

Ireland's National Inventory System

Bernard Hyde, Paul Duffy,
Brian Quirke, Emilia Hanley,
Saniul Alam

Regional Training Seminar on National Systems for
GHG Inventories (and Projections),
Zagreb, Croatia
14th – 16th October 2015

Background

- The Irish Environmental Protection Agency (EPA) was established under the Environmental Protection Agency Act of 1992
- Under Sections 52 & 69 of the EPA Act, the Agency is required to establish and maintain databases and inventories of emissions to the environment and to provide such information to interested parties
- Under Section 55 of the Act the Agency must provide information and advice to Government in order that it can comply with Ireland's reporting obligations and commitments within the framework of international agreements
- These requirements are the regulatory basis on which the EPA produces annual inventories of GHGs
- The Department of Environment Community and Local Government (DECLG) designated the EPA as the focal point for submission of emissions data to the UNFCCC Secretariat and to the UNECE Secretariat
- The EPA compiles the national GHG inventories on behalf of the Department for submission under the United Nations Framework Convention on Climate Change and to the EU Commission under the Monitoring Mechanism Regulation (No 525/2013)



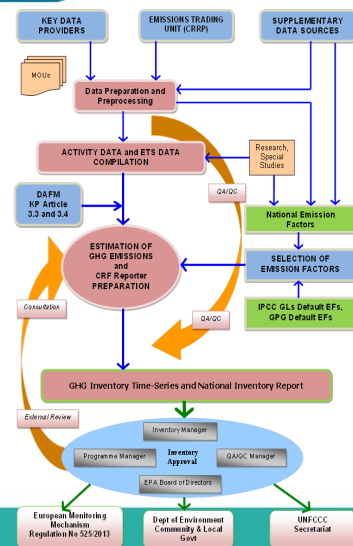
Objectives

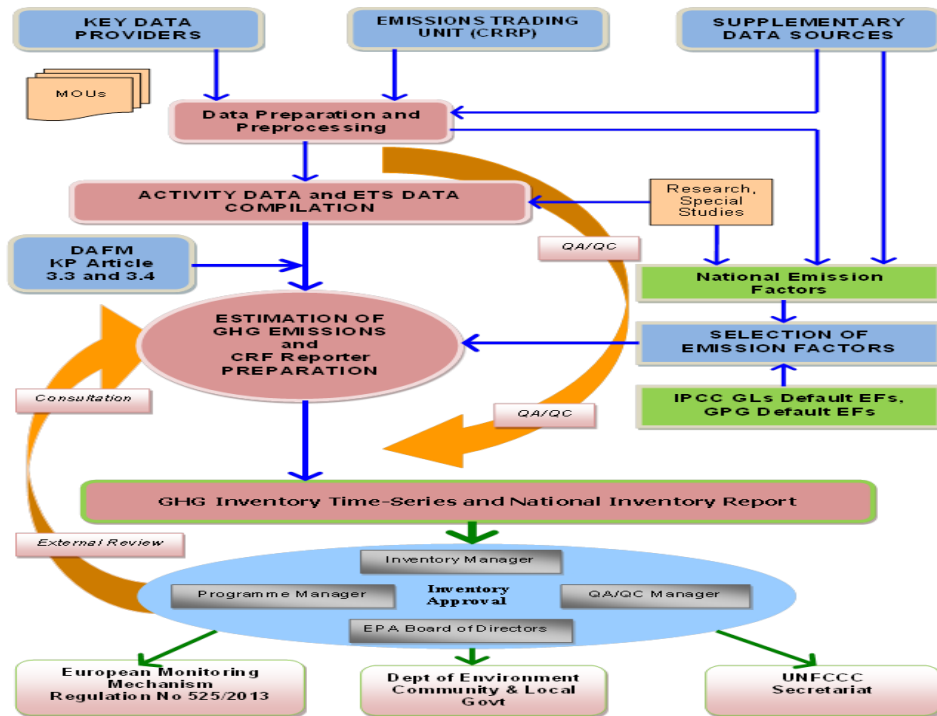
- Ensure that Ireland can compile a robust inventory and report emissions (and removals by sinks) in accordance with Article 5, para 1 of the Kyoto Protocol
- Facilitate the formal review of information submitted
- Ensure and improve the quality of the national inventory
 - Transparency
 - Consistency
 - Comparability
 - Completeness
 - Accuracy
- Includes air pollutants (UNECE)

Institutional Arrangements for the NIS



- **1995:** Department of the Environment, Community and Local Government designated the EPA as the **inventory agency** with responsibility for the submission of emissions data to the UNFCCC Secretariat and to the Secretariat for the Convention on Long-Range Transboundary Air Pollution (CLRTAP)
- **2007:** Government Decision 3rd April
- **2007:** The EPA was designated as the **Single National Entity**
- **2007:** the Climate Resource and Research Programme (CRRP) within the Office of Climate, Licensing, Resources and Research (OCLRR) took official responsibility for compiling and submitting the GHG inventory to EU MMR and UNFCCC on behalf of DECLG and became the **inventory agency**
- Formal inventory approval before submission – EPA Board





Roles and Responsibilities



- Single National Entity: (EPA)
 - Establish Institutional and legal arrangements
 - Review before submission (Board of the EPA via the Programme Manager of the Climate Resource and Research Programme in OCLR)
- Inventory Agency: (EPA/OCLR – operational office CRRP)
 - Improvements prioritisation (KCA/uncertainties) and implementation
 - Internal
 - External peer review
 - EU (EU MMR)
 - UNFCCC
 - Scheduling tasks and co-ordinating updates
 - Drafting/Updating MoUs or specifying contracts for delivery
 - Data gathering from data suppliers (e.g. see MoUs)
 - Checking & quality assurance (Reviews) (see QA/QC)
 - Compilation of initial and updated versions for submission to EU MMR & UNFCCC
 - Sign-off by the QA/QC manager/inventory manager
 - Dissemination of GHG information
 - Management and archiving of data and documentation



Roles and Responsibilities (2)

- Data providers & contractors
 - Delivery of updates and new estimates to required time and quality in appropriate formats and with documentation and accompanying information (QA/QC and uncertainties)
 - Management of own data gathering in consultation with inventory agency.
 - Identification of NIS needs (new agreements, data suppliers).
 - Respond to questions from government or review teams



Arrangements for Data flow into the Inventory Agency

- Contracted experts with specification for CRF and NIR contributions
 - Forest lands for Convention reporting and KP Article 3.3 reporting are prepared under contract to Department of Agriculture, Food and Marine (DAFM) and supplied from DAFM to the Inventory Agency (OCLR) under a MoU (CARBWARE)
 - Other Convention LULUCF categories compiled by research contracted directly to the Inventory Agency (OCLR)
- Memoranda of Understanding (MOU)
 - Between key data providers ↔ inventory agency (OCLR)
 - Set out scope, timing and quality (checking, quality assurance, uncertainties and documentation) of the inputs in accordance with the guidelines for national systems
 - Includes secondary MOUs, used by some key data providers to formalise the receipt of data from their own particular sources

Summary of MoUs

Key Data Provider	Data Supplied	Deadline	Sector in which data are used
Sustainable Energy Authority of Ireland	National Energy Balance; Detailed national energy consumption disaggregated by economic sector and fuel	30 September	Energy, Waste
Department of Agriculture, Food and Marine	Table 1.1-1.4 1. Statistical data for cattle compiled under the Animal Identification and Movement (AIM) scheme 2. Fertiliser and lime statistics 3. Poultry statistics 4. Sheep statistics	30 September	Agriculture
Department of Agriculture, Food and Marine (Forest Sector Development Division)	Table 2.1 • GHG emission/removal estimates from all pools for forest lands under the Convention • Statistical data on Afforestation, Reforestation, Deforestation and harvesting for forest land lands under Article 3.3 of KP • GHG emission/removal estimates from all biomass pools for KP Article 3.3	30 September	LULUCF and Article 3.3 of the Kyoto Protocol
Central Statistics Office	Annual population, livestock populations, crop statistics, housing survey data	30 September	Agriculture, Industrial Processes, Waste
Bord Gáis	Analysis results for indigenous and imported natural gas	30 September	Energy
Marine Institute	Annual Report on Discharges, Spills and Emissions from Offshore Gas Production Installations	30 October	Energy
Emissions Trading Unit	Verified CO ₂ estimates and related fuel and production data for installations covered by the EU ETS ¹	30 April	Energy, Industrial Processes
*Department of Communications, Energy and Natural Resources	National Oil Balance (as a component of the energy balance)	30 September	Energy
*Road Safety Authority	Road transport statistics from the National Car Test (NCT)	30 April	Energy
**Forest Service	(i) GIS data base on premiums and grants afforestation areas (iFORIS) with associated attributes (ii) NFI database	30 September	LULUCF and Article 3.3 activities
**Coillte	GIS data base of intersected of NFI permanent sample plot points (Coillte-NFI plots) with sub-compartment and management unit data.	2007, 2012 30 September	LULUCF and Article 3.3 activities

¹ETS – Emissions Trading Scheme

*These bodies have MOUs with SEAI rather than with OCLR

**These bodies have MOUs with the Department of Agriculture, Food and Marine rather than with OCLR

Projections

- In 2011, EPA began to consolidate MoU's and service level agreements across the agency - for all sections/offices and datastreams
 - One MoU/service level agreement to replace several per organisation
 - All requirements clearly laid out in agreement table(s)
- Provided the opportunity to revise where necessary the agreement tables and to include activity data provision for national emission projections where appropriate e.g. energy forecasts from SEAI and Art 3.3 data from DAFM
- Analogous to national inventory compilation
- MMR (525/2013) Art 12 & MMR IR (749/2014) Art 20
 - National system for projections
 - National system for policies and measures



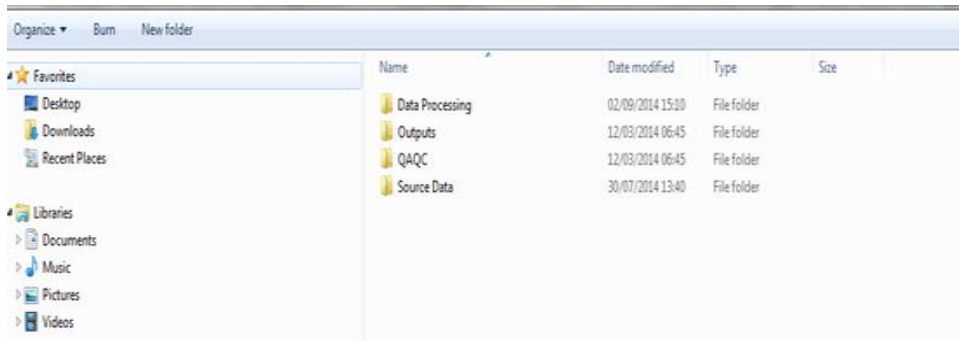
Projections (contd.)

- Similar structure to NIS
- Some small developments
- Mainly focused on internal calculation checks
- Round robin checks when possible
- Sense check by government departments - Principal Officer Technical Group, EPA, Government Departments and agency experts
- Final sign off by EPA Board of Directors (similar to inventory)
- Projections and policies and measures national system overviews submitted in 2015 under EU MMR
- Improvements plan now in place



Data management - Inventories & Projections

- Currently Microsoft Excel based
- Activity data stored in Source Data files
- Linked to calculation sheets in Data Processing
- Emissions estimated at lowest possible level of disaggregation
- Move to database structure ?



QA/QC



Key for Colour Coding of cells	AD 1.4 N2O Crops	AD 3.1 N2O Alls Dep	AD 3.2 N2O Leaching
Input data/Output data	AD 3.1 N2O Alls Dep	AD 3.2 N2O Leaching	AD 3.3 N2O Leaching
Calculation/Check with Calculation/Check cells	AD 3.1 N2O Alls Dep	AD 3.2 N2O Leaching	AD 3.3 N2O Leaching
Data sourced from another	AD 3.1 N2O Alls Dep	AD 3.2 N2O Leaching	AD 3.3 N2O Leaching
Extrapolated / extrapolated	AD 3.1 N2O Alls Dep	AD 3.2 N2O Leaching	AD 3.3 N2O Leaching
Assumptions / assumed values	AD 3.1 N2O Alls Dep	AD 3.2 N2O Leaching	AD 3.3 N2O Leaching
Literature emission factor	AD 3.1 N2O Alls Dep	AD 3.2 N2O Leaching	AD 3.3 N2O Leaching
Data source information	AD 3.1 N2O Alls Dep	AD 3.2 N2O Leaching	AD 3.3 N2O Leaching
General notes	AD 3.1 N2O Alls Dep	AD 3.2 N2O Leaching	AD 3.3 N2O Leaching
Warnings or outstanding actions	AD 3.1 N2O Alls Dep	AD 3.2 N2O Leaching	AD 3.3 N2O Leaching
Conversion factors & constants	AD 3.1 N2O Alls Dep	AD 3.2 N2O Leaching	AD 3.3 N2O Leaching
Check to be entered into the CSE	AD 3.1 N2O Alls Dep	AD 3.2 N2O Leaching	AD 3.3 N2O Leaching
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AD 4.00 N2O Leaching	AD 3.1 N2O Alls Dep	AD 3.2 N2O Leaching	AD 3.3 N2O Leaching

- Data selection and acquisition, data processing and reporting
- System in place since 2006
- Spreadsheets structured and organised to facilitate QA/QC
- External reviews on an ad hoc basis - methodological change
- External service provider assessment of QA/QC
 - Transparency
 - Robustness
 - Accessibility

QA/QC Procedures & Templates 2014-15 - Microsoft Excel

Version 1.1

QA/QC Activities

Paul Duffy has overall responsibility for the coordination of the activities below.

The tables below provide details of the QA/QC activities for Ireland's emissions inventory. There are three types of activity presented separately:

- General activities which cover the General compilation practices and procedures which need setting up and maintaining
- Annual activities which should be undertaken on an Annual basis
- Periodic activities which should be undertaken in response to specific events in the inventory activities

The status column shows the current status of the QA/QC activities in the plan

The Guidance and records column in the tables below provides links to more detailed guidelines and templates for recording QA/QC information relevant to the specific headings

This file with its associated sheets can be used to track QA/QC activities as they are undertaken throughout the year and should be archived at the end of each inventory year and a new file started. Where QA/QC procedures are changed, modifications of

QA/QC Activity Name	QA/QC Activity Description	Deadline	Note	Date completed	Trigger	Activity Type	Responsibility	Guidance, records and templates	Output & Link to output
General Inventory QA/QC Management Activities									
Review and update roles and responsibilities	Definition and Maintenance of Terms of Reference for Responsibilities for inventory planning, preparation and management	31 December	Has this been reviewed for 2013 submission?	30/12/2012	Beginning of inventory compilation cycle	Documentation	Paul Duffy	see Responsibilities	see Responsibilities
Review management practices	Improve and maintain good data management practices including archiving. E.g. file naming and use of defined and shared directory structure, documentation and archiving	31 December	Update	30/12/2012	Update as necessary to track progress. Use as reference for consistent working practice	Procedure to follow	Ail, Paul Duffy, Emilia Hanley, Bernard Hyde	see Archiving & Data Management	See DataManagement
Implement and check implementation of QA/QC template for calculation sheets	Use of QA/QC forms for inventory spreadsheet tools and outputs & transparent documentation of inventory methodologies. Check that all spreadsheets have an up-to-date QA/QC sheet	31 December	Some calculation sheets need QA/QC updating	30/12/2012	Creation of a new spreadsheet or update of methodology	Documentation	Ail, Paul Duffy, Emilia Hanley, Bernard Hyde	see QA/QC TemplateSheet	
Maintain master list of calculation sheets	List of calculation spreadsheets/tools & status monitor	31 December	Update	30/12/2012	Update as necessary to track progress	Documentation	Ail, Paul Duffy, Emilia Hanley, Bernard Hyde	see CalculationSheetsList	
Maintain Improvement Log/Plan	Development and maintenance of inventory improvement log & co-ordinate annual improvements	ongoing (amend/review as necessary)	Update	Ongoing	update as improvement needs or possibilities are identified	Documentation	Paul Duffy	see ImprovementPlan	

QA-QCRecordProcedures\Templates_2014-1 - Microsoft Excel

Version 1.1

Inventory Improvement Plan

The QA/QC coordinator should elaborate and maintain an inventory improvement plan below based on:

- the results of the evaluation of the fulfilment of specific quality objectives,
- the results of the evaluation of the implementation of the previous improvement plan,
- the results and findings of QA/QC procedures conducted,
- the key category assessment,
- the uncertainty assessment and
- the findings from the UNFCCC inventory review and any EC level inventory reviews.

Use this template below to list items for inventory improvement

Priority improvement actions should be agreed with the Inventory Review Group prior to revisions.

The QA/QC Coordinator annually evaluates the inventory improvement plan and its implementation and updates the plan accordingly.

Improvement	Source of improvement suggestion	Sector	Pollutants	Name	Data needed	Skills/Expertise needed	Effort required	Priority	Date	Improvement Status	Documentation Reference
New revised energy calculation sheets for revised energy balances	Identified by Air Inventory team	Energy	CO ₂ , CH ₄ and N ₂ O	Paul Duffy	new energy balances and ETU data for 2005			high	25-May-07	complete	
Review of fluorinated gas emission estimates and revision of time series estimates	Identified by Air Inventory team	2F Consumption of Halocarbons and SF ₆		Bernard Hyde	All methodological reports and historical industry datasets			high	25-Nov-07	complete	
Update of road transport emission factors	Identified by Air Inventory team	1.A.3.b	CO ₂ , CH ₄ and N ₂ O	Paul Duffy	Fuel use data, vehicle kilometer data and COPERT model version 4.40			high	30-Jan-08	complete	
Revise CH ₄ and N ₂ O Efs for all stationary combustion sources	EU Consistency checks and UNFCCC ARRs	Energy	CH ₄ & N ₂ O	Paul Duffy	IPCC Guidelines	P.Duffy & E.Hanley	Energy sector Efs review v1.8.pdf	high	30-Aug-09	complete	NIR 2010 Section 3.2.1, 3.7 and Annex C
Inclusion of forest fires in LULUCF	ERT in country review	5.A	CH ₄ & N ₂ O	Phillip O'Brien	Forest fire statistics			medium	05-Dec-07	complete	
Revise CH ₄ method/model for landfills	ERT ARR para 8.5 ARRs 2009	6.A.1 and 6.A.2	CH ₄	Bernard Hyde	Waste Statistics and LFG Survey	B.Hyde	Waste 2008 New v2.0.xls	high	31-Oct-09	complete	NIR 2010 Section 8.2.2 and 8.2.3
Issues from ARR 2009	UNFCCC Review Report 2009 IPCC/ARR/2009/IDL										
Revise CH ₄ Efs for Maure Management for Dairy Cattle and AWMS proportions.	Saturday Paper 25-Sep-2010	4.B Maure Management: Dairy Cattle	CH ₄	Paul Duffy	Saturday Paper CR IR 2010 25-Sep2010 FINAL Response IR-8.doc	B.Hyde	Revised Submission: IR-LAND-2010 v2.1.xls	high	06-Nov-10	complete	
The ERT recommends that Ireland:	Saturday Paper 25-Sep-2010	5 (IP-1A.2)	CO ₂	Paul Duffy	Saturday Paper CR IR 2010	K.Black	Revised	high	06-Nov-10		

QA/QCActivities Responsibilities DataSuppliers&Stakeholders Archiving&DataManagement CalculationQA-QCTemplate CalculationSheetList InventoryImprovementPlan ARR for 2014

QA-QCRecordProcedures\Templates_2014-1 - Microsoft Excel

Version 1.1

Annual Review Report (Centralized, 2012)

Use this sheet to document the Party response to ERT recommendations and encouragements

ES Annex I is linked to these cells to create the NIR output

ES use these cells for notes and progress

Sector	Issue	ARR Paragraph	Recommendation	Party response	NIR Section	Status	Other notes
General	Completeness	10	The inventory covers all mandatory source and sink categories for the period 1990-2010 and is complete in terms of years and geographical coverage. However, the ERT noted that some emission sources have been reported as not estimated ("NE"), including: CH ₄ emissions from land converted to wetlands; CH ₄ emissions from land converted to settlements; N ₂ O emissions from solvents; CO ₂ emissions from asphalt roofing, road paving with asphalt, and food and drink production; and CH ₄ emissions from poultry. The ERT encourages Ireland to provide estimates for these categories in its next annual submission and to continue its efforts to include, in its inventory, emission estimates for categories for which there are no methodologies or emission factors (Efs) available to estimate emissions in the Intergovernmental Panel on Climate Change (IPCC) Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories (hereinafter referred to as the IPCC good practice guidance) or in the Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories (hereinafter referred to as the Guidelines). In response to a question raised by the ERT during the review, Ireland explained that a tier 2 key category analysis was not performed due to resource constraints. However, some elements of the qualitative approaches mentioned in section 7.2.2 of the IPCC good practice guidance (namely, mitigation techniques and technologies, high expected emissions growth, high uncertainty, unexpectedly low or high emissions) are already being carried out by the Party, and, therefore, Ireland does not expect the performance of a tier 2 key category analysis to result in significant improvements to the inventory. The results of the key category analysis are discussed in the NIR and are used as a driving factor for the prioritization of inventory improvements. The ERT encourages Ireland to implement a tier 2 key category analysis.	The inventory agency will consider the ERT's encouragement and continue to prioritise inventory improvements based on KCs and review findings within current resources.		Completed	
General	Key category analysis	16	The inventory agency carried out some work on a Tier 2 KCA during this and the previous submission. The work was not finalised in time for this submission (2014) as the current KCA and uncertainty assessment are not performed at the same level of disaggregation.		Chapter 1, Section 1.5.2	Completed	
General	KCA	17	Ireland has identified CO ₂ emissions from afforestation and reforestation under Article 3, paragraph 3, of the Kyoto Protocol as a key category for 2010. The results of the key category analysis for the KP-LULUCF activities are presented in KP-LULUCF CRF table NIR-3. The ERT encourages Ireland to include, in the NIR, a paragraph explaining the data sources and the analysis performed.		Chapter 1, Section 1.5.2	Note added to NIR	
General	Transparency	18	The degree of transparency of the information included in the NIR and in the CRF tables is, in general, relatively good. The ERT did not identify any restrictions relating to the provision of information in the CRF tables or in the NIR for confidentiality reasons. In particular, the ERT commends the Party for improving the confidentiality of information in the energy sector (residential and business emissions).		Chapter 3, Section 3.2	Completed	ES Changes

General Transparencys ARR for 2009 submission ARR for 2010 submission ARR for 2011 submission ARR for 2012 submission ARR for 2013 submission ARR for 2014 submission



The Good Points

- EPA has the dual responsibilities of being the single national entity and the inventory agency
- System is almost ten years old - well established
- Small team - experience in all sectors and across pollutants
- Small number of key data providers - good relationships
- Inventory experience benefits the projections



The Bad Points

- Small team - lack of sector specific focus, timeliness, difficult to implement substantial changes, institutional knowledge
- Currently require external consultants in emission estimation and QAQC
- Timeseries - 25 years in inventory, projections to 2035, possibility of errors, database ?
- Projections and PAM's systems are separate

