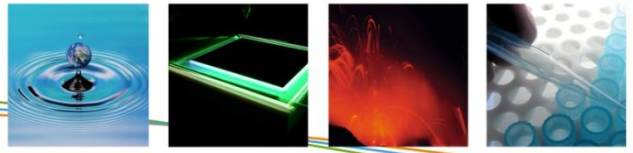
vito
vision on technology



Towards and India – Belgium S & T collaboration
VITO – TERI partnership as a case

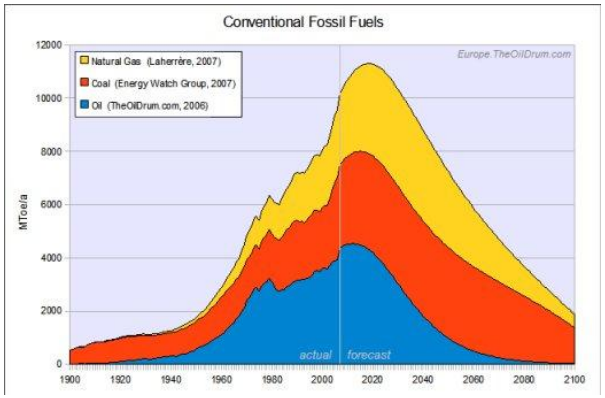
Ludo Diels, Flemish Institute for Technological Research, Belgium

Awareness Raising and Information campaign in India

1O - 28 September 2012

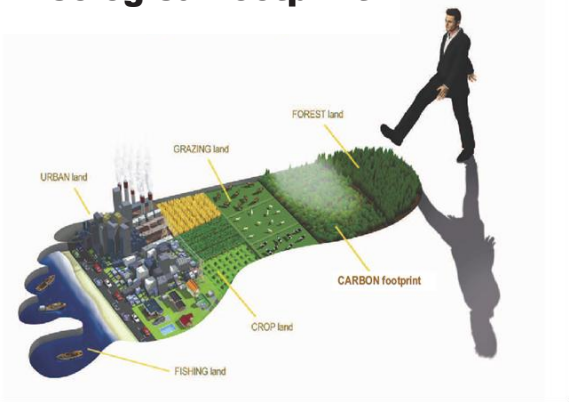
VITO aims to support the urgent transition to sustainability, badly needed as our planet is facing extreme challenges

Peak fossil fuel ~ 2010

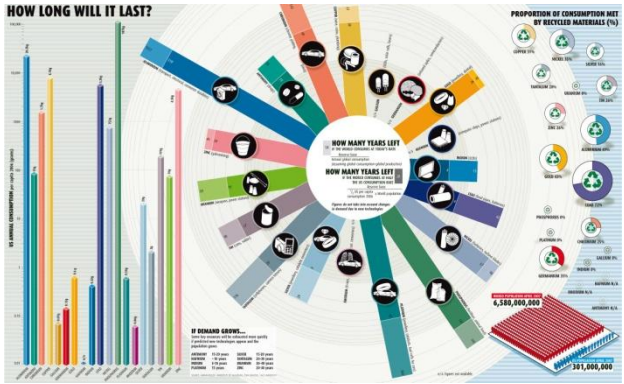


"Our prosperity model has been powered by fossil fuel. We have based our entire existence on the extraction and use of resource that are going to be gone in a relatively short time" **Richard Heinberg**

Ecological footprint



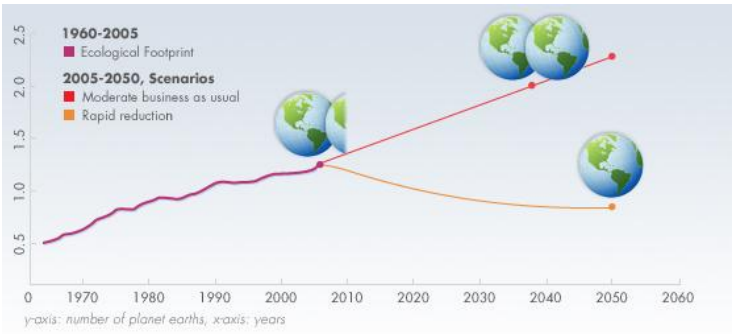
Minerals & metal ores – not renewable



Source: Earth Audit, David Cohen(2007)

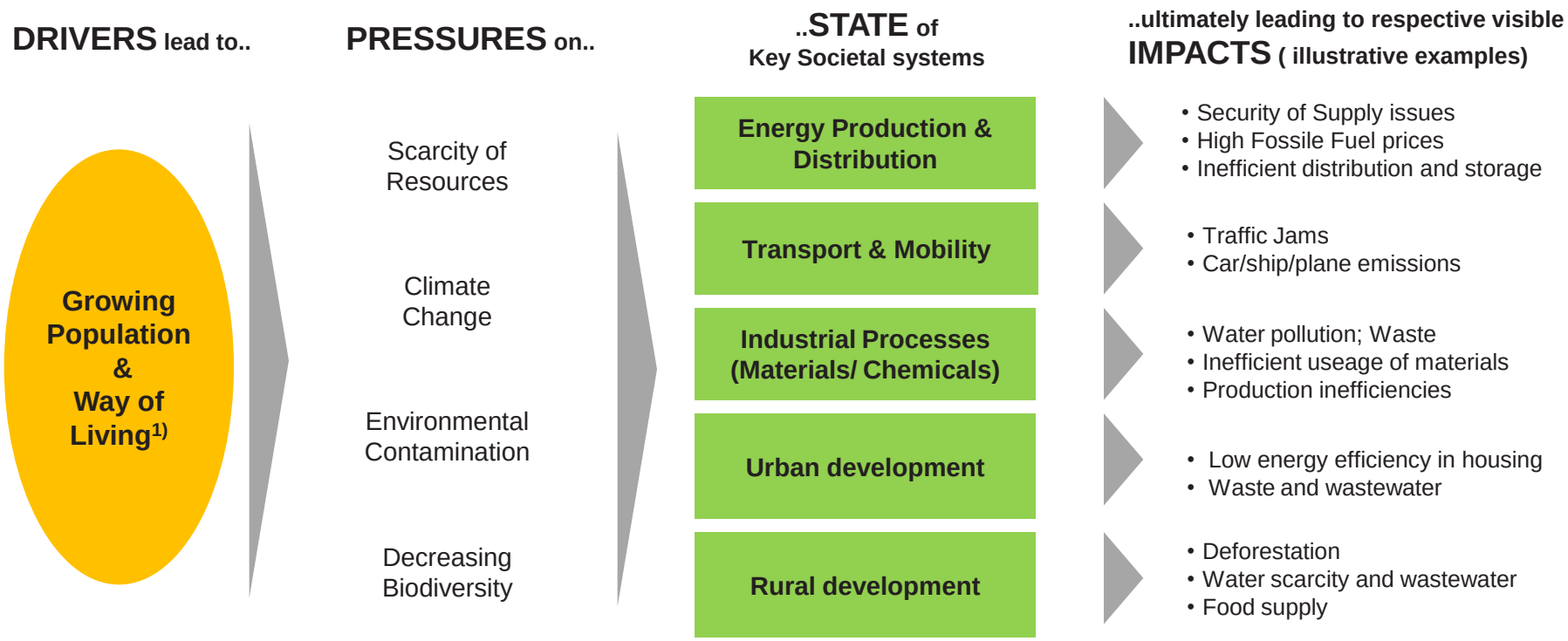
"During lifetime of baby boomers half of the world's important non-renewable resources are used up." **Richard Heinberg**

2 planets by 2030



Source: WWF International living planet report (2008)

Successful structural changes need radical transitions in central societal systems



While Solutions or "Responses" are at hand at each stage, a transition will really be successful when the need of acting end-of-pipe disappears

RESPONSES

Lifestyle Changes | **Policy** | **Cleantech solutions** | **Remedial Cleantech/ Cleaning solutions**

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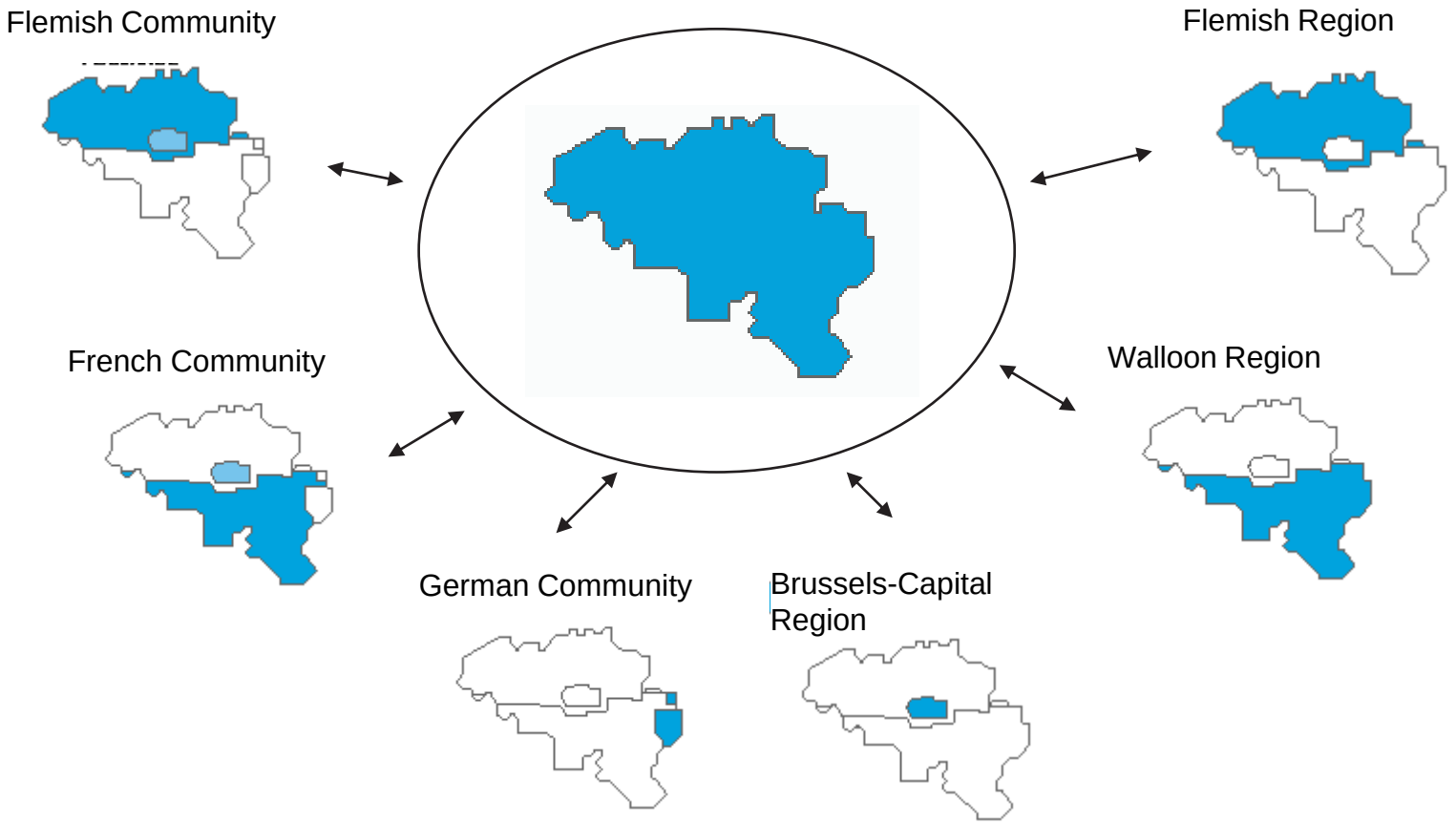
Notes: 1) Way of Living is directly related to degree of Development

BELGIAN COOPERATION AND CONSULTATION

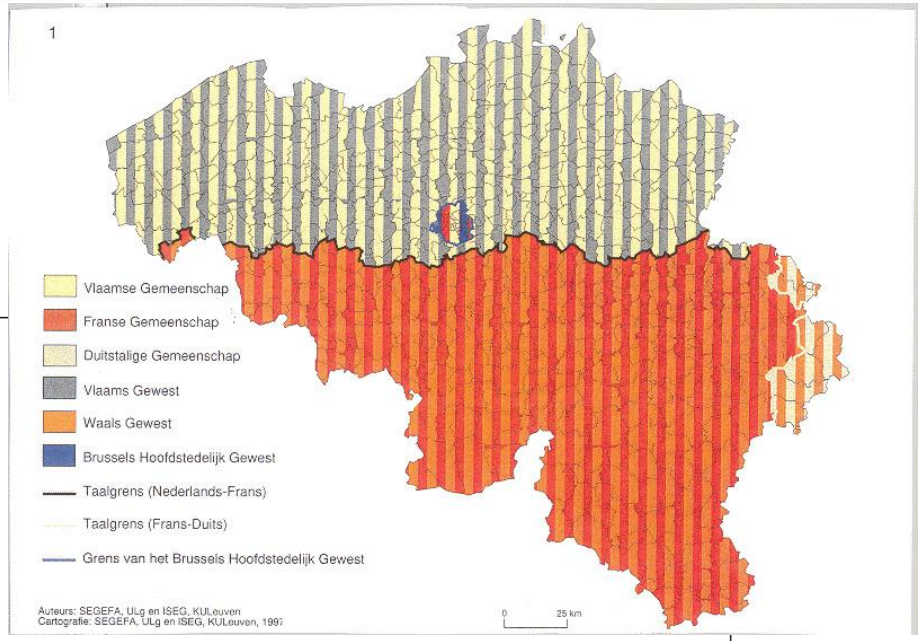


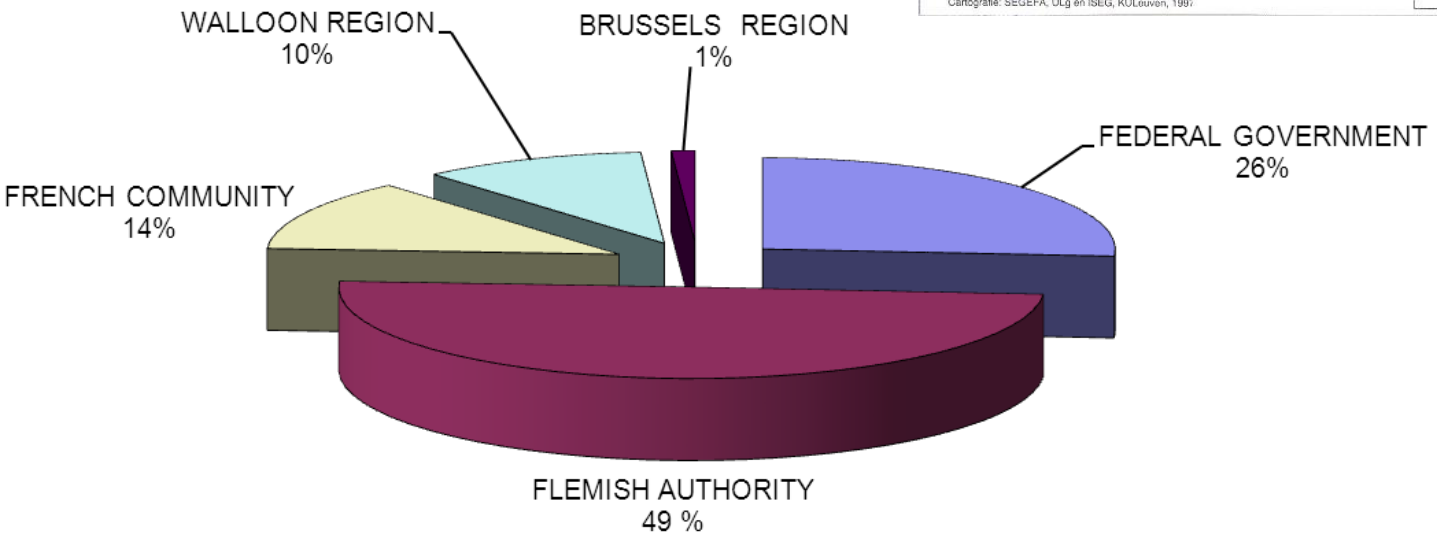
The Interministerial Conference on Science Policy

- The International Cooperation Commission
- The Federal Cooperation Commission

Public R&D Budgets per authority

VITO enbles the S&T collaboration between India and Belgium





Belgium-India Joint Committee on Cooperation in Science and Technology

- New Delhi, April 13, 2011
- Collaboration on:
  - Astronomy & Astrophysics (ARIES telescope)
  - Environment (strong emhasis on waste and wastewater treatment) including water production.
  - Climate Change (strong emphasis on biomass and green chemistry)
  - Water Management
  - Clean Technology (with strong emphasis on green chemistry and energy)
- Exchange of researchers
- Organisation of networking and conferences (i-SUP2012, May 6 – 9, 2012)

Joint EU – India initiatives

- Joint Programm Initiative on Water Challenges for a Changing World
- EU/MS-India Pilot Initiative on Water- and Bio-resources related changes
  - Water purification and urban waste water reclamation and reuse (DST)
  - Waste Water treatment and reuse in agronomical systems (DBT)
- Strategic Research Agenda
  - Water
  - Health
  - Energy
- NEW INDIGO (DST) on networking
  - Green Chemistry
  - Waste Water Treatment

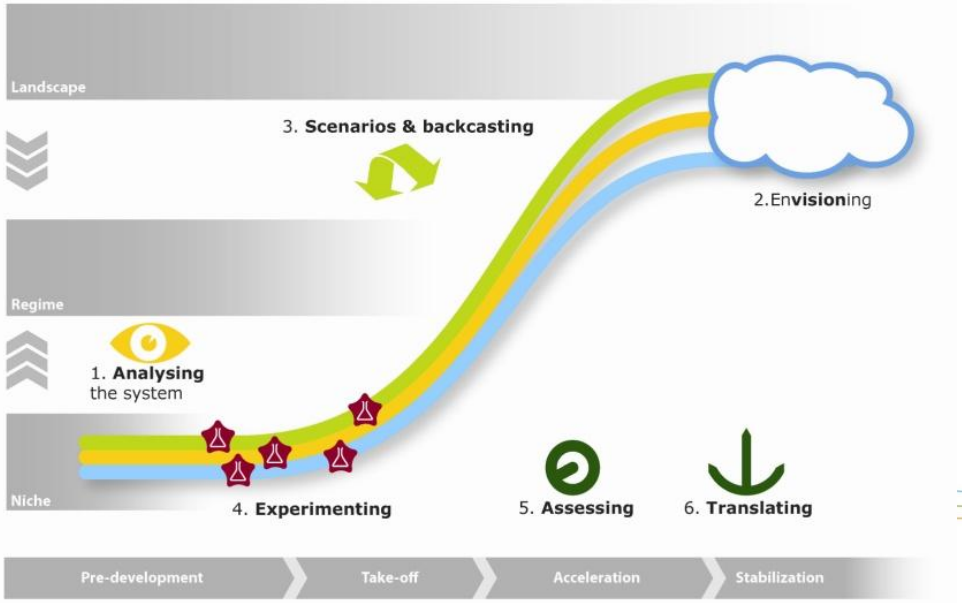
VITO – India collaboration

- VITO – TERI (as a case)
  - Transition development & modelling
  - Joint Research Centre on biomass and biotech (chemistry)
  - Joint Initiatives on energy

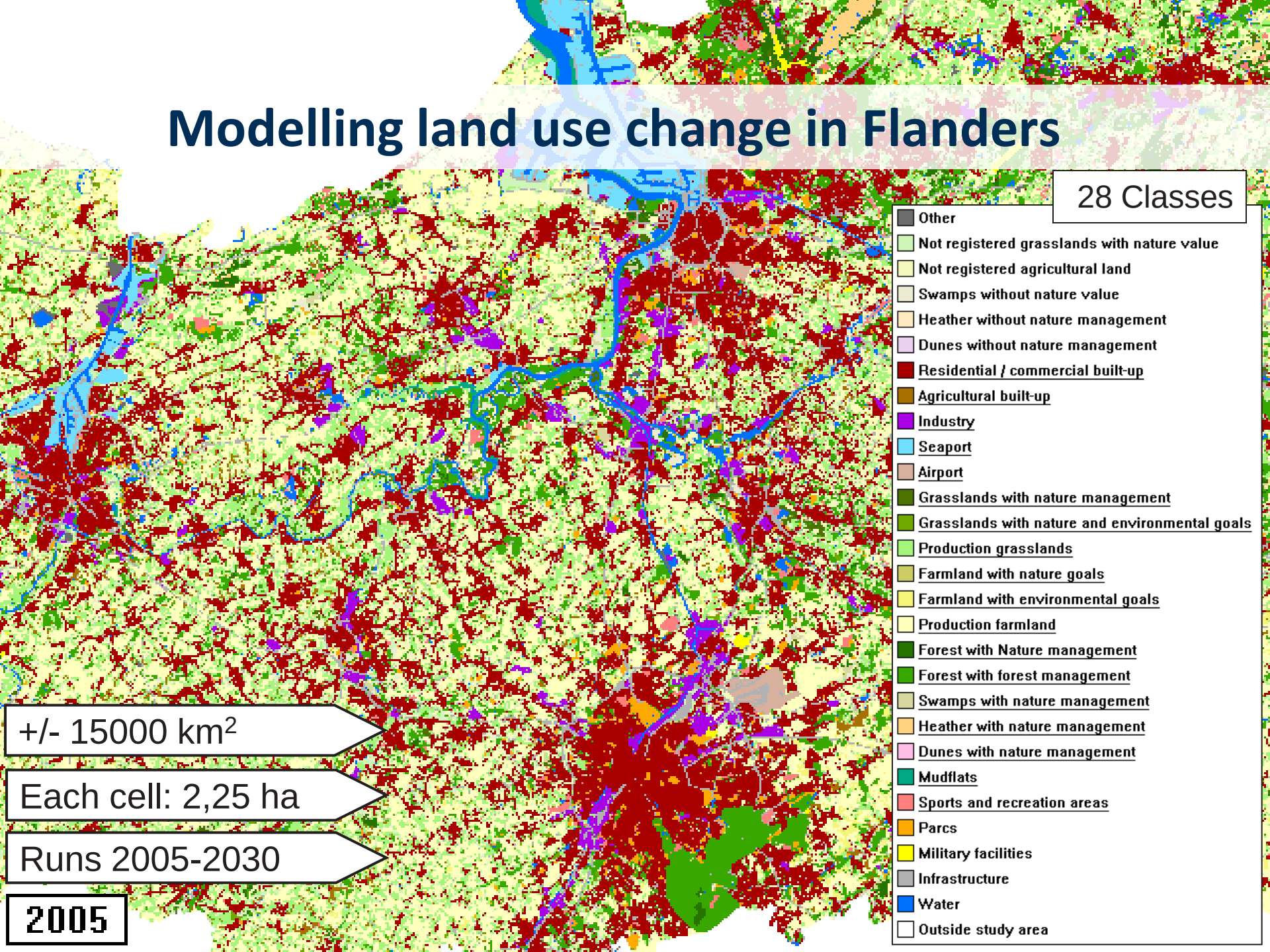
- FCA (Flanders Cleantech Association) – India
  - Energy production & distribution
  - Transport & mobility
  - Urban development
  - Rural development
  - Industrial processes
  - Cleaning soil, air, water, waste

VITO – TERI collaboration as a case

- Transition development & modelling
  - Land use modelling for Urban and transport planning
  - Integration of Clean Technologies in rural villages (combination with INSTEP program)
  - Integrated waste and wastewater treatment initiative generating energy
  - Water quality and quantity management



Modelling land use change in Flanders



VITO – TERI collaboration as a case

- Joint Research Centre VITO-TERI on biomass and biotech (JEIRIBIO)
  - Definition of Strategic Research Agenda on biomass (SAHYOG)
  - Biomass production and processing
    - IPBO (International Plant Biotechnology Research Centre)
    - VALBIOM (Wallonian initiative on Valorisation of Biomass)
    - FISCH (Flanders Initiative for Sustianble Chemistry)
    - Ports of Ghent and Antwerp focusing on biomass energy (Ghent Bio Energy Valley) and biomass-based chemistry (Non-energables Ghent, Antwerp)
    - Sewage plus (MWH, Waterleau, …)
    - CASCADE approach:
      - Food/feed – materials/chemicals – energy

➔ Cleantech development for a biomass-based economy

VITO – TERI collaboration as a case

- Joint initiatives on energy
  - Solar, wind and biomass energy
  - Geothermy leading to electricity production
  - Integration of local energy production systems in (mini) smart grids
  - Energy efficiency in buildings and industrial processes
  - Landfill mining

Looking for new collaborations

- INCO-LAB: Joint lab on biomass between the EU and India
- KBBE2013.3.6-01: Novel bioinspired materials & processes
- NMP2013.4.1-2: Mineral extraction
- KBBE2013.3.2-04: The CO2 algae biorefinery
- KBBE2013.3.1-01: Plant high value products
- KBBE2013.3.3-04: Industrial Biocatalysts
- KBBE2013.3.4-01: Preventing & Valorising bio-waste in biorefineries

New S&T collaborations

- Marie Curie post doc grants
- Belgian grants for PhD exchange
- 10 months stay grants for PhD
- S&T conferences
- SAHYOG (Strengthening networking on BiomAss researcH and biowaste conversion – biotechnologY for EurOpe India inteGration)
- EU-IN STI HOUSE (FEASIBILITY STUDY FOR THE OPENING OF AN EU-INDIA JOINT HOUSE FOR SCIENCE, TECHNOLOGY & INNOVATION)
- WATER4CROPS: Integrating biotreated wastewater reuse and valorization with enhanced water use efficiency (WEF) to support the Green Economy in EU and India
- SWITCH-ASIA: Promoting Sustainable Consumption and Production
- JEIRIBIO: Joint lab VITO-TERI

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SI House India-EU Joint House for Science & Innovation

SAHYOG

Water4Crops

Within VITO, Flanders Cleantech Association promotes the Flanders cleantech industry internationally

What FCA can offer

- Search Engine cleantech companies Flanders
- Footprint of international projects
- International promotion(partner to FIT) & support
- Cases cleantech implementation frontrunners
- Overview cleantech actors in Flanders
- Open communication platform: LinkedIn discussions, events,..

Belgium – India collaborations

- i-SUP2012 (Innovation for Sustainable Production) 7 – 9 May 2012
  - India Night
  - Joint conference India – Belgium Joint comite in cooperation on Science & Technology
- Brussels Sustainable Development Summit (17 – 18 December 2012)
- Co-organisation in DSDS 2012
- Support to joint Commission BLEU-India
- Support to EU-India initiatives
- Belgium is responsible with Finland for the bio-economy scientific collaboration in the framework of SFIC

Sustainable resources management
- Sustainable building materials
- Closed resources cycles
- Water and waste water

Smart growth Transition management
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Land use and spatial impacts
- Spatial environmental impacts related to human health

Quality of life and social aspects
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WATER AND WASTE WATER MANAGEMENT

- Controlled **rainwater buffering** and soil **infiltration** avoiding flood risks and long term drought risks

- Rational use of **potable water supplies**: limiting primary use by consumers, ensuring use of **water fit for purpose**

- Waste water treatment technologies for **closed water cycles** with **nutrient** and **energy/waste heat recuperation**
- **SEWAGE PLUS**

Water and waste water

Expertise

KATHOLIEKE UNIVERSITEIT LEUVEN
UNIVERSITEIT GENT
Universiteit Antwerpen
universiteit hasselt
VAP Vlaams Algenplatform
CINBIOS INDUSTRIAL BIOTECH CLUSTER
EABA EUROPEAN ALGAE BIOMASS ASSOCIATION
WssTP The European Water Platform
EMH European Membrane House
SusChem European Technology Platform For SUSTAINABLE CHEMISTRY

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CLOSED RESOURCES CYCLES

- Innovative design an policy support on all levels of built environment, minimizing use of **primary resources**, maximizing use of **renewable resources** :
  + reconversion (districts)
  + adaptability & flexibility (building)
  + deconstruction for reuse (element)
  + dismantling for recycling (material)

- **Enhanced landfill mining**: re-using of discarded resources from landfill sites for building applications

- New business models and concepts: **Cradle to Cradle**, product service systems, leasing agreements, platforms for material pooling,…

Closed resources cycles

Expertise

C2C NETWORK

PLAN C

Gyproc INFINITO

OVAM
OPENBARE VLAAMSE AFVALSTOFFENMAATSCHAPPIJ

Vrije Universiteit Brussel

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Biomass and Biowaste as resources

- Inventarisation of biomass and biowaste in Belgium and via harbours overseas

- Mapping of large chemical industry and replacement of fossil resources by biomass (Non energables)

- Process intensification of new biorefineries.

- Flanders Initiative for Sustainable Chemistry

Biomass and biowaste as resources

Expertise

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FISCH

CINBIOS
INDUSTRIAL BIOTECH CLUSTER

Port of Antwerp

essenscia
vlaanderen

OVAM
OPENBARE VLAAMSE AFVALSTOFFENMAATSCHAPPIJ

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SUSTAINABLE BUILDING MATERIALS AND INFRASTRUCTURES

- Development of **LCA-based databases** and calculation methods for the selection of **sustainable building materials** following CEN TC350

- **LCA of building products** commissioned by industrial players analyzing **resources, emissions** and **environmental impacts**

- Assessment of environmental performance of **innovative solutions and concepts**

- Policy support on **environmental product labels** and **declarations**

Sustainable building materials and infrastructures

Expertise

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

OPENBARE VLAAMSE AFVALSTOFFENMAATSCHAPPIJ

Wienerberger
Building Value

Gyproc
SAINT-GOBAIN

BBF

PMC BMP

teppfa

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SMART MOBILITY AND TRANSPORT

- **Monitoring driving** and travel **behavior** and conducting experiments on **innovative mobility concepts**

- Developing and testing solutions for increasing the share of **clean vehicles** and **active modes**
-Enhancing market introduction of **hybrid and electric vehicles**

-Examining long-term scenarios for **land use** and related **transport energy use** and **emissions** towards e.g. 2020/2050 targets
- Analysis of impact of transport related **air quality measures** (e.g., low emission zones)

Smart mobility and transport

Expertise

lne. Departement Leefmilieu, Natuur en Energie

provincie Limburg

Port of Antwerp

ER

iea International Energy Agency

INTELLIGENT ENERGY EUROPE

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ENERGY EFFICIENT BUILDINGS

- **Market instruments** and **policy measures** for Energy Efficient Buildings: implementation of **near zero energy buildings** and energy upgrade of the **existing housing stock**

- Policy support through energy modeling and **scenario analysis** towards e.g. **2020/2050 targets** at regional or national level

- **Cost optimization approaches** for energy and emissions at regional and national level e.g. based on Markal/Times models.

Energy Efficient Buildings

Expertise

provincie Limburg

UNIVERSITEIT GENT

VEA Vlaams Energieagentschap

EnR

iea International Energy Agency

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SMART SYSTEMS FOR INTELLIGENT ENERGY NETWORKS

- **Smart systems** for **intelligent energy networks** in a smart grid market: energy in buildings combined with mobility and energy markets.

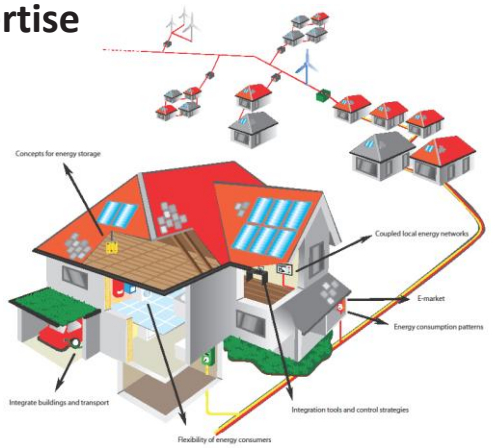
- Intelligent thermal and electrical systems based on **renewable energy sources, electrical** and **thermal energy storage**

- System integration and control of different components at the level of a **building** to a **complete district**

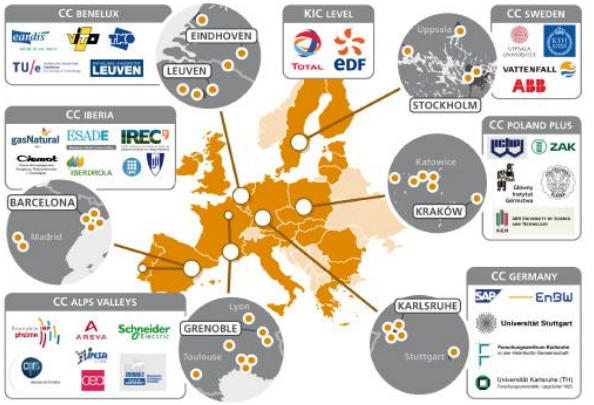
- Interconnected lab infrastructures

Smart systems for intelligent energy networks

Expertise



European network KIC-EIT



linear
Intelligent Networks

KATHOLIEKE UNIVERSITEIT
LEUVEN

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INDOOR AIR QUALITY

- Research on **indoor air quality** and the influence of building materials, **energy efficient** building methods (low energy or passive buildings) and **ventilation systems** and controls

- **Healthy building materials** and in-house consumer products: focus on **low emission products**, identification and measurement of impact of **emerging pollutants**

- Product **emission tests**, evaluation of existing **product labels** and translation of research towards policy measures

Indoor air quality

Expertise

VEA Vlaams Energieagentschap

lne. Departement Leefmilieu, Natuur en Energie

JRC EUROPEAN COMMISSION

Health & Consumer Protection Directorate-General

World Health Organization

- **Sustainable resources management**
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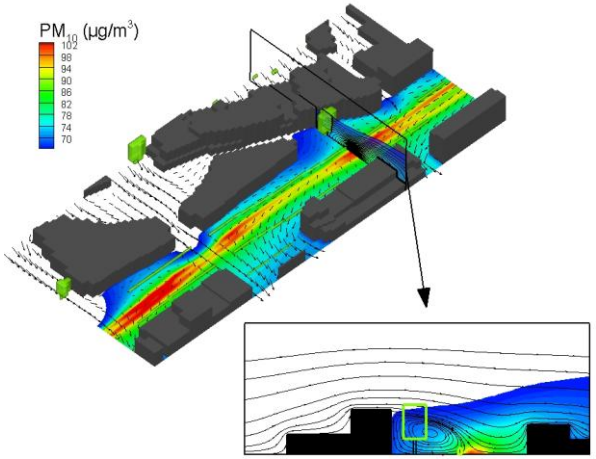
SPATIAL ENVIRONMENTAL IMPACTS RELATED TO HUMAN HEALTH

- **Outdoor air quality** monitoring and modeling via atmospheric models at **district**, **urban** or **regional scales** focussing on impacts of human activities on **human health** and **environmental** consequences

- Spatial modeling of urban environments to predict **impact of spatial planning measures** e.g. introduction of new traffic routes, green zones/parks on air quality, noise pollution and **urban heat island effect**

Land use and spatial environmental impacts

Expertise



STAD ANTWERPEN

lne. Departement Leefmilieu, Natuur en Energie

Port of Antwerp

Rijkswaterstaat

VMM Vlaamse Milieumaatschappij

JRC EUROPEAN COMMISSION

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SUSTAINABILITY ASSESSMENTS

- Existing sustainability assessment schemes for buildings (**BREEAM, LEED, DGNB, HQE**,…) and communities (**One Planet Principles, BREEAM Communities, LEED-ND**)

- **Life Cycle Assessment** and **LCA-based tools** on the EU market

- **Ecological footprint**, **carbon footprint**, Input-Output modelling

-SuFiQuaD methodology **optimizing environmental** impacts/costs, **financial** costs and **building qualities** through LCA, LCC and Multi-Criteria Analysis (MCA)

Sustainability assessments

Expertise

lne. Departement Leefmilieu, Natuur en Energie

Belgian Science Policy

BBRI

breeam Certified Assessor

KATHOLIEKE UNIVERSITEIT LEUVEN

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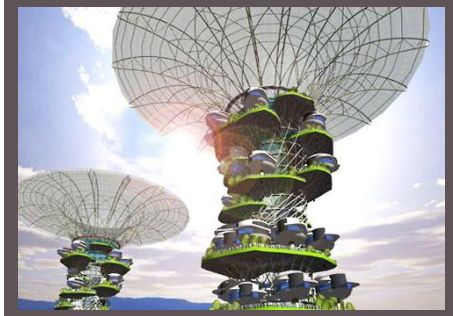


TRANSITION MANAGEMENT

- Guiding **transition processes** on a systems level, comprising technological, policy and societal subsystems, through broad stakeholder involvement from policy makers, industry, ngo's, midfield organisations,…

- Collective envisioning of desired **future sustainable solutions** and **construction of pathways**; starting from the analysis of the current system

- **Shared governance** mobilizing stakeholders involved: dealing with **willingness** to use, pay and invest; new **collaborative forms** and market models; smart **urban development policies**

Transition management

Expertise

PLAN C

transitie duurzaam wonen & bouwen

Erasmus
ERASMUS UNIVERSITEIT ROTTERDAM

Drift
Dutch Research Institute for Transitions

You can contact us

- Transition Management

  Arnoud.lust@vito.be
- Land use modelling

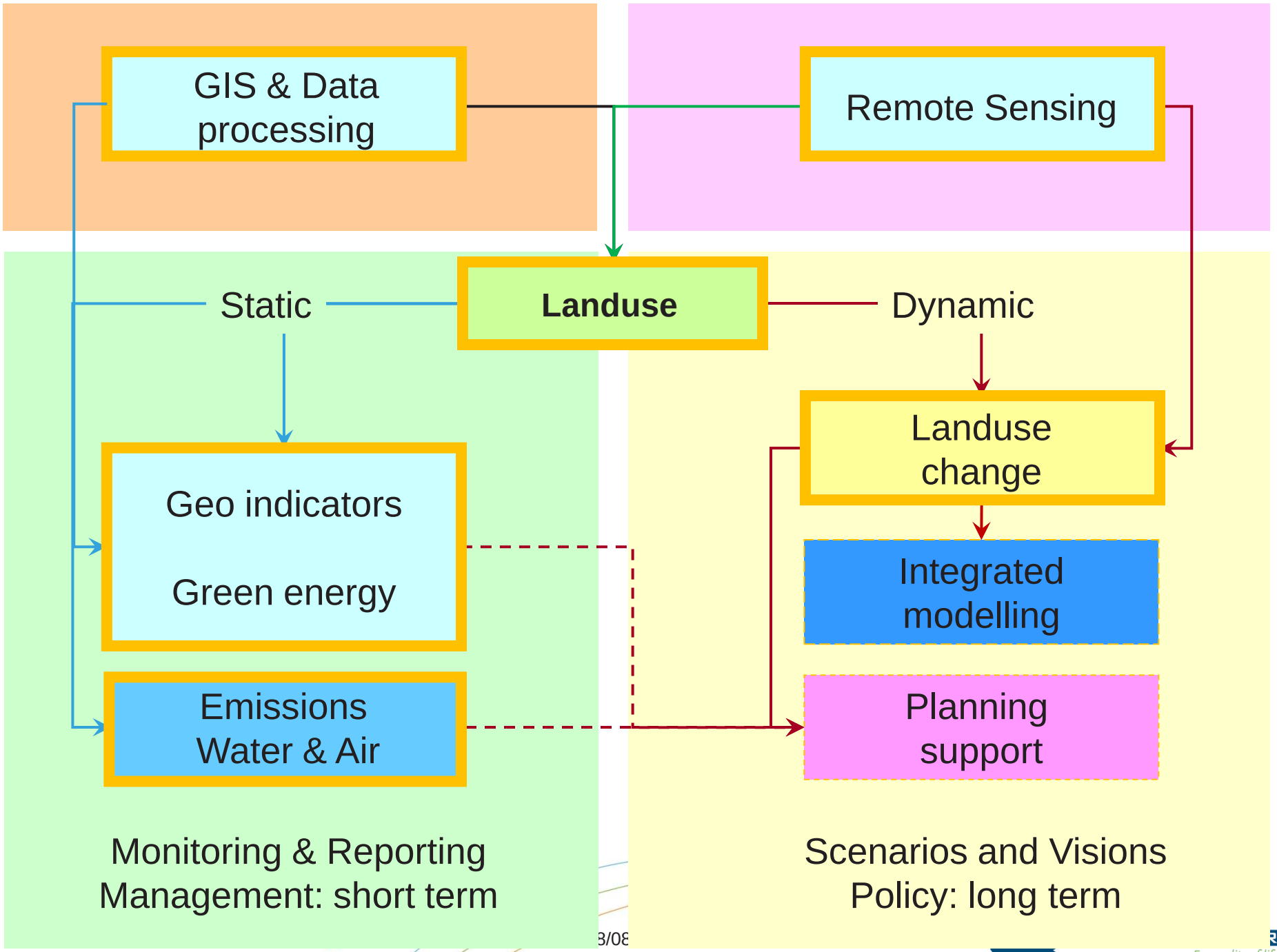
  Guy.engelen@vito.be
- Joint wastewater and waste treatment

  Heleen.dewever@vito.be
- Joint biomass Biotech Centre

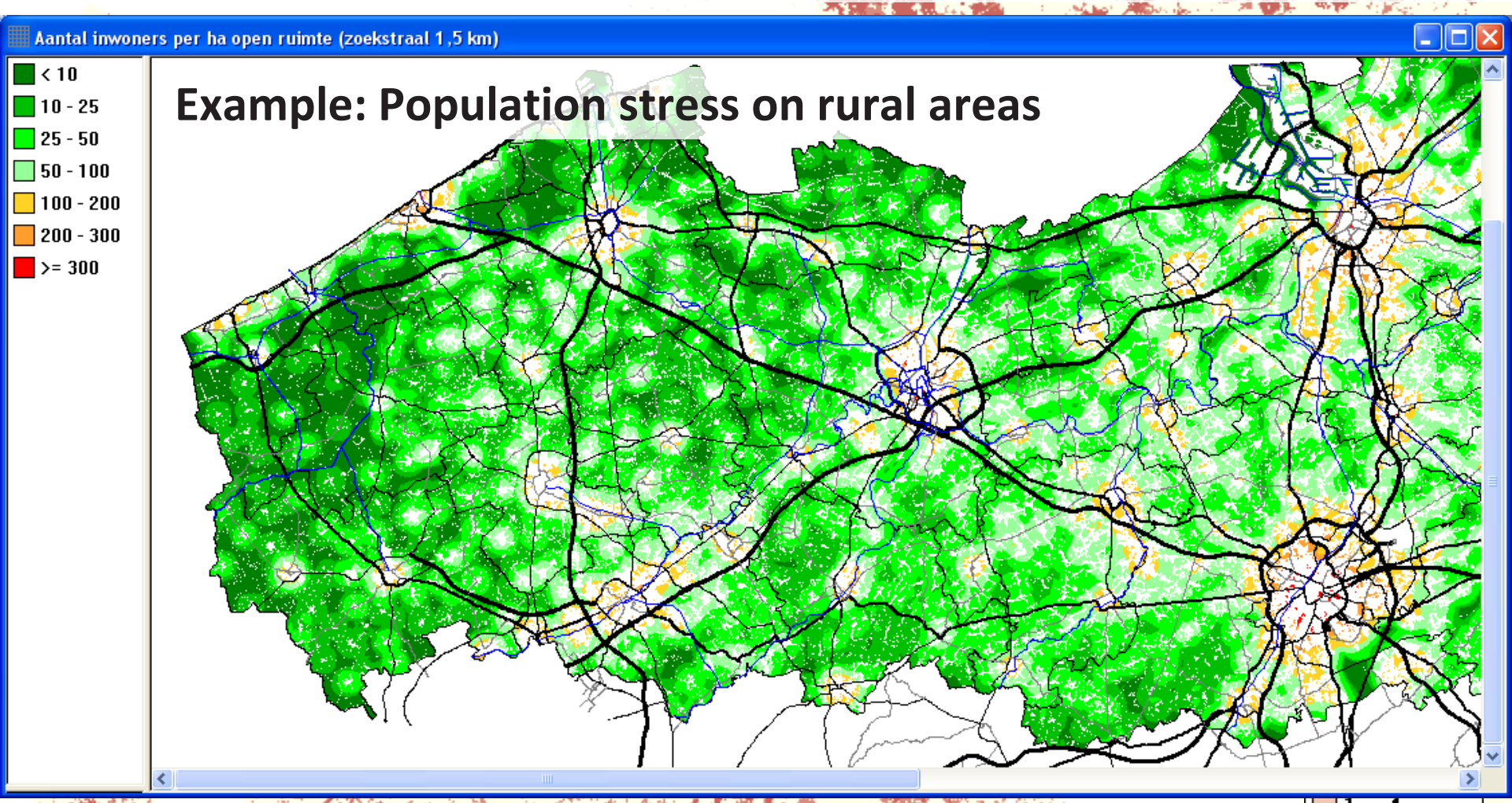
  Ludo.diels@vito.be
- Joint initiatives on energy

  Guy.vekemans@vito.be
- Flanders Cleantech Association

  Ludo.diels@vito.be



Land use based dynamic indicators

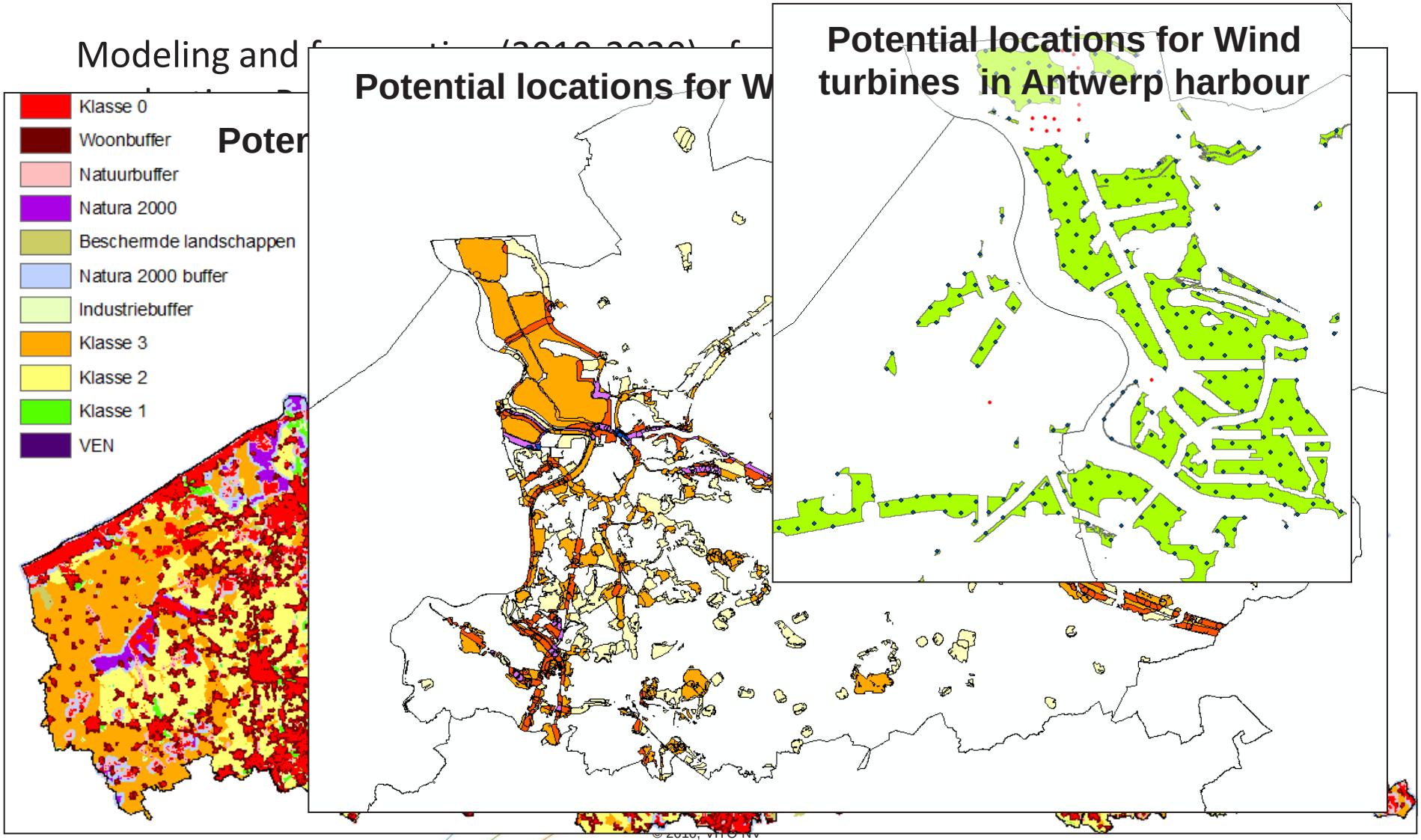


2005

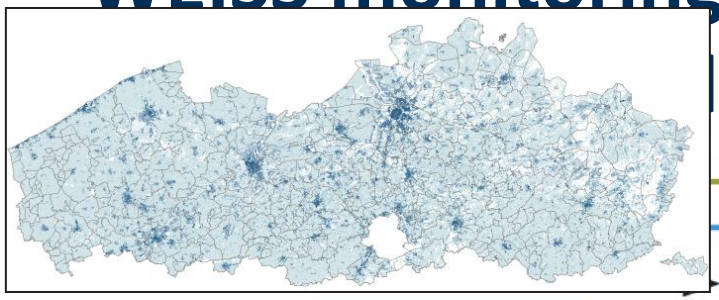
1 ... 4
0 ... 1
0 ... 0

Green energy production: spatial dimension

Modeling and f



WEISS monitoring and forecasting emissions to ...l path from source to sink



Gross emissions

Net emissions

No retention calculations

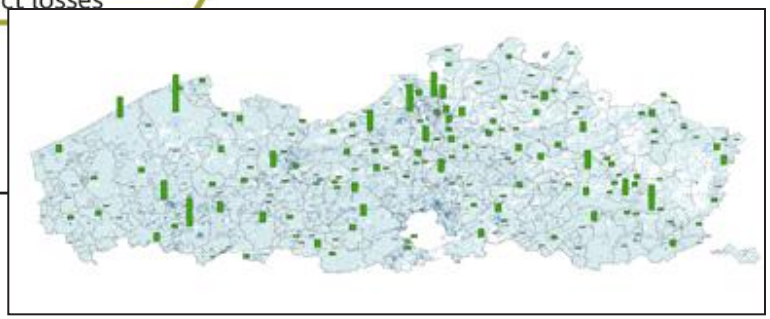
Shipping

...

source

emission

transport



Diffuse source

Point source

emission

surface water load

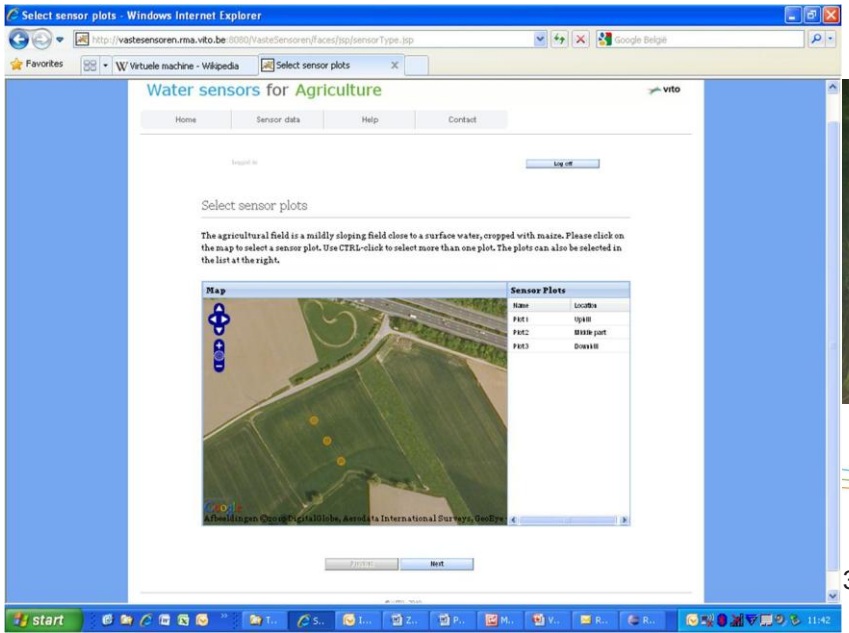
emission = surface water load

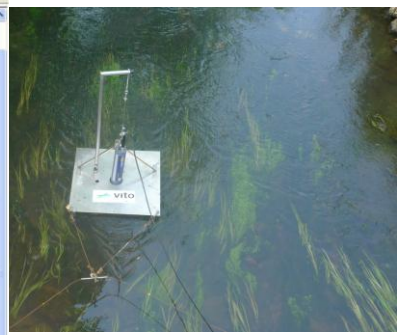
GENINGEN UR
For quality of life

RMA OT LWM expertise related to water

"Develop reliable, rapid and cost-effective monitoring techniques for the detection of water contaminants"

- measuring techniques for monitoring (strategies, new technologies)
- use of sensors (in soil, surface waters and groundwater)
- data transmission, visualisation and interpretation + advice for improvement of existing systems





RMA OT LWM expertise related to water

"Provide integrated assessment of water resources and analysis of management options at various spatial and temporal scales":

- characterisation and desk studies (quantitative / qualitative)
- tools and modelling of soil and water advice on water management issues
- advice on agricultural practices: water use, irrigation needs, use of fertilizers, pesticides , soil contamination
- FP7 project Aquarehab: Integration of rehabilitation technologies for degraded waters in river basin management