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Implementation of 2006 IPCC GLs in the Greek GHG Inventory
Feedback from the use of the 2006 IPCC Inventory Software

IPCC Side Event at SB38
"Responding to the UNFCCC Reporting Needs:
IPCC Inventory Software and Methodology Reports"
Bonn, 8 June 2013

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Greek GHG Inventory Team

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✓ **Overview of Greek GHG inventory system**

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Greek GHG Inventory System

Participating Entities

- The **Ministry of Environment, Energy and Climate Change, MEECC** (former Ministry for the Environment and Public Works) designated as the national entity responsible for the national inventory.

- The **National Technical University of Athens (NTUA) / School of Chemical Engineering**, which has the technical and scientific responsibility for the inventory planning, preparation and management, as a technical consultant of the Ministry.

- **Data providers**: Ministries, governmental agencies, international associations, along with individual private industrial companies.

Organizational Structure of the GHG National Inventory System
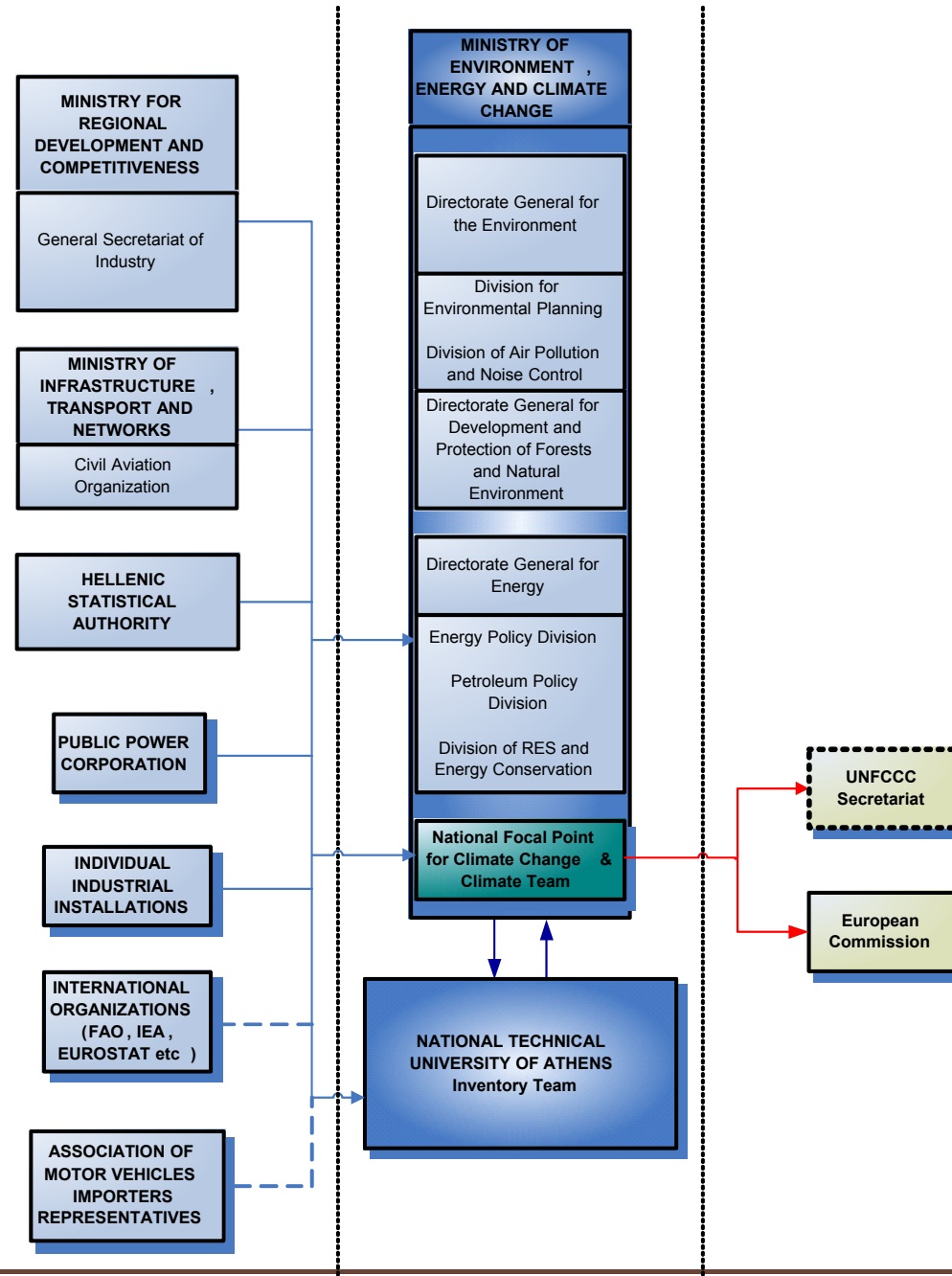
Legal Framework of Co-operation

The framework for the co-operation between the entities of National GHG Inventory System, i.e. MEECC, NTUA Inventory Team and the data providers is based on:

➢ Circular 918/21-4-08 released by MEECC entitled "Structure and operation of the National Greenhouse Gases Inventory System- Roles and Responsibilities", which includes a description of each entity's responsibilities, concerning the inventory preparation, data providing or other relative information.

➢ The appointment of specific focal persons of the involved competent Ministries and Agencies

This formal framework has improved the collaboration between the entities involved, assuring the timely collection and quality of the activity data required and solving data access restriction problems raised due to confidentiality issues
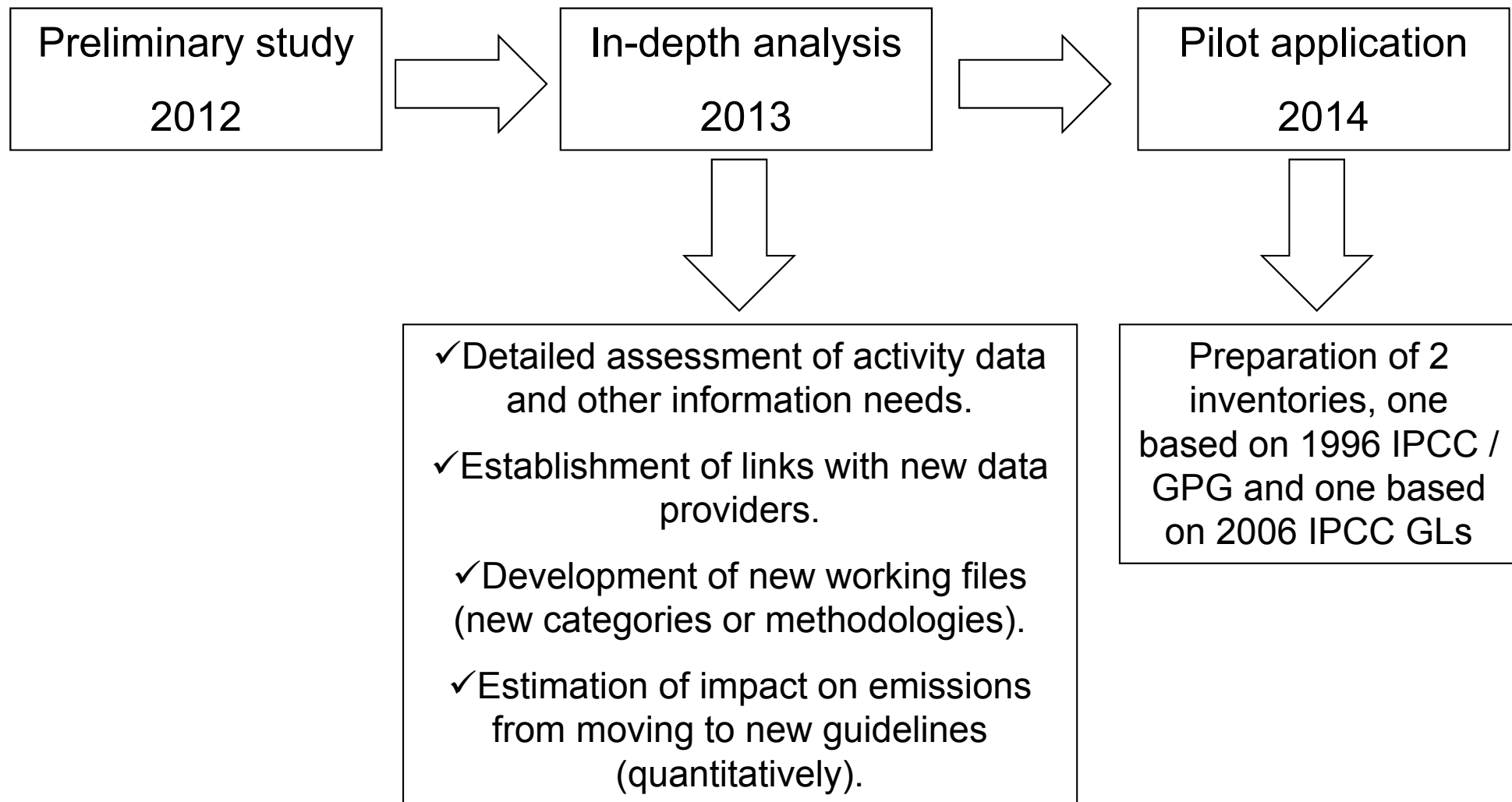
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Schedule to implement 2006 IPCC GLs in Greek GHG inventory

| Preliminary study 2012 | → | In-depth analysis 2013 | → | Pilot application 2014 |

In-depth analysis 2013:

✓ Detailed assessment of activity data and other information needs.

✓ Establishment of links with new data providers.

✓ Development of new working files (new categories or methodologies).

✓ Estimation of impact on emissions from moving to new guidelines (quantitatively).

Pilot application 2014:

Preparation of 2 inventories, one based on 1996 IPCC / GPG and one based on 2006 IPCC GLs

Preliminary study

✓ Preliminary study, performed in 2012, was based on:

  ➢ Background papers from ETC / Air & Climate change

  ➢ Various presentation from workshops, experience of other Parties

  ➢ 2006 IPCC GLs

  ➢ 2006 IPCC Software for National Greenhouse Gas Inventories

✓ How we used the software during the Preliminary study:

  ✓ Supplementary to the GLs, easy to use, well constructed tool

  ✓ facilitates the comparison of the new GLs with the previous and identification of changes

  ✓ Assist / ensure that our assessment cover all changes (complete) and verify our conclusions

  ✓ Estimate the effect of the changes (quantitatively)

  ✓ Assist us to understand and estimate the new sources

  ✓ .....

Preliminary study / Results : Energy (1/3)

Stationary combustion

Changes	Effect	Effort	Comments
New reporting element: Carbon dioxide capture and storage	no	no	Not occurring in Greece
More detailed reporting categories in Manufacturing Industries and Construction (CRF 1A2)	no	low	Reallocation, additional information is included in working files
NCVs: update and extension of lists	minor	low	PS values are used in most cases
Assumption of full oxidation - oxidation factor: 1 for default EF (before 0.98 (coal), 0.99 (oil and peat), and 0.995 (gas))	0.5-2% ↑	low	Till now default OF are applied
Updated/extended lists of default CO_2 / CH_4 / N_2O EF	low	low	CO_2: mainly PS EFs, CH_4 and N_2O: Non-key category
CO_2 from non-fuel use of fossil fuels moved from Energy to IPPU	no	low	Reallocation

Low effort to implement changes – low effect on emissions

Preliminary study / Results: Energy (2/3)

Mobile combustion

Changes	Effect	Effort	Comments
Urea-based catalysts (Road Transport)	low	low	Use of latest COPERT version
Tier 3 methodology for off-road emissions.	no	no	Non-key category
More detailed description for railways. Tier 3 for CH4 and N2O proposed	no	no	Non-key category
Tier 2 for aviation is based on "individual aircraft types" and not on aggregate aircraft movements (Tier 2a)	low	low	Tier2a is currently used
Default fuel-based CH4 and N2O emission factors for water-borne navigation were introduced as new element in the 2006 IPCC GLs	low	low	Non-key category

Low effort - Aviation and road transport will be affected

Preliminary study / Results: Energy (3/3)

Fugitives

Changes	Effect	Effort	Comments
CH4 from coal seam degasification now to be reported in year when emissions / recovery occur (before year when mined through)	no	no	Only lignite surface mines exist in Greece
CH4 from underground abandoned mines	no	no	Only lignite surface mines exist in Greece
Several updated emission factors as well as further guidance on estimating emissions are available for the oil and gas sector.	low	Low - medium	Non-key categories
Emissions from geothermal energy	low	low	New category

Low effort to implement changes – fugitives from oil and gas sector and geothermal will be affected – only lignite surface mines in Greece

Expected use of the software in the pilot application of the 2006 IPCC GLs
Energy sector

✓ Guide to convert our working files (spreadsheets):

- ➢ Check whether the default NCVs and EFs currently in use in the inventory are in line with 2006 IPCC GLs
- ➢ Reallocate the non energy fuel use and associated emissions to IPPU
- ➢ Estimate emissions from new sources (Urea catalysts)
- ➢ Implement changes in aviation (new Tier 2)
- ➢ **Reconstruct the 1B2 source category working files (fugitives from Oil and NG), since several updated emission factors as well as further guidance on estimating emissions are available for the oil and gas sector.**

✓ QA/QC tool (reproduce emission estimations of our working files).

Preliminary study / Results: IPPU (1/2)

Changes	Effect	Effort	Comments
Mineral industry	no	no	No impact, higher Tiers are applied (compatible to 2006 GLs)
Ammonia	no	no	No impact, emissions are based on NG consumption (PS). No urea production.
Nitric acid (new default EFs)	no	no	No impact (Medium pressure)
Petrochemical and Carbon Black Production (new)	low	low	
Metal production	no	no	High Tier methods already in use (compatible to 2006 GLs)
Lead, Zinc and Other Production (new)	low	low	
Emissions from non-energy use of fuels	low	low	Reallocation from Energy and solvents, but also new default methods for lubricants, paraffin and emissions from asphalt plants

Changes (new or improved methodologies) to key categories will not affect inventory (use of high tier PS methods)

Reallocation from energy and some new categories will have a slight effect on inventory

Preliminary study / Results: IPPU (2/2)

Changes	Effect	Effort	Comments
Electronics Industry Emissions, photovoltaic (new)	low	low	Possible source of NF3 (new gas)
Emissions of SF6 and PFC from Electrical equipment	no	no	PS data are used
Emissions of fluorinated substitutes for ozone depleting substances, Refrigeration and Air Conditioning (improved method)	low, ↑ (<5%)	low	Inclusion of emissions from refrigerant management of containers
Foam blowing	low	low	EFs for first year losses is changed
Fire protection	low	low	Change of methodology

Low effort to implement changes

Expected use of the software in the pilot application of the 2006 IPCC GLs IPPU sector

✓ Guide to convert our working files (spreadsheets):

➢ Reallocation of non energy fuel use associated emissions from energy to IPPU

➢ Estimate emissions from new categories / sources (lead and zinc, photovoltaics)

➢ Implement changes in f-gases emissions calculation (incorporate EF and method changes in our files)

✓ QA/QC tool (reproduce emission estimations of working files).

Preliminary study / Results: Agriculture (1/3)

Enteric fermentation

Changes	Effect	Effort	Comments
Emission factors for cattle have been revised	no	no	Greece uses tier 2 method, thus these default EFs is not be relevant

Manure management

Changes	Effect	Effort	Comments
Changes in CH4 emission factors for cattle, swine and buffalo.	low	low	Relevant for swine and buffalo
Changes in emission factors for direct N2O emissions from Manure Management	low	medium	numerous changes of EFs, further increase of disaggregation of WMS
Estimation of indirect N2O emissions from N volatilization from manure management systems (new)	low	medium	need for disaggregated WMS data
Tier 2 and Tier 3 methods have been clearly defined for leaching and runoff losses from various WMS (new)	low - medium	medium	Difficulties to obtain country-specific data to move to higher tier.

Manure management – changes in EFs – difficulties from the need of disaggregated data

Preliminary study / Results: Agriculture (2/3)

Agricultural soils-Direct

Changes	Effect	Effort	Comments
Estimation of emissions from organic N applied as fertilizer including animal manure, compost, sewage sludge, rendering waste.	no	low	reallocation
Biological nitrogen fixation has been removed as a direct source of N2O	low	low	
N mineralisation associated with loss of soil organic matter resulting from change of land use or management on mineral soils	low	medium	
EF for N additions e,g, due to mineral fertilizers was revised as 1% instead of 1.25%.	medium	low	
The EFs for rice paddies have been made separate from those for other types of agricultural soil systems	low	low	
New EFs for the N2O emissions from grazing animals on pasture, range and paddock.	low	low	

Change / new EFs, reallocation between subcategories, new reporting item

Preliminary study / Results: Agriculture (3/3)

Agricultural soils-Indirect

Changes	Effect	Effort	Comments
The overall value for the emission factor for leached N has been changed from 0.025 to 0.0075 kg N2O–N/kg N leached/ in runoff water.	high	low	
N in crop residues (above- and below ground), including N-fixing crops and forage/pasture renewal returned to soils.	low	medium	
N mineralisation associated with loss of soil organic matter resulting from change of land use or management on mineral soils	low	medium	

Other

Changes	Effect	Effort	Comments
Urea use (new)		low	
New CH4 EF for rice cultivation	low	low	

Change of EF with high effect in the inventory

Expected use of the software in the pilot application of the 2006 IPCC GLs Agriculture

✓ Guide to convert our working files (spreadsheets):

> ➤ Implement changes (i.e. reallocation between subcategories, new EFs, new sources)

> ➤ **Reconstruct the working files of 3.C source category (especially direct and indirect N2O emissions) or use the software for this category.**

✓ QA/QC tool (reproduce emission estimations of working files).

Preliminary study / Results: LULUCF

Change	Effect	Effort	Comments
Complete, consistent treatment of fires		medium	Assessment during in-depth analysis
Harvested Wood Products		medium	Assessment during in-depth analysis
Settlements remaining settlements		medium	Assessment during in-depth analysis
Wetlands		medium	Assessment during in-depth analysis
Extended default values of existed methods	low	low	Assessment during in-depth analysis

Expected use of the software in the pilot application of the 2006 IPCC GLs LULUCF

✓ Guide to convert our working files or use directly the software

  ➤ HWP and other categories (?)

✓ QA/QC tool (reproduce emission estimations of working files).

Preliminary study / Results: Waste (1/3)

Solid waste disposal

Change	Effect	Effort	Comments
New defaults for dry matter content, DOC content in % dry waste, total carbon content in % of dry weight and fossil carbon fraction in % of total carbon.	low	low	
Newly introduced (nappies, rubber and leather, plastics, metal, glass, other inert waste) and updated (garden and park waste, wood) defaults for DOC	low	medium	Difficult to obtain accurate and full time series (till 1960) of all these disaggregated data.
Newly introduced default values for DOC and fossil carbon content for process waste (industrial waste generated at the facilities).	low	medium	
Update and detailing of k-values (methane generation rate per type of waste) and of half-lives for FOD model	no	no	Already in use
Methane correction factor: type of site 'Managed' is now subdivided into 'Managed – aerobic' and 'Managed – Semi-aerobic'	low	medium	

Improved default emission factors or default parameters – difficulties due to the need of dissagregated data.

Preliminary study / Results: Waste (2/3)

Wastewater handling

Change	Effect	Effort	Comments
No distinction between emissions from wastewater and sludge	no	no	They are reported separately in annual UNFCCC submissions
New guidance for the estimation of CH4 emissions from uncollected wastewater and N2O emissions from advanced wastewater treatment plants.	low	low	
Update of BOD5 values (new values for individual countries).	low	low	
Expansion of default MCF for different systems.	low	medium	

Improved default emission factors or default parameters and new guidance (refinement of methods).

Preliminary study / Results: Waste (3/3)

Waste incineration - other

Change	Effect	Effort	Comments
Update of default emission factors and dry matter parameter for industrial waste and sewage sludge	low	low	
Hazardous waste and clinical waste as new subcategories for 'Other waste' with new default values for DOC and fossil carbon content	no	no	They have been included in annual submissions to UNFCCC.
Open burning of waste (new category)	no	no	It is not permitted in Greece.
Biological treatment of solid waste (new category)	low	low	

Waste incineration is not a practice in Greece.

Expected use of the software in the pilot application of the 2006 IPCC GLs Waste sector

✓ Guide to convert our working files (spreadsheets):

  ➢ Use new EFs and parameters (DOC, etc)
  ➢ Estimate emissions from new sources (Biological treatment of solid waste)

✓ QA/QC tool (reproduce emission estimations).

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Conclusions (1/3)

➢ **2006 IPCC GLs:**

  ✓ More clear and concise

  ✓ Improved guidance / refinement of previous methods / new methods

  ✓ Additional sources / gases

Conclusions (2/3)

➢ **Feedback about 2006 IPCC Software for national GHG inventories**

✓ easy to use

✓ facilitates conversion from previous GLs to 2006 IPCC GLs

How?:

Preliminary study

✓ very useful during the preliminary study - used as a guide to assess changes (new EF ranges, new sources, reallocation between subcategories, etc)

➢ **Feedback about 2006 IPCC Software for national GHG inventories**

it will be further used during pilot application of 2006 GLs (2014)

✓ Identify and use new EFs and parameters

✓ Reallocate emissions between sectors or categories

✓ Estimate emissions from new sources

✓ Verify the emissions produced by our working files

✓ Reconstruct working files or use the software exclusively for the estimation of emissions from

    ➢ 1.B.2 sector (fugitives from Oil and NG)

    ➢ 3.C (especially direct and indirect N2O emissions)

    ➢ HWP

✓ Training (new inventory experts)

✓ Plans to use the software in our University courses for introduction of students to GHG inventories

Thank you for your attention!

Ευχαριστώ πολύ!

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