

**ENVIEVAL**

Grant Agreement Number 312071



# **ADDRESSING CHALLENGES OF EVALUATING RDP IMPACTS ON CLIMATE STABILITY**

*Experiences from case studies in Finland and Italy*

**JANNE ARTELL – LUKE, FINLAND**

**ANDREA POVELLATO – CREA-INEA, ITALY**

EU Evaluation Helpdesk

Good Practice Workshop - Assessing environmental effects of RDPs  
Vilnius, 27-28 October 2015

27.10.2015



# WHAT evaluation challenges have been targeted ?

- **Greenhouse Gas emissions is not an impact indicator (yet)**
  - Calculation of Carbon Footprint (CF) at micro level (Italy)
  - Estimation of GHG emissions at macro level (Finland)
- **Differences between CF and IPPC**
  - CF is based on Life Cycle Analysis, including energy from transport, chemical inputs, NOT accounted in “Agriculture” sector in IPCC
  - Better estimation of whole effects of changing farming practices
- **Counterfactual at micro level (IT)**
  - Selection of pairs at process level
  - Attempt to create a CF at farm level (JRC Carbon Calculator)
- **Counterfactual at macro level (FI)**
  - How to deal with lack of non-participants?
  - Multi-regional partial equilibrium modelling

# HOW was the assessment carried out ?

- **Identification of RDP measures (IT)**
  - Agrienvironment (sub-)measures (Organic, Integrated and Advanced Integrated account for 70% of the uptakes)
  - Naive vs. Statistics-based Evaluation options
- **Identification of RDP measures (FI)**
  - Agrienvironment measures (94% of arable land under AEM)
  - Less Favoured Areas (whole country eligible for LFA, exception: cleared land since 2004 ~2.5% of total UAA)
  - No specific GHG targets by measures:
    - ❖ *Analysis on AEM and LFA effects on GHG (incl. land use)*

## Estimation of Carbon Footprint (Emilia Romagna IT)

To estimate differences in CO<sub>2</sub> emissions resulting from specific RDP measures (Organic, Integrated and Advanced Integrated Management) compared to conventional farming systems

- **CF cropping systems**

- Wheat, Corn, Alfalfa, Pear, Tomato, Vineyard
- LCA Approach (IPCC)



CF in the production process

Carbon soil sink

N<sub>2</sub>O emission from fertilizers

- **CF livestock systems**

- Dairy, Beef, Fattening
- LCA Approach (IPCC)

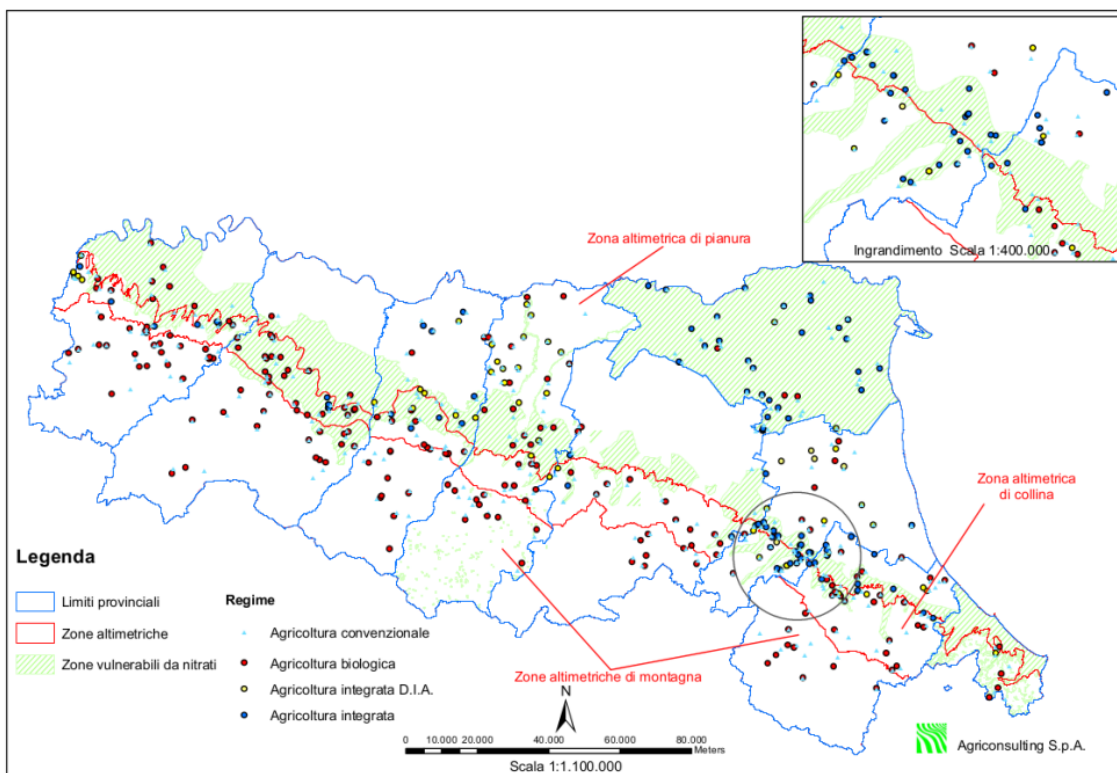


CH<sub>4</sub> emission from enteric fermentation

CH<sub>4</sub> and N<sub>2</sub>O from manure management

## Counterfactual at micro level (IT)

### Spatial distribution of farm/parcel sample



3-years survey on:

- almost 700 farms
- 2.828 combinations of cropping systems (1414 pairs)
- 18 livestock farms

Attempt to create a hierarchical sampling

Multi-purpose survey, used for the assessment of indicators for water and soil quality (joint costs)

## Upscaling from Micro to Macro Level (IT)

Inference of results at regional level to assess the consequences of PSR with regard to CO<sub>2</sub> emissions

### UPSCALING:

$$CFP_{\downarrow regional} = \sum 1 \uparrow n_{\text{crops}} (CFP_{\downarrow crop} * COEFF_{crop} * Ha_{crop})$$

CFP: Carbon Footprint

COEFF: degree of equivalence with “similar” analysed crops

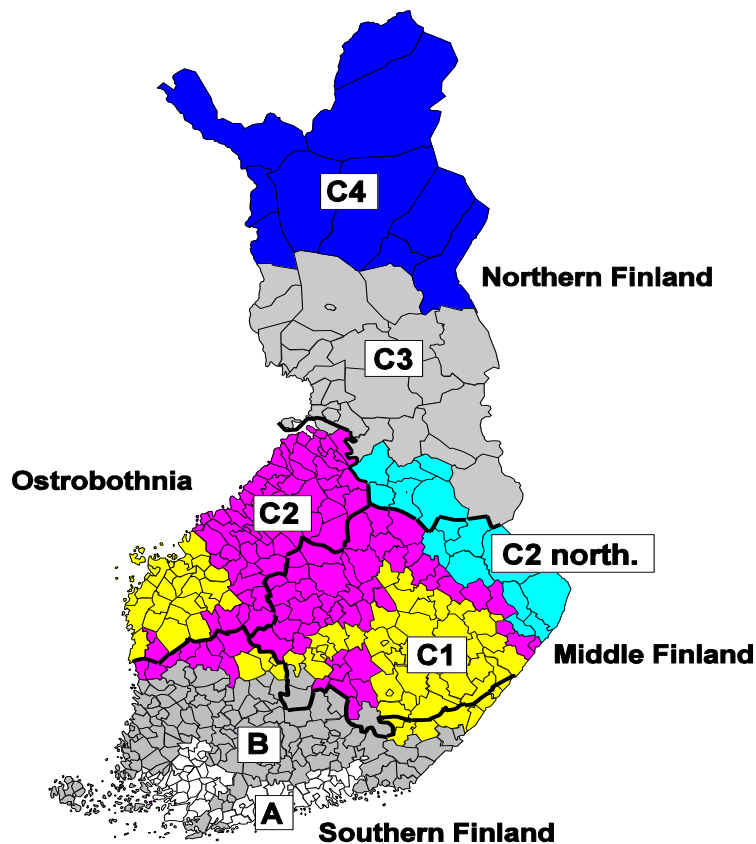
Ha: Total regional hectares of single crops

## DREMFIA model (FI)

Simulates national agricultural production and markets 1995 – 2020

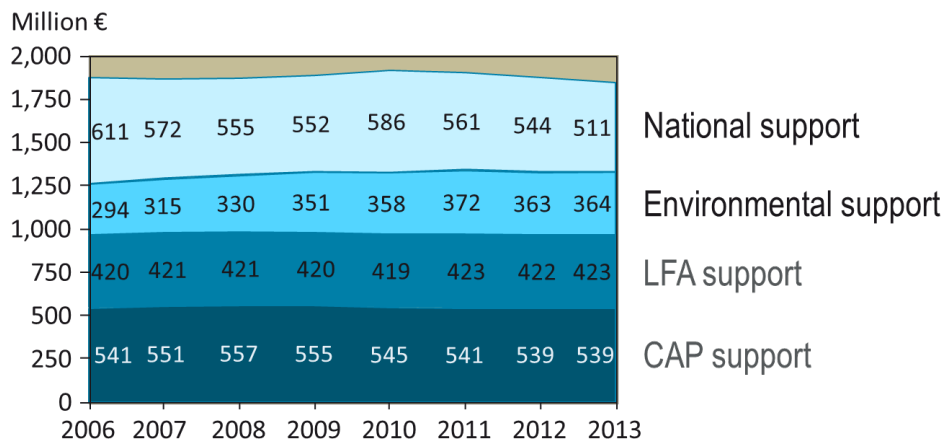
**Counterfactual modelled directly, no need for comparison groups**

Main areas and support regions



- 17 sub-regions modelled
  - ❖ Profit maximizing assumption
- Prices of inputs and outputs affect production decisions
- Handles RDP requirements explicitly
- GHG emissions take into account:
  - ❖ Input use
  - ❖ Livestock number and type
  - ❖ Land use (and change)

## Definition of the counterfactual (FI)



No specific GHG targets by measures:  
*Analysis on total AEM and LFA effects*

Counterfactual:  
Situation *without* AEMs and LFA  
= severe effect on ag. production  
Decide viable options

### Counterfactual

1. "No\_pillar2" – replace LFA and AEM with pillar 1 payments from 2007 on
2. "No\_envi" – AEM 118 €/ha removed → farm payments +50 €/ha AND no limits to N&P fertilizer use (Nitrates Directive requirements hold)
3. "No\_LFA" – remove LFA → farm payments +50 €/ha in all of Finland  
Removes prior progressive increase towards North Finland  
Removes increases for livestock producers and harvest obligation



## WHAT are the results of the assessment (IT-1) ?

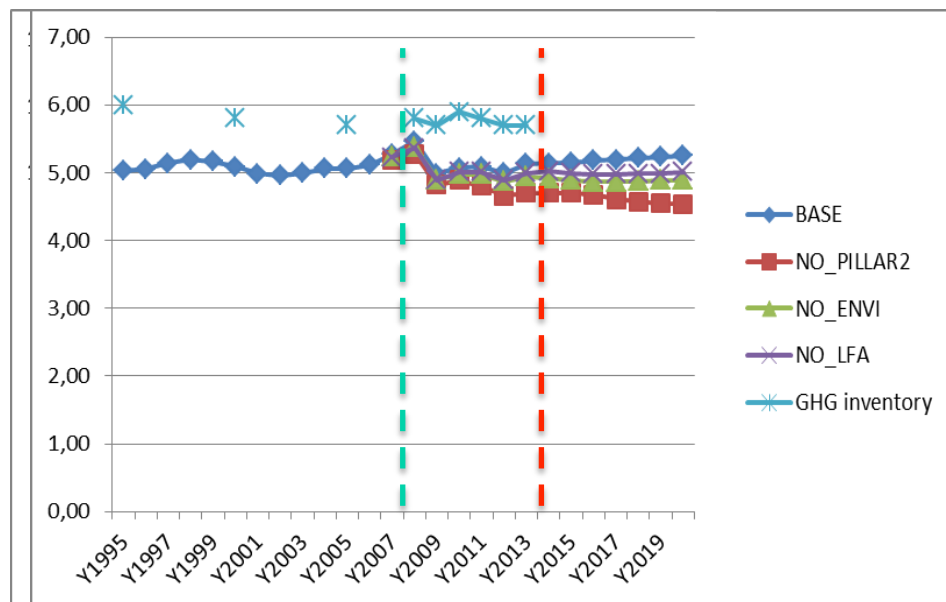
	Production (ton Ceq)	Nitrous Oxide N <sub>2</sub> O (ton Ceq)	Carbon sink (ton Ceq)	GHG reduction (ton Ceq)
Integrated Production	1.138	1.857	2.142	5.137
Organic Farming	1.737	1.881	1.610	5.228
Total at regional level	2.875	3.738	3.752	10.365
Total (%)	28%	36%	36%	100%

Percentage on Agricultural  
regional GHG emissions:  
0,3%

## WHAT are the results of the assessment (IT-2) ?

	UAA (ha)	Carbon Reduction (Kg CO <sub>2</sub> /ha)	Total (Mg)
Integrated Production	44.491	423	18.835
Organic Agriculture	53.242	393	20.932
Cover crops	764	1.625	1.241
Soil Organic Matter	1.002	2.131	2.136
Conversion/Maintenance to Permanent Grassland	30.495	1.265	38.576
Landscape Features	3.641	7.121	25.929
Set Aside	5.973	1.447	8.642
AgriEnvironmental Measures (total)	137.842	937	129.148

## WHAT are the results of the assessment (FI) ?



Pillar 2 maintains livestock production and land in cultivation →

+14% impact on GHG emissions

with land use effects, the overall effect of pillar 2 is +7% on GHG emissions

Total abolishment of pillar 2?

Remember, constitutes 1/3 of the total agricultural payments paid

- Land abandonment (more than 1/3 in most regions)
- More significant decrease in livestock production
- GHG emissions and production would decrease drastically

## To what extent could the targeted evaluation challenges be addressed?

- **Strengths (IT)**

- CF allows for estimating the whole GHG emissions based on a well-established procedure (ISO rules)
- Linkage between micro and macro level based on relatively simple aggregation of results obtained at micro level
- Existence of well-established farm sample (e.g. FADN) as a good starting point for the collection of information

- **Weaknesses (IT)**

- Representativeness of the sample
- Availability of information on farm practices (additional survey as pre-condition)
- LCA coefficients have to be tested on field at local level

# To what extent could the targeted evaluation challenges be addressed?

- **Strengths (FI)**

- Results not dependent on data on non-participants
- Macro-level results with massive auxiliary result information
  - ❖ Other environmental impacts also estimable
- Can estimate a number of counterfactuals
  - ❖ Forces to think the viable counterfactual

- **Weaknesses (FI)**

- Assumption of profit maximization (on regional level, however!)
- Requires key personnel and continuous updating
  - ❖ Accessibility and hidden knowledge →  
Not for the average evaluator

## Recommendations: What needs to be considered when using this method for the ex post evaluation ?

- **for Managing Authorities (IT)**
  - Appropriate scheduling of monitoring activities:
    - Multipurpose Surveys (role of FADN)
    - End-of-the-programme Survey as First-of-the-(next)programme S.
  - Effective data warehouse over the years (decades?)
- **for Evaluators (IT)**
  - Concentrating the M&V efforts on relevant measures
  - Increasing expertise on Statistics-based Evaluation options and modelling

# Recommendations: What needs to be considered when using this method for the ex post evaluation ?

- **for Managing Authorities (FI)**
  - Keeping the model running requires:
    - ❖ Key personnel at work
    - ❖ Data collection (may include env. monitoring) suitable for the model
  - Building the model requires time and effort
  - A good model provides as good answers as the questions are!
  
- **for Evaluators (FI)**
  - Building a model requires time and effort
  - Finding and using a suitable model may require co-operation with other parties
  - Consider the type of counterfactual what you propose!



Thank you for the attention!

[www.envieval.eu](http://www.envieval.eu)

[povellato@inea.it](mailto:povellato@inea.it) - [janne.artell@luke.fi](mailto:janne.artell@luke.fi)

