

„PlaneteGES“=„PlaneteGHG“ (GreenHouse Gases)

Presentation of the french method for the calculation of Carbon sequestration in agricultural soil and biomass as part of the greenhouse gas balance of the farm

18. März 2010



PlaneteGHG is based on

PLANETE =

- a method for energy balances and energy efficiency of farms; developed from SOLAGRO/Toulouse since 1998;
- this method was also used in Lower Austria for energy balances and energy efficiency advices of 130 farmers during the years 2002-2006

and

DIALECTE =

- a method for the evaluation/measuring of the agrienvironmental performance of farms; also developed from SOLAGRO/Toulouse since 1998.
- PlaneteGHG is „tested“ in France since 2002 with around 1000 farms
- Results/References from around 40 types of farms/types of production (f.e. plant production, milk production, suckling cow production, vine- and fruit-growing, pig and beef fattening,....)

PlaneteGHG is used now (2010)

in France:

- for „energy and GHG advices of farmers“:
 - if farmers want to get subsidies for any renewable energy investments, they have to check their farm in terms of energy and GHGs before;
- therefore this winter around 200 advicers were trained in the program by SOLAGRO;

in Lower Austria (LA):

We want to „test“ this method also in LA:

- in all regions of LA (in „Waldviertel“, „Weinviertel“ - north of the River Danube, as well as in „Mostviertel“, „Industrieviertel“ south of the Danube)
- with a lot of types of production (all kinds of animal production and plant production, including viticulture and fruit-growing)
- in connection with different agrienvronmental schemes (farmers within the LA Ecopoints Program and the „ÖPUL-Measure-Scheme“)

PlaneteGHG calculates ...(1)

- **annual CO₂-emissions (out of energy use):**
 - from direct energy use (fuel, electricity),
 - from indirect energy use (for the production and the transport of energy, agricultural products, feed stuff, mineral fertiliser),
 - from the energy use of other persons working on the farm (f.e., „Maschinenring“)
- **annual CH₄ and N₂O-emissions (out of animals):**
 - CH₄ from the enteric fermentation (cows, cattle, sheep, goats, horses, pigs, poultry),
 - CH₄ from the manure (depends on the CH₄-conversion factor of the manure; f.e. grazing gets the same factor als slurry, more CH₄ from solid manure of pigs then of cattle, of course no CH₄ emissions out of „biogas plants“ are calculated),
 - N₂O from emissions of NH₃ from the storage of manure, less from grazing, the same amount of emissions from slurry and biogas slurry.

PlaneteGHG calculates ...(2)

- **annual N₂O-emissions (out of other sources):**
 - **direct emissions from the soil after fertiliser application, after breaking down legume plants (symbiotic fixed N gets free) or temporarily or permanent grassland)**
 - **indirect emissions of NH₃ (from mineral fertilisers, out of calculated annual 25 kgN/ha deposition from the atmosphere and from N-wash outs into the (ground)water).**
- **„Positively calculated“ is the annual CO₂ sequestration:**
 - **throughout positive actions of cultivating and land use (f.e. minimal tillage, direct and mulch seeding, intercropping, underseeding, working in of straw and residues or other organic matter (also manure), „green soils“ in vineyards (no „bare soils“), but also afforestation or changing from arable land to grassland is calculated positive;**
 - **throughout the annual growing of landscape elements (trees and shrubs, including their roots);**
 - **throughout the CO₂ sequestration in wooden houses and buildings of the farm (the amount is calculated over a period of 20 years).**

The dimension of the CO₂ emissions (% share)

	animal production	plant production
CO₂ out of energy	15-25%	40-60%
CH₄, N₂O from animals and manure	40-60%	
N₂O from other sources	25-35%	40-60%
Minus: annual CO₂ sequestration	0 – up to 80% of the emissions	0 – up to more than 100 % of the emissions
Sum	annual netto-emissions	annual netto-emissions
scopes	+1 to 8 t CO₂/ha and year	-2 to 4 t CO₂/ha and year

CO₂ „POOL“ (1) in agricultural soils

Calculated permanent CO₂ pool in the soil:

- vine- and fruit-cultures (with bare soils): **128 t CO₂/ha**
- annual arable cultures (straw taken away): **146 t CO₂/ha**
- fodder cropping (temporary grassland): **183 t CO₂/ha**
- permanent grassland: **256 t CO₂/ha**

scope: 128 to 256 t CO₂/ha

CO₂ „POOL“ (2) in landscape elements (LE)

Calculated permanent CO₂ pool in LE:

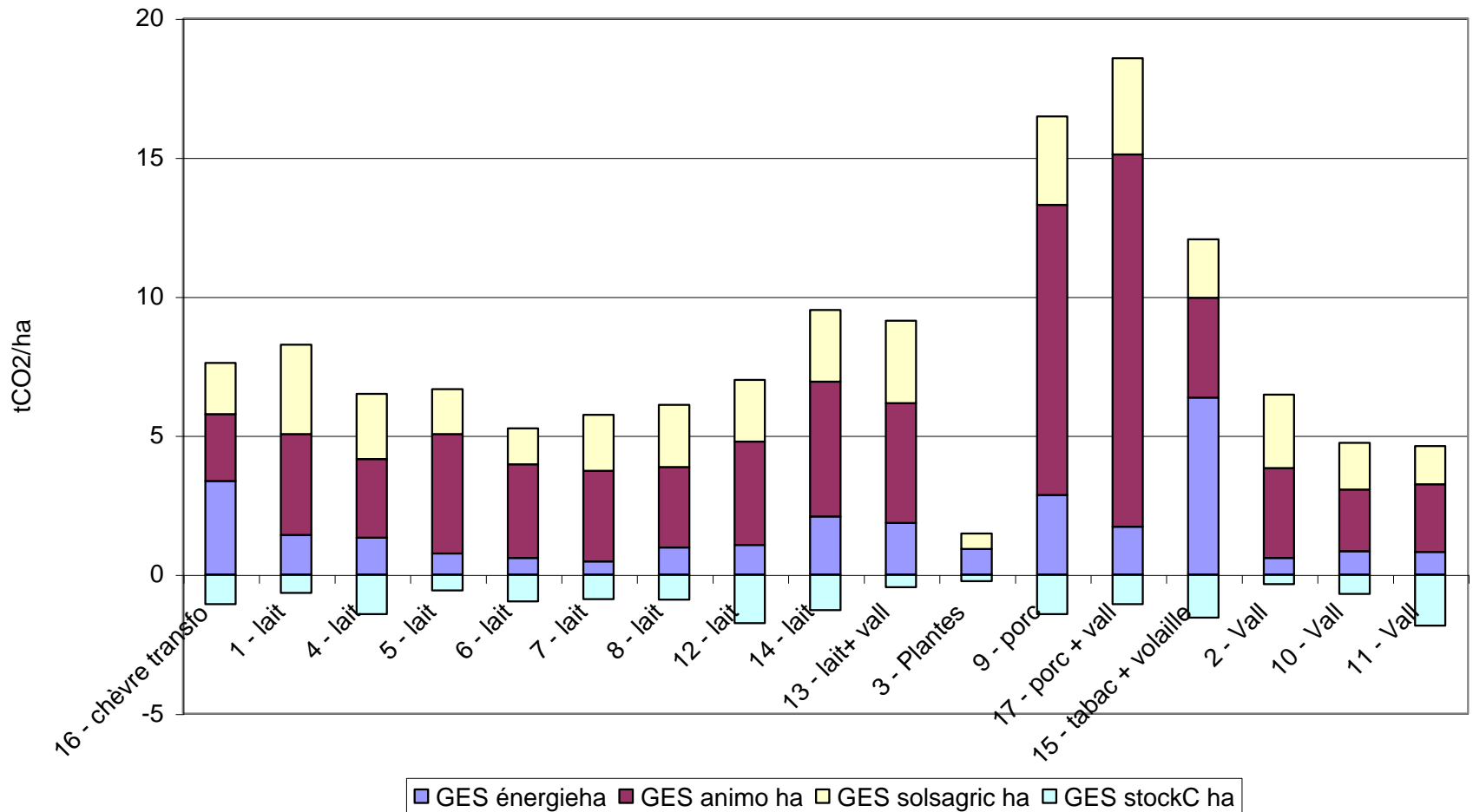
The principle is:

- the more area is reserved for landscape elements and
- the more trees (and additionally shrubs) we have
- the more CO₂ sequestration in the wood, the soil and the roots is calculated

scope: from 0 up to 50 t CO₂/ha

Results of PlaneteGHG-Mauges 2

GES des exploitations : répartition en t/ha



First results from Lower Austria

farm				Types of production	CO2 Pools in soils	CO2 Pools in LE	annual emission (t CO2/ha)		
Nr	ha	al	gl	animal production (% share) plant production (% share)	t CO2/ha	t CO2/ha	animal prod.	plant prod.	aver- age
1	44	-	44	milk production (100 %)	256 t	23 t	4,3 t	-	4,3 t
2	14	-	14	suckling cow production (100%)	256 t	21 t	3.3 t	-	3,3 t
3	43	13	30	suckling cows,horses,poultry,pigs (95%), plant production (5 %)	230 t	29 t	3,3 t	-1,1 t	3,2 t
4	47	45	2	pig fattening (45%), plant production (55%)	147 t	15 t	18,5t !	1,3 t	8,8 t
5	29	20	9	suckling cow production (55%), plant production (45%)	186 t	10 t	3,6 t	-0,1 t	1,9 t
6	71	57	14	plant production (biogas plant- 89%, herbes-11%)	187 t	8 7	-	0,5 t	0,5 t
7	112	110	2	sheep (2%), plant production (98%)	148 t	2 t	1,7 t	0,1 t	0,1 t

ha = agriculturally used land, al = arable land, gl = grassland

The annual CO2 sequestration in soils and LE of the farms

farm (Nr.)	1	2	3	4	5	6	7
the annual CO2 sequestration in soils and LE (t CO2 of the whole farm)	60 t	12 t	52 t	61 t	47 t	75 t	201 t
minimal tillage, mulch and direct seeding (ha)			5 ha	20ha	3 ha	11ha	107 ha
working in of straw and residues (ha)				37ha	3 ha	5 ha	107 ha
working in of organic manure of the farm (ha)				7 ha	17 ha	26ha	11 ha
intercropping and underseeding (ha)				15ha			39 ha
working in of exogene organic matter (ha)							19 ha
fodder crops and ley grass longer then 1 year (ha)			8 ha		3 ha	28ha	
LE with trees, > 5m high (%)	15%	9,1%	7,4%	1,5%	3,7%	1,9%	1,5%
LE with shrubs, 1-5 m high (%)	0,2%		0,9%	1,3%		0,1%	1,3%
herbaceous LE, < 1 m high (%)		0,4%	1,6%	1,0%	0,9%	1,7%	1,0 %

Conclusions

- **PlaneteGHG is a very engaging method for calculation of CO₂ sequestration and CO₂ fluxes in agricultural farms**
- **to formulate useful measures for forcing CO₂ sequestration in soils and landscape elements**
- **but also to calculate the amounts, achievements and further possibilities of single farmers**
- **for „diminution of climate change“**

Thank you for your attention!