Reducing emissions in agriculture: Precision agriculture technologies in crop farming

Ieva Licite
Capacity building workshop for effective policy implementation under the Effort Sharing Decision
May 14 2014

Agricultural sector in Latvia

1,8 mln ha managed agricultural land (34% grassland, 66% cropland)
~140 000 ha unmanaged/abandoned agricultural land

National target 2020 - 2 mln ha productively managed agricultural land

- Share in GDP 1,8% (2012)

  structure of agricultural output (2012) – 38% animal breeding, 62% crop farming. The proportion of output is reflective to GHG. Crop farming – of most significance.

- AGRI share in GHG (2012) (without LULUCF)

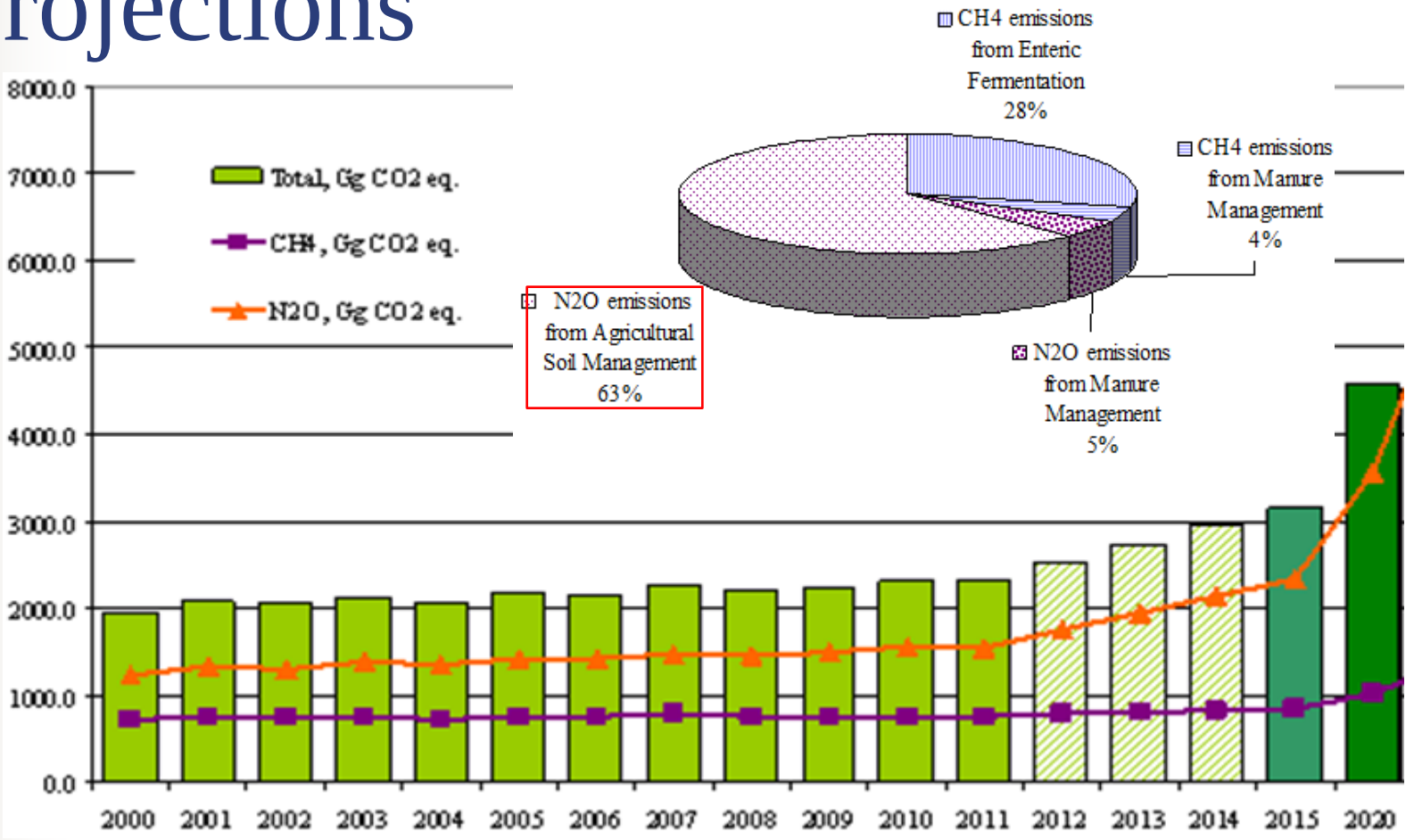
  22 % from total CO_2 ekv.; 29 % from non-ETS CO_2 ekv.

- Low emissions on 1 ha of agricultural land – 1,3 t CO_2 ekv.

  which is less than half of the European average (2.6 t CO_2 ekv.)

Source – Central Statistical Bureau, Eurostat, calculations of Ministry of Environmental Protection and Regional Development

AGRI GHG and national projections



N_2O – synthetic fertilisers, manure and organic soils
CH_4 – enteric fermentation, manure management

*Source – **national calculations of GHG (Latvian University of Agriculture) and Latvia`s National Inventory Report (2014)***

Knowledge coverage and gaps: Emissions – measures–abatement potential?

Emissions – National inventory (from Tier1 to upper Tiers!)

Abatement potential:

Lack of sufficient knowledge background of analyses and evaluation of abatement potential of particular measures at national level, proposed project under the State Research Programme – results 2017.

Measures –Rural Development policy - **main instrument**

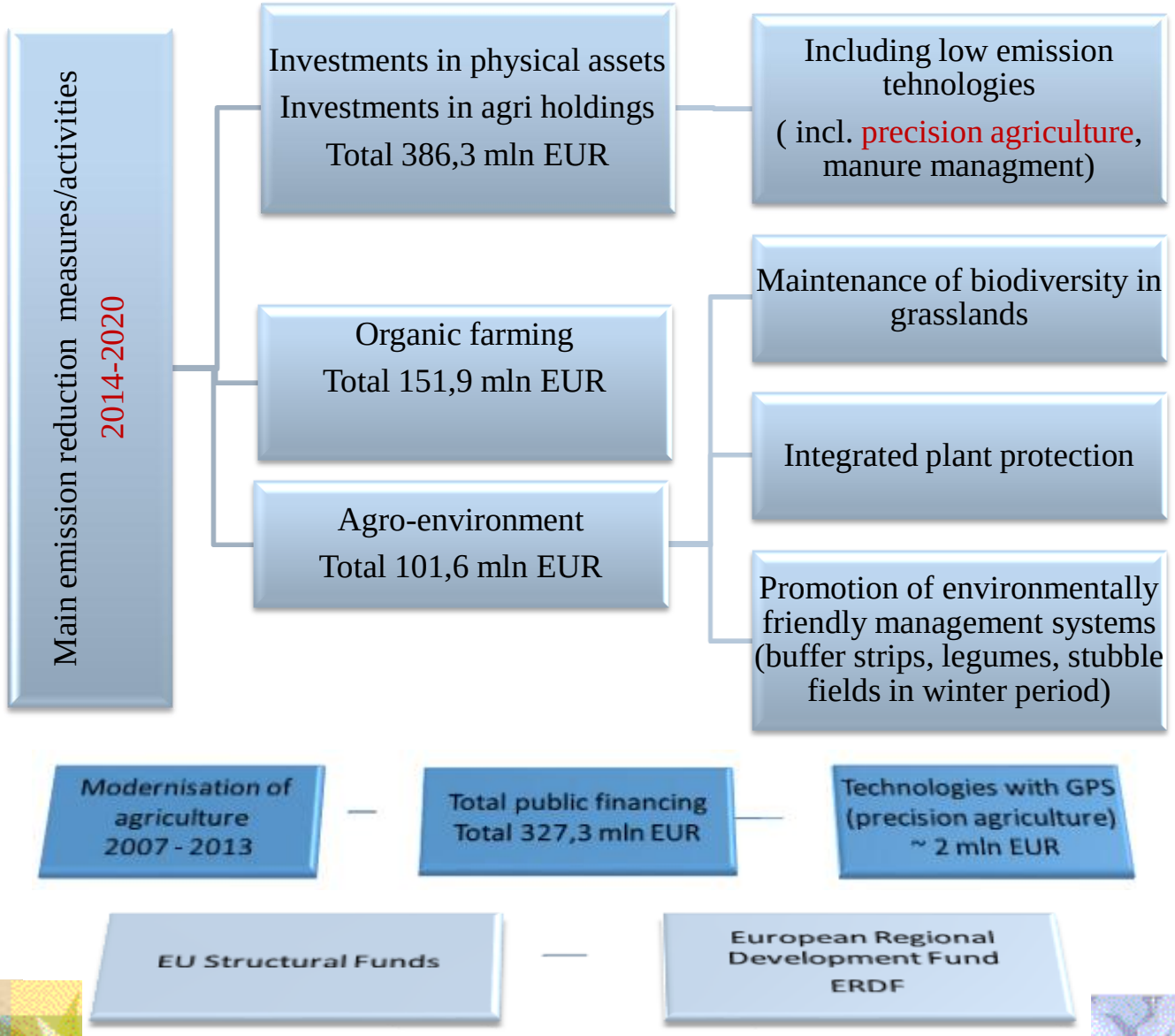
RDP 2014-2020 follows pattern of RDP 2007-2013

All of the RD priorities shall contribute to the cross-cutting objectives of .... ***climate change mitigation and adaptation****.*

An important criterion to select eligible projects- reduction of GHG

EU Structural Funds – ERDF

Rural Development policy



Precision agriculture – option to mitigate in crop farming (I)

Dealers - *AgriCon (6 y experience), Konekesko, AgTech (Green Seeker), Amazone*

Economy driven process with positive environmental effect – especially for large scale, intensive crop farming. Important motivation - cost rises for fuel, fertilizers, seeds and plant protection materials.

correct amount in the correct place at the right time

Farms operating on >100ha - 2,9 thsnd (~ 46% from total agricultural land)

<u>According to dealers information:</u>

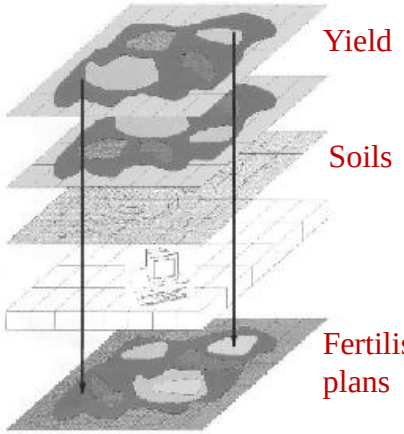
1) Sensor based nitrogen management – in about 22 farms (from 280 ha to 3200 ha, average area for sensor usage – 800 ha);

2) Fertiliser plans for P, K, Mg, CaO, ph - 34 farms (~26 000 ha) ~110 farms with prepared fertiliser plans (~18 000 ha), but not in usage - lack of apropriate spreaders/tehnology.

Precision agriculture – option to mitigate in crop farming (II)

Main steps

- field research - soil structural heterogeneity (maps)
- soil analysis - geo-referenced (GPS) soil samples (maps)
- Geo-referenced yield maps
- fertilization plans – geo-referenced information uploaded to spreader technologies of tractors
- machinery - crop sensing systems/fertiliser spreaders, automatic steering systems



Main gains (*source: «AgriCon»)*

- Yield rise - 3 to 7 %, saved N fertiliser - 2 to 14% (winter and summer grains, rape) Reduced nitrogen balance on average 20 kg / ha.
- Nitrogen sensor test in Latvia (2011) for summer wheat shows yield rise 148 kg/ha while N input reduced by 3 kgN/ha to compare with traditional tehnology.

Experience – crop farm «Vilciņi 1»

National winner of **WWF Baltic Sea Farmer of the Year Award 2013** - *nominated for innovative use of precision agricultural technology and collaboration with University of Agriculture*

EU Structural Funds (9 projects), >2100 ha, (winter wheat, rape, summer wheat, summer barley and field beans)

Precision technologies since 2003:

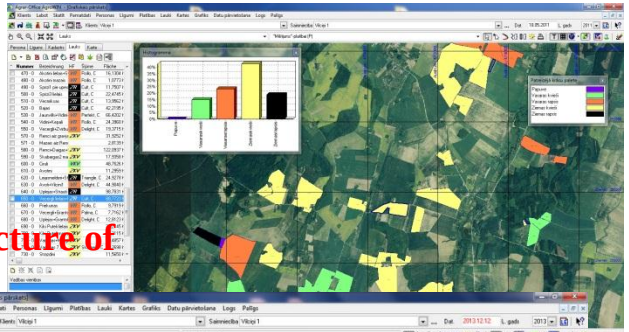
- ✓ agricultural software (*Land_Data Eurosoft*)

field history analyses

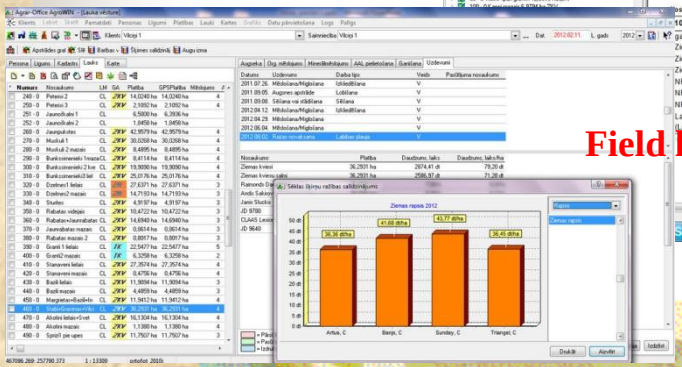
Mapping

fertilisation plans

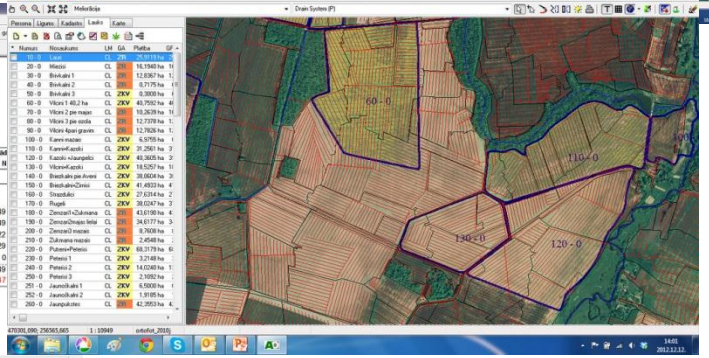
financial analysis



Ortofoto + structure of sowings



Field history analyses

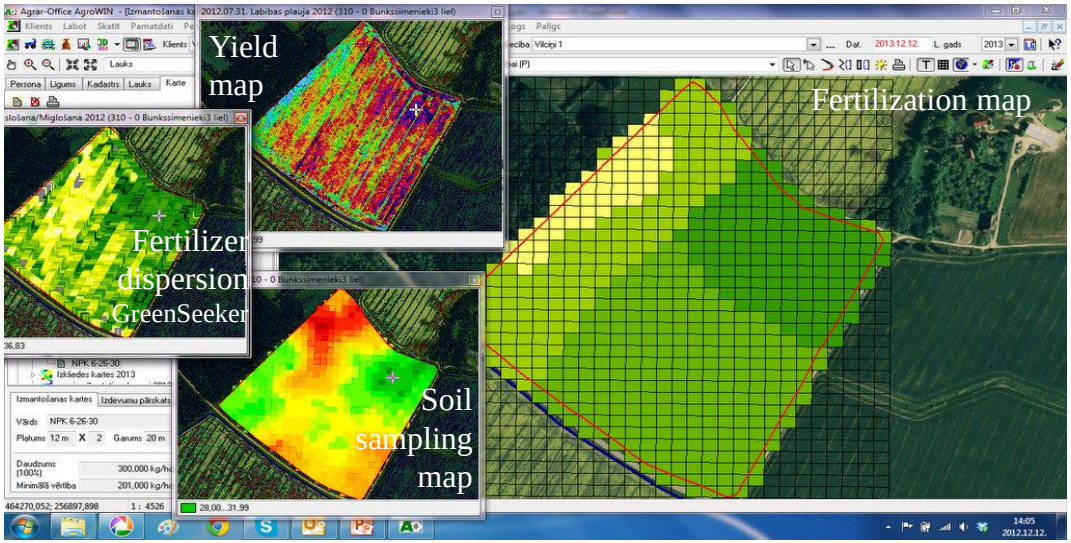


Map of amelioration system

Experience – crop farm «Vilciņi 1»

Precision technologies since 2003:

- ✓ AO Green-Seeker optical sensing system for N application



- ✓ combine harvesters that generate yield maps
- ✓ machinery fitted with GPS automatic steering and parallel driving systems

- ❖ no overlap between the drill trips
- ❖ Lower fuel consumption and less working time
- ❖ reduced load to machinery

Findings– crop farm «Vilciņi 1»

- ✓ Better control over management of farm fields
- ✓ Precise economic analysis
- ✓ Environmentaly friendly tehnologies
- ✓ Facilitation of the work of employees (opportunity to attract young and enthusiastic staff, but training needed)
- ✓ Fertilizer and fuel savings
- ✓ Higher yields and income

Key learning points

Challenges	Solutions
Scale of farming .. what if small farm?	Cooperation, renting, simpler (not so expensive) solutions
Availability of technologies (costs)	Wide range of product offerings and competition – lower prices. Support from RDP etc., but still missing effective policy incentives.
Knowledge transfer (raising awareness), research activities	Scientific background – mostly taken from much more experienced agri systems - but YARA projects (within Baltic Deal) and tests in Latvia! Research on efficiency with real local data, research on mitigation potential – universities. Farmers education («fear» reduction) – advisory and training bodies, dealers.
Sustainable intensification	Raised efficiency in usage of fertilizers, raised yields, raised productivity (income from each ha)

The biggest challenge while reducing agri GHG from policy planning perspective – knowledge gaps regarding abatement potential and national GHG abatement cost curves.

Thank you for your attention!

Ieva.Licite@zm.gov.lv

Ministry of Agriculture of Latvia

Department of Agriculture