Landscape deterioration

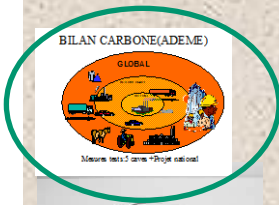
PLANET

- Natural resources
- Global Biodiversity
- Air pollution
- Greenhouse gas effect

Indicators : Life cycle assessment

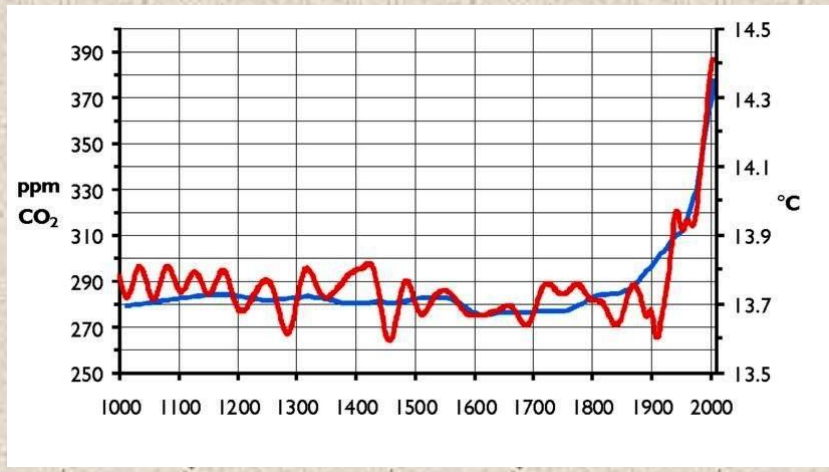


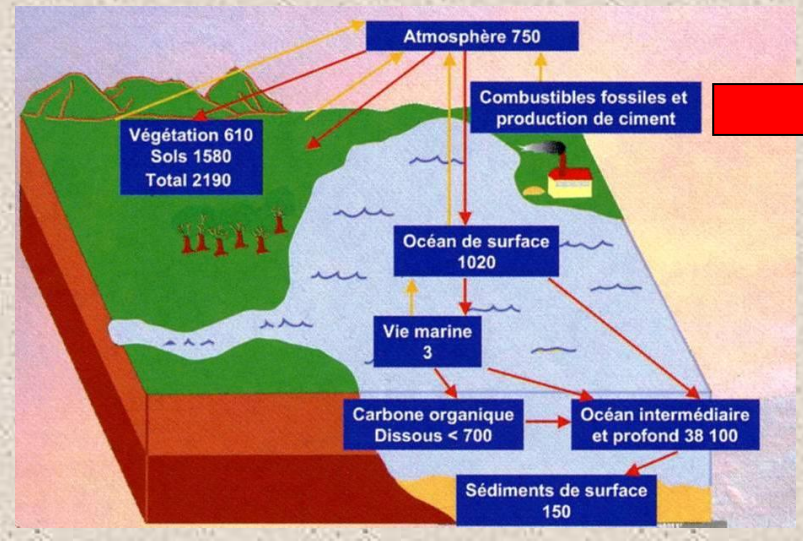




1970 - 1980 — **1980 - 1990** — **1990 - present**

Best management — **Integrated production** — **Sustainability (future generations)**



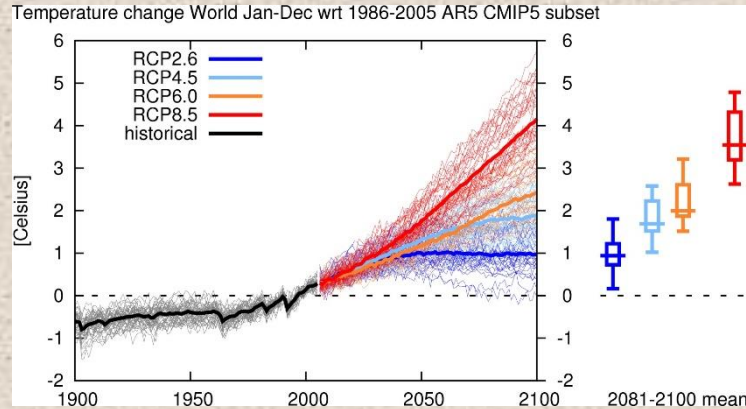


As of today we discharge about 6 to 7 billions tons of carbon /year (20 to 25 billions CO2 tons equivalent)

What about tomorow ?

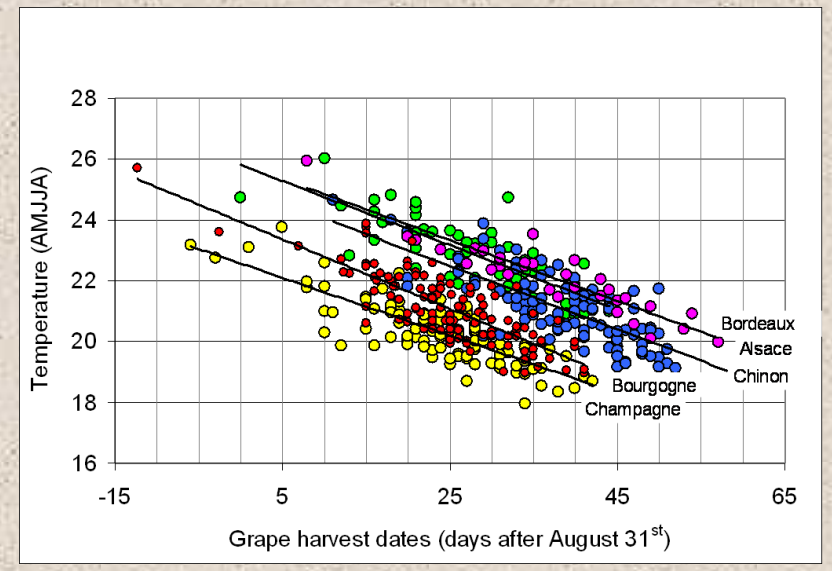
EXCHANGE CARBON

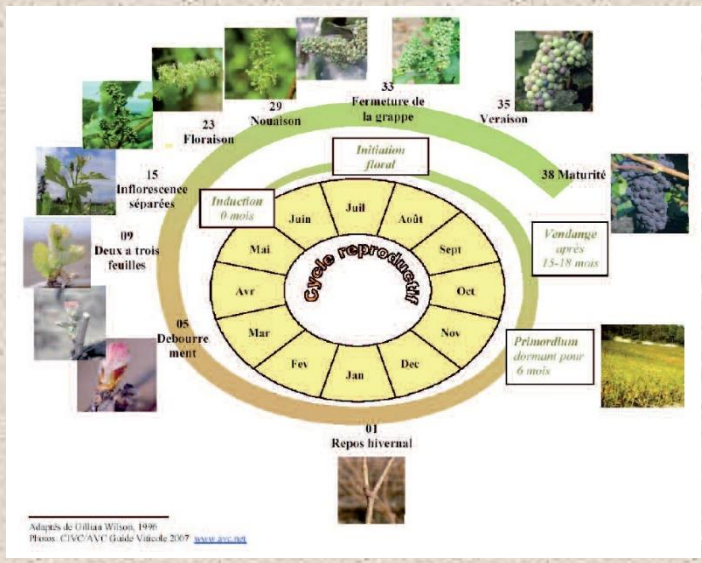
(IN BILLIONS OF TONS/year)



Elevation des températures pour les 4 grands scénarios du GIEC Source KNMI

WINE SECTOR TOMORROW : EVOLUTION OR REVOLUTION?





Correlation between the temperature and of the dates of grape harvest of various vineyards (Source V. Daux – CNRS/ARVICLIM Project)

An average rise in temperature of 1° C of the maximum temperature during the growth period (April to August) corresponds to faster ripening and brings the harvest date forward by 10 days on average (8 to 12 days).

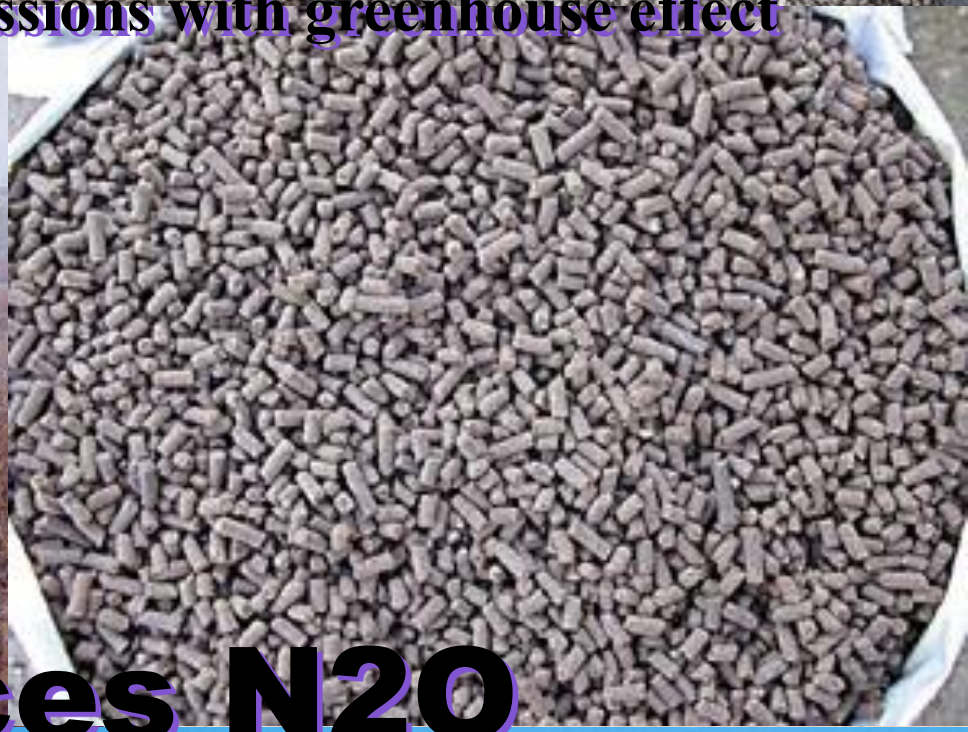
Principal anthropic gas emissions with greenhouse effect

Sources of CO2

Slide CIVC

Sources of Methane

Principal anthropic gas emissions with greenhouse effect



Sources N2O

nitrous oxide

Slide CIVC

Principal anthropic gas emissions with greenhouse effect

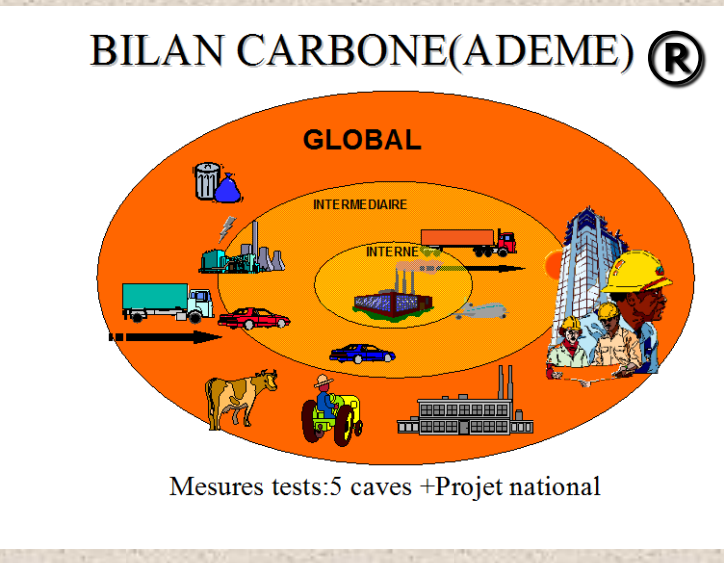
Halogened gases

Slide CIVC

Accounting of the emissions of GESpar method Carbone® Assessment

GES	Persistance (in years)	Heating power
CO_2	150	1
CH_4	12	23
N_2o	120	296
HFC / HCFC	220	12 000
PFC	50 000	8 700
SF_6	3200	22 200

CARBON BALANCE



- There are 3 three approaches
- - **Internal** or legal basis, **for direct emissions called energy** (related to the use of energy, fossil or electric) and the so-called non-energy (related to the use of nitrogen fertilizers and leakage of refrigerants);
- - The **intermediate** perimeter or added emissions, taking into account some of the **transport** (internal cargo freight to customers, customers to exploitation, transport commuting employees, employees of transport-related missions), **manufacturing of inputs**, including purchase of grapes, as appropriate, as well as all the services charged to operations;
- - The **overall perimeter** or Bilan Carbone, which is the comprehensive consideration of all emissions attributable to operations, including the transport of inputs, **construction of buildings, waste management and wastewater**, the Amortization of capital assets.

The EXCEL Spreadsheet …

coefficients of conversion

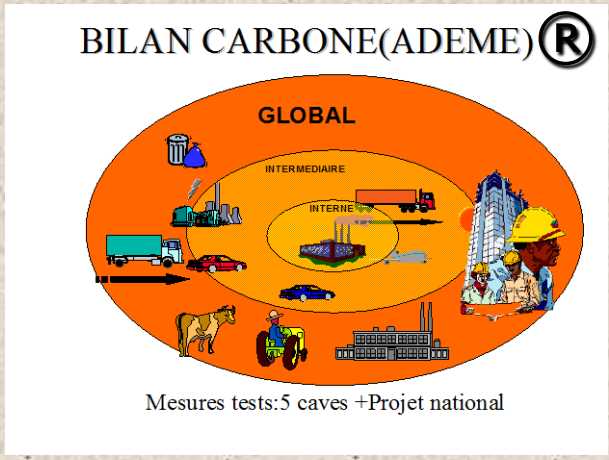
result in kg are equivalent carbon

Fichier Edition Affichage Insertion Format Outils Données Fenêtre ? Acrobat

	A	B	C	D	E	F	G	H	I	J	K
1	CONSOMMATION D'ENERGIE DANS LES LOCAUX										
2											
3	**Utilisation de combustibles dans les locaux de l'entreprise**										
4											
5	Combustible	Conso (tonnes)	kg équ. C par tonne	Conso (kW.h)	kg équ. C par kWh	Conso (tep)	kg équ. C par tep	Conso (litres)	kg équ. C par litre	**kg équ. carbone**	
6											
7	Gaz naturel chauffage		908		0,064		739			0	
8	Gaz naturel procédés		908		0,064		739			0	
9	Gaz de cokerie				0,051		590			0	
10	Gaz de raffinerie		876		0,060		699			0	
11	Charbon		710		0,105		1209			0	
12	Coke de lignite		764		0,115		1327			0	
13	Essence		1 025		0,085		981		0,74	0	
14	Pétrole		916		0,076		889		0,78	0	
15	Fioul lourd		968		0,088		1013		0,83	0	
16	Diesel		951		0,082		958		0,81	0	
17	Fioul domestique		951		0,082		958		0,81	0	
18	GPL		954		0,074		867		0,54	0	
19	Kerosene		967		0,082		952		0,78	0	
20	Ethane		878		0,060					0	
21	Naphta		1 034		0,078					0	
22	Bitume		963		0,075					0	
23	Lubrifiants usagés		884		0,075					0	
24	Coke de pétrole		927		0,103		1206			0	
25	Autres hydrocarbures		880		0,072					0	
26											
27	**Total combustibles dans les locaux de l'entreprise**									0	

Climate plan

Application of the Carbone balance ® assessment with the wine sector (in French)



Mesures tests:5 caves +Projet national

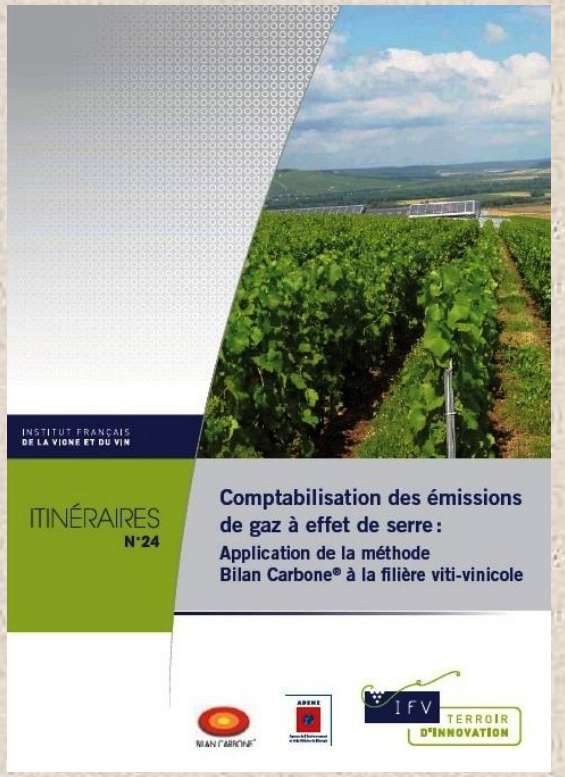
http://www.vignevin.com/publications/collection-itineraires.html

Production CO2 Factors

Intrants viticulture	Facteur d'émission (kg.éq.CA)	Source	Incertitude (%)
Agrafe aluminium (FE aluminium)	2 680	ADEME	30
Piquets acier galvanisé	1 000	AJYR	40
Piquets acier galvanisé (acier 40% recyclage)	738	AJYR	NC
Piquets acacia	4	Groupe de travail	NC
Pierre à chaux	42	UNGDA	50
Fil de palissage en acier galvanisé (FE acier)	870	ADEME	30
Fil de palissage Inox neuf 18/8	1 432	Bilan Produit 2008	NC
Fil de palissage Inox recyclé 18/9	1 255	Bilan Produit 2008	NC
Compost (par tonne de déchets composités)	30	ADEME	50
Sulfate d'ammonium (par tonne de matière active)	200	UNGDA	50
"Solfochaux" (par tonne de matière active)	100	UNGDA	50
"Sulfosol" (par tonne de matière active)	1 000	UNGDA	50
Produits oenologiques	**Facteur d'émission (kg.éq.CA)**	**Source**	**Incertitude (%)**
Acide citrique, monohydraté	900	UNGDA	50
Acide D,L tartrique	900	UNGDA	50
Acide sorbique	220	UNGDA	50
Albumine d'oeuf, colle de poisson, gélatine, lactalbumine, caséinate de potassium	1 508	ADEME	30
Autres acides et sels d'acides	900	Groupe de travail	50
Bentonite, kaolin	300	UNGDA	50
Bisulfite de potassium	400	UNGDA	50
Carbonate de calcium	20	IMA Europe	50
Copeaux (bois)	10	ADEME	50
Ethanol incitité d'origine agricole	400	ADEME	25
Ethanol incitité d'origine viti-vinicole	500	UNGDA	50
Gomme arabique	400	UNGDA	50
Micro-organismes et extraits (bactéries, levures, écorces de levures)	600	UNGDA	50
Protéines de lait / lait en poudre	5107	ADEME	70
Saumure (chlorure de sodium)	46	Eco-Profils Plastic Europ	NC
SO_2 liquide	120	Bilan Produit 2008	NC
Sucre (saccharose)	200	ADEME	20
Tanins	600	UNGDA	50
Autres produits oenologiques	5107	Groupe de travail	70
Autres intrants de vinification	**Facteur d'émission (kg.éq.CA)**	**Source**	**Incertitude (%)**
CO_2 d'origine chimique (fabrication)	223	ECO-invent	NC
Kieselguhr, diatomites, perlites	275	AJYR	50
Capsule tirage aluminium vitr effervescent (FE aluminium)	2 680	ADEME	30
Obturateur PE* (FE moyenne plastiques)	650	ADEME	20
Eau potable	0,087	Bilan Produit 2008	NC

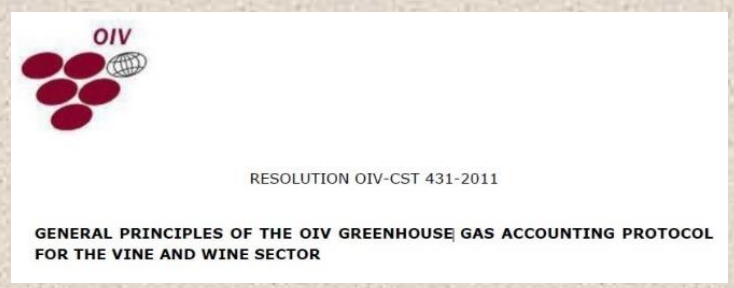
Strategy reduction ex viticulture

Activité	Préconisations générales	Actions proposées	Impacts positifs directs	Niveaux d'efficacité
Viticulture	Diminuer les consommations de fuel	Choix des équipements de traction en fonction des besoins réels	Energie interne	
		Réglage du tracteur	Energie interne	
		Réduction du régime des tracteurs		
		Espacement des rangs à la plantation		
		Raisonnement des interventions sur les parcelles : optimisation des trajets, couplage d'opérations	Energie interne	
	Raisonner la lutte antigel	Suivi précis de la météo	Energie interne	
		Recours aux techniques de brassage d'air, d'aspersion d'eau, de combustion de gaz, plutôt que l'utilisation de chaufferettes au fuel	Energie interne	
	Raisonner les pratiques culturales	Amélioration de la structure des sols	Emissions non énergétiques	
		Diminution de la compaction des sols	Emissions non énergétiques	
		Enherbement temporaire ou permanent des vignes	Emissions non énergétiques	
	Raisonner l'emploi des produits phytosanitaires	Respect des prescriptions (doses / hectare)	Energie interne - émissions non énergétiques - intrants - fret entrant	
		Raisonnement du nombre de traitements phytosanitaires	Energie interne - intrants - fret entrant	
	Raisonner l'emploi d'engrais minéraux azotés	Raisonnement de la fertilisation	Energie interne - émissions non énergétiques - intrants - fret entrant	
		Recours aux amendements organiques	Emissions non énergétiques -	



International Organisation of Vine and Wine
Intergovernmental Organisation

A first resolution was finalized, providing the general principles of oiv protocol for calculating the stock of greenhouse gases for the wine sector If contain information on the approach to scale companies and the industry products.


RESOLUTION OIV-CST 431-2011

GENERAL PRINCIPLES OF THE OIV GREENHOUSE GAS ACCOUNTING PROTOCOL FOR THE VINE AND WINE SECTOR

In preparation : resolution guideline communication and document references international datas greenhouse effect in wine sector

- **Vineyard biomass and winemaking coproduct Valorisation**
- **Oenological energy process**
- **Tractor (power, biocarburants?)**
- **Nitrogenous fertilization émissions/discharge de N2O**
- **Freight & shipping packaging**
- **Transportation worker**
- **Management inputs , services)**
- **Energy effectiveness of the buildings« Ecoconception »**

Communication

Plants which produce Nitrogen in winter (IFV Sud-ouest)

valorization vine shoot

www.vignevin.com

Valorization pomace, lies etc.

Project ECOWINERY

www.ecowinery.eu

Programme d'éducation et de formation tout au long de la vie

ADVICLIM

LEONARDO EUROPEAN PROJECT ECOWINERY

www.ecowinery.eu

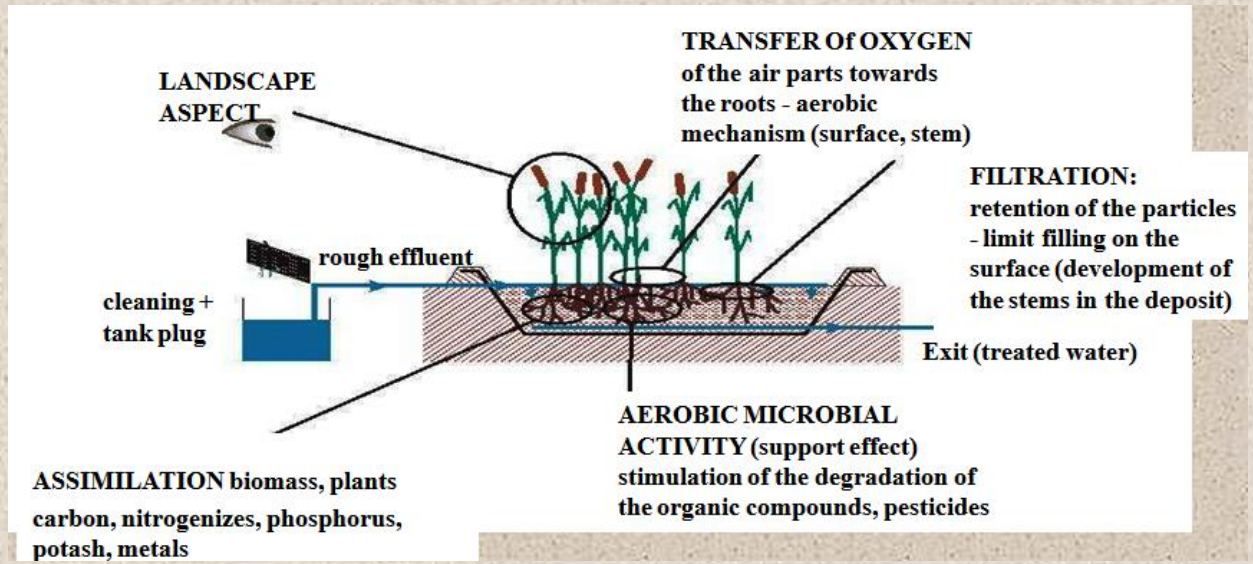
WINERY WASTEWATER TREATMENT
mainly aerobic systems

Source : Nicolas F

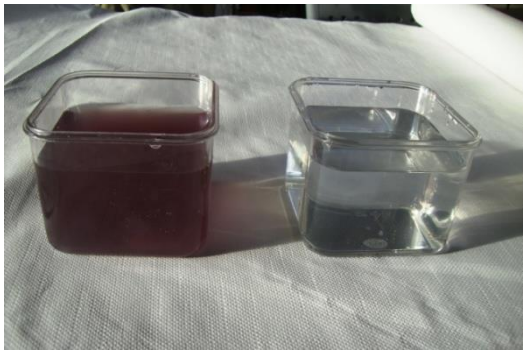
ENERGY?
SLUDGES?
LANDSCAPE INTEGRATION?

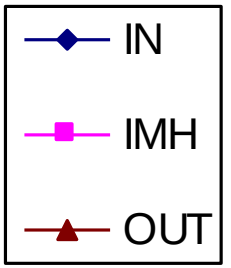
Wetland area

Reed

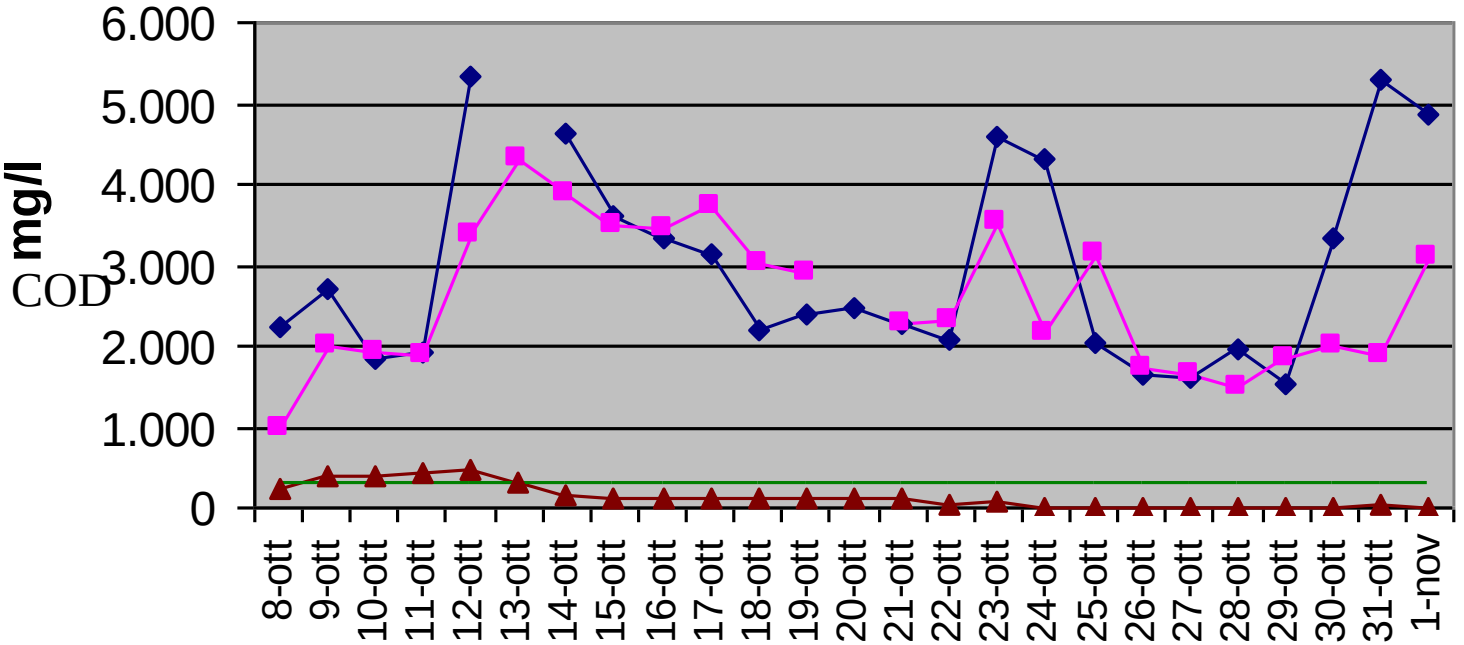


CONSTRUCTED WETLAND



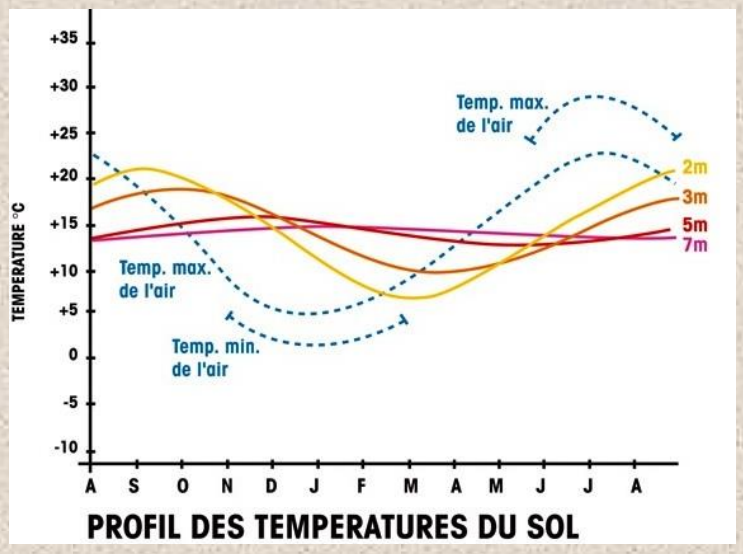


zeolitic mineral



ZEOFIT0 PROCESS

THERMAL INERTIA UNDERGROUND



PROFIL DES TEMPERATURES DU SOL

Caves « crayère » Champagne

Photo 1: Clos de la Tech Winery (La Honda, Californie, USA), exemple d'une cave forée.

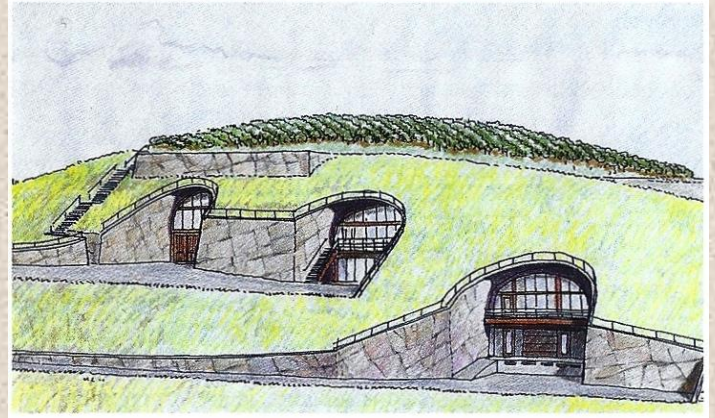
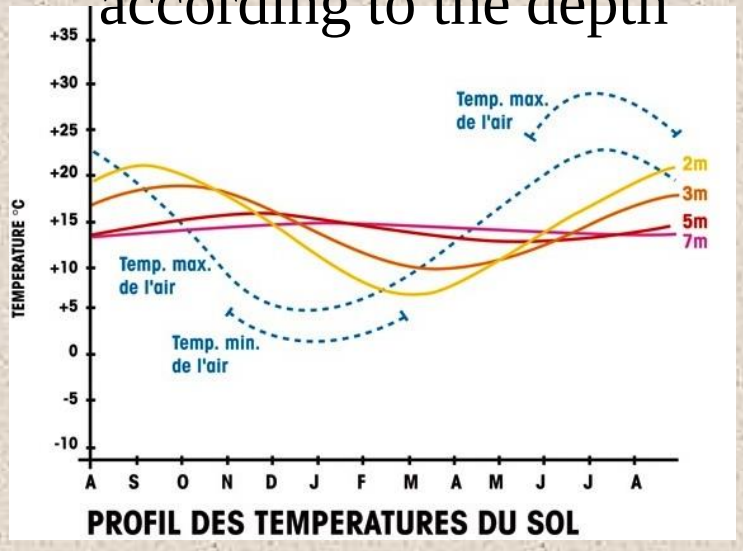


Photo 5: Woollaston Estates Winery, vue en coupe de la conception « en escalier » d'une installation à écoulement par gravité (Nelson, Nouvelle-Zélande).

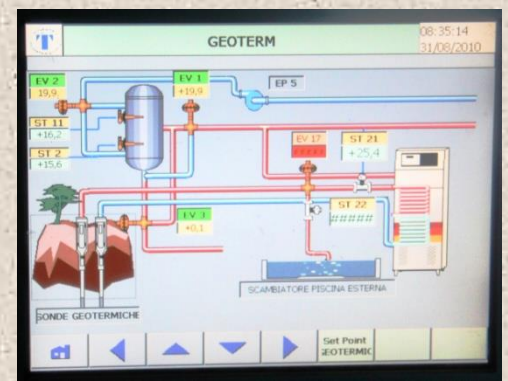
THERMAL INERTIA UNDERGROUND

Temperature in the ground according to the depth



Puits canadien

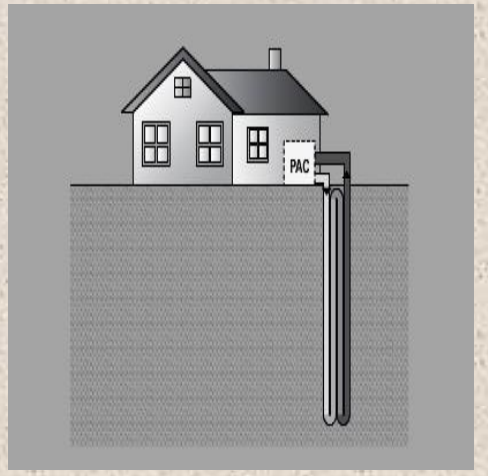
Géothermie



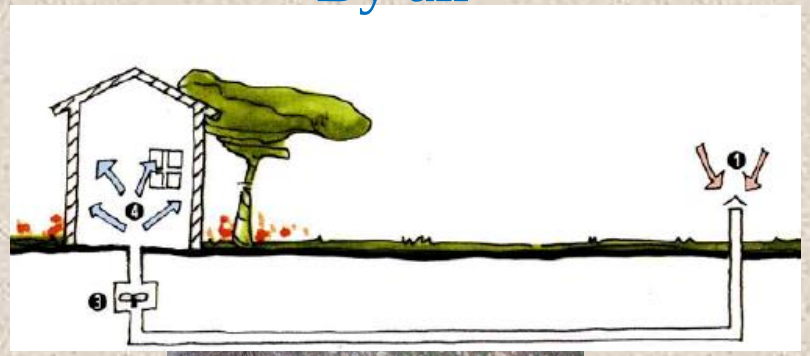
ENERGIE

Solar

Geothermic

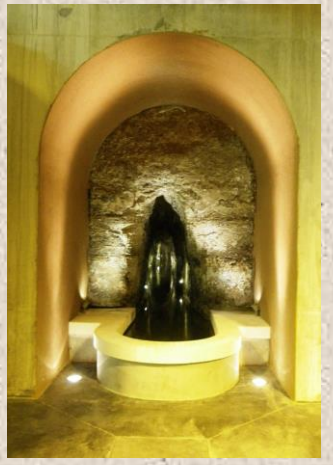


By air



Canadien well

By water



ECO-DESIGN WINERIES/CELLARS

Local stone

Vegetative roof

Vegetative wall

Wood

CONCLUSION

EVOLUTION OF THE CLIMATE /GREENHOUSE EFFECT