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Report on the individual review of the annual submission of Ireland submitted in 2022*

Note by the expert review team

Summary

Each Party included in Annex I to the Convention must submit an annual inventory of emissions and removals of greenhouse gases for all years from the base year (or period) to two years before the inventory due date (decision 24/CP.19). Parties included in Annex I to the Convention that are Parties to the Kyoto Protocol are also required to report supplementary information under Article 7, paragraph 1, of the Kyoto Protocol with the inventory submission due under the Convention. This report presents the results of the individual review of the 2022 annual submission of Ireland, conducted by an expert review team in accordance with the "Guidelines for review under Article 8 of the Kyoto Protocol". The review took place from 19 to 24 September 2022 in Bonn.

* In the symbol for this document, 2022 refers to the year in which the inventory was submitted, not to the year of publication.

Contents

Abbreviations and acronyms

2006 IPCC Guidelines	*2006 IPCC Guidelines for National Greenhouse Gas Inventories*
AAU	assigned amount unit
AD	activity data
Annex A source	source category included in Annex A to the Kyoto Protocol
AR	afforestation and reforestation
Article 8 review guidelines	"Guidelines for review under Article 8 of the Kyoto Protocol"
CARBWARE	Irish carbon reporting system
CBM-CFS3	Carbon Budget Model of the Canadian Forest Sector
CER	certified emission reduction
CH_4	methane
CM	cropland management
CO_2	carbon dioxide
CO_2 eq	carbon dioxide equivalent
Convention reporting adherence	adherence to the "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual greenhouse gas inventories"
COPERT	software tool for calculating road transport emissions
CPR	commitment period reserve
CRF	common reporting format
EEA	European Environment Agency
EF	emission factor
EMEP	Cooperative Programme for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe
EPA	Environmental Protection Agency of Ireland
ERT	expert review team
ERU	emission reduction unit
EU ETS	European Union Emissions Trading System
EUROCONTROL	European Organisation for the Safety of Air Navigation
Eurostat	statistical office of the European Union
F-gas	fluorinated gas
FM	forest management
FMRL	forest management reference level
GHG	greenhouse gas
GM	grazing land management
HFC	hydrofluorocarbon
IE	included elsewhere
IEF	implied emission factor
IPCC	Intergovernmental Panel on Climate Change
IPPU	industrial processes and product use
KP reporting adherence	adherence to the reporting guidelines under Article 7, paragraph 1, of the Kyoto Protocol
KP-LULUCF	activities under Article 3, paragraphs 3–4, of the Kyoto Protocol
LULUCF	land use, land-use change and forestry
N	nitrogen
N_2O	nitrous oxide
NA	not applicable
NE	not estimated
NF_3	nitrogen trifluoride

NIR	national inventory report
NO	not occurring
PFC	perfluorocarbon
QA/QC	quality assurance/quality control
RMU	removal unit
RV	revegetation
SEF	standard electronic format
SF_6	sulfur hexafluoride
SIAR	standard independent assessment report
UNFCCC Annex I inventory reporting guidelines	"Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual greenhouse gas inventories"
UNFCCC review guidelines	"Guidelines for the technical review of information reported under the Convention related to greenhouse gas inventories, biennial reports and national communications by Parties included in Annex I to the Convention"
WDR	wetland drainage and rewetting
Wetlands Supplement	*2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands*

I. Introduction

1. This report covers the review of the 2022 annual submission of Ireland, organized by the secretariat in accordance with the Article 8 review guidelines (adopted by decision 22/CMP.1 and revised by decision 4/CMP.11). In accordance with the Article 8 review guidelines, this review process also encompasses the review under the Convention as described in the UNFCCC review guidelines, particularly in part III thereof, namely the "UNFCCC guidelines for the technical review of greenhouse gas inventories from Parties included in Annex I to the Convention" (annex to decision 13/CP.20). The review took place from 19 to 24 September 2022 in Bonn and was coordinated by Jamie Howland and Lisa Hanle (secretariat). Table 1 provides information on the composition of the ERT that conducted the review for Ireland.

Table 1
Composition of the expert review team that conducted the review for Ireland

Area of expertise	*Name*	*Party*
Generalist	Carmen Teresa Meneses López	Venezuela (Bolivarian Republic of)
	Kristina Saarinen	Finland
Energy	Vincent Camobreco	United States
	Ricardo Fernandez	European Union
	Diana Guzman Barraza	Mexico
	Ioannis Sempos	Greece
IPPU	Koen Smekens	Belgium
	Katarina Yaramenka	Sweden
Agriculture	Daniel Bretscher	Switzerland
	Joel Gibbs	New Zealand
	Juan José Rincón Cristóbal	Spain
LULUCF and KP-LULUCF	Signe Kynding Borgen	Denmark
	Thelma Krug	Brazil
	Timothy Liersch	Australia
	Nagmeldin Mahmoud	Sudan
Waste	Fatma Betül Demirok	Türkiye
	Stana Kopranović	Bosnia and Herzegovina
Lead reviewers	Fatma Betül Demirok	
	Ioannis Sempos	

2. The basis of the findings in this report is the assessment by the ERT of the Party's 2022 annual submission in accordance with the UNFCCC review guidelines and the Article 8 review guidelines.

3. The ERT has made recommendations that Ireland resolve identified findings, including issues[1] designated as problems.[2] Other findings, and, if applicable, the encouragements of the ERT to Ireland to resolve related issues, are also included in this report.

[1] Issues are defined in decision 13/CP.20, annex, para. 81.
[2] Problems are defined in decision 22/CMP.1, annex, paras. 68–69, as revised by decision 4/CMP.11.

4. A draft version of this report was communicated to the Government of Ireland, which provided comments that were considered and incorporated, as appropriate, into this final version of the report.

5. Annex I presents the annual GHG emissions of Ireland, including totals excluding and including LULUCF, indirect CO_2 emissions, and emissions by gas and by sector, and contains background data on emissions and removals from KP-LULUCF, if elected by the Party, by gas, sector and activity.

6. Information to be included in the compilation and accounting database can be found in annex II.

II. Summary and general assessment of the Party's 2022 annual submission

7. Table 2 provides the assessment by the ERT of the Party's 2022 annual submission with respect to the tasks undertaken during the review. Further information on the issues identified, as well as additional findings, may be found in tables 3 and 5.

Table 2
Summary of review results and general assessment of the 2022 annual submission of Ireland

Assessment			*Issue/problem ID#(s) in table 3 or 5*[a]
Dates of submission	Original submission: NIR, 8 April 2022; CRF tables (version 1), 8 April 2022; SEF tables, 8 April 2022 Revised submission: CRF tables (version 2), 7 September 2022 Unless otherwise specified, values from the most recent submission are included in this report		
Review format	Centralized		
Application of the requirements of the UNFCCC Annex I inventory reporting guidelines and the Wetlands Supplement (if applicable)	Have any issues been identified in the following areas:		
	(a) Identification of key categories?	No	
	(b) Selection and use of methodologies and assumptions?	Yes	A.6
	(c) Development and selection of EFs?	No	
	(d) Collection and selection of AD?	Yes	A.1, I.1
	(e) Reporting of recalculations?	No	
	(f) Reporting of a consistent time series?	No	
	(g) Reporting of uncertainties, including methodologies?	Yes	G.5
	(h) QA/QC?	QA/QC procedures were assessed in the context of the national system (see supplementary information under the Kyoto Protocol below)	
	(i) Missing categories, or completeness?[b]	Yes	E.15, L.1, W.6
	(j) Application of corrections to the inventory?	No	
Significance threshold	For categories reported as insignificant, has the Party provided sufficient information showing that the likely level of emissions meets the criteria in paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines?	Yes	
Description of trends	Did the ERT conclude that the description in the NIR of the trends for the different gases and sectors is reasonable?	Yes	
Supplementary information under	Have any issues been identified related to the following aspects of the national system:		

Assessment			*Issue/problem ID#(s) in table 3 or 5*[a]
the Kyoto Protocol	(a) Overall organization of the national system, including the effectiveness and reliability of the institutional, procedural and legal arrangements?	No	
	(b) Performance of the national system functions?	No	
	Have any issues been identified related to the national registry:		
	(a) Overall functioning of the national registry?	No	
	(b) Performance of the functions of the national registry and the adherence to technical standards for data exchange?	No	
	Have any issues been identified related to the reporting of information on AAUs, CERs, ERUs and RMUs and on discrepancies in accordance with decision 15/CMP.1, annex, chapter I.E, in conjunction with decision 3/CMP.11, taking into consideration any findings or recommendations contained in the SIAR?	No	
	Have any issues been identified in matters related to Article 3, paragraph 14, of the Kyoto Protocol, specifically problems related to the transparency, completeness or timeliness of the reporting on the Party's activities related to the priority actions listed in decision 15/CMP.1, annex, paragraph 24, in conjunction with decision 3/CMP.11, including any changes since the previous annual submission?	No	
	Have any issues been identified related to the following reporting requirements for KP-LULUCF:		
	(a) Reporting requirements of decision 2/CMP.8, annex II, paragraphs 1–5?	No	
	(b) Demonstration of methodological consistency between the reference level and reporting on FM in accordance with decision 2/CMP.7, annex, paragraph 14?	No	
	(c) Reporting requirements of decision 6/CMP.9?	No	
	(d) Country-specific information to support provisions for natural disturbances in accordance with decision 2/CMP.7, annex, paragraphs 33–34?	No	
CPR	Was the CPR reported in accordance with decision 18/CP.7, annex; decision 11/CMP.1, annex; and decision 1/CMP.8, paragraph 18?	No	G.1
Adjustments	Has the ERT applied any adjustments under Article 5, paragraph 2, of the Kyoto Protocol?	No	
	Has the Party submitted a revised estimate to replace a previously applied adjustment?	No	Ireland does not have a previously applied adjustment
Response from the Party during the review	Has the Party provided the ERT with responses to the questions raised, including the data and information necessary for assessing conformity with the UNFCCC Annex I inventory reporting guidelines and any further guidance adopted by the Conference of the Parties?	Yes	
Recommendation for an exceptional in-country review	On the basis of the issues identified, does the ERT recommend that the next review be conducted as an in-country review?	No	

Assessment		*Issue/problem ID#(s) in table 3 or 5*[a]
Questions of implementation	Did the ERT list any questions of implementation?	No

[a] Further information on the issues identified, as well as additional findings, may be found in tables 3 and 5.
[b] Missing categories for which methods are provided in the 2006 IPCC Guidelines may affect completeness and are listed in annex III.

III. Status of implementation of recommendations included in the previous review report

8. Table 3 compiles the recommendations from previous review reports that were included in the most recent previous review report, published on 17 February 2021,[3] and had not been resolved by the time of publication of the report on the review of the Party's 2020 annual submission. The ERT has specified whether it believes the Party had resolved, was addressing or had not resolved each issue or problem by the time of publication of this review report and has provided the rationale for its determination, which takes into consideration the publication date of the most recent previous review report and national circumstances.

Table 3
Status of implementation of recommendations included in the previous review report for Ireland

ID#	*Issue/problem classification*[a, b]	*Recommendation from previous review report*	*ERT assessment and rationale*
General			
G.1	CPR (G.10, 2020) KP reporting adherence	Present the calculation of the CPR and ensure that the comparison calculation uses the most recent GHG inventory.	Addressing. The Party reported in its 2022 NIR (p.374) updated text describing the calculation of the CPR and used the correct AAUs and the total emissions of 2020. However, the ERT noted that the total emissions in 2020 as submitted in April 2022 did not match the values in the NIR. In response to the question of the ERT on the issue, the Party stated that the value in the NIR was completed in advance of the final inventory data. It provided the correct value from the resubmission of September 2022, and the calculation showing that Ireland's total emissions in 2020 are 58,032.34 kt CO_2 eq and the value of eight times the most recent reviewed inventory is 8*58,032.34 kt CO_2 eq = 464,258.72 kt CO_2 eq. The ERT noted that in the NIR the Party appears to have reported these figures in t CO_2 eq but has labelled them as kt CO_2 eq. The calculations do not change the value of the CPR, which is based on the assigned amount. The ERT concludes that this potential problem of a mandatory nature does not influence the Party's ability to fulfil its commitments for the second commitment period of the Kyoto Protocol and therefore this issue was not included in the list of potential problems and further questions raised.
G.2	KP-LULUCF supplementary information (G.4, 2020) (G.6, 2018) (G.9, 2016) (G.9, 2015) Transparency	Include the value of the FM cap in the NIR and in the CRF accounting table, together with information on its calculation.	Resolved. The Party reported in its NIR (p.359) and CRF accounting table the numerical value of the FM cap and referred to paragraph 13 of the annex to decision 2/CMP.7 for the formula used in its calculation.

[3] FCCC/ARR/2020/IRL. The ERT notes that the report on the review of Ireland's 2021 annual submission has not been published yet owing to insufficient funding for the review process. As a result, the latest previously published annual review report reflects the findings of the review of the Party's 2020 annual submission.

ID#	*Issue/problem classification*[a, b]	*Recommendation from previous review report*	*ERT assessment and rationale*
G.3	Notation keys (G.7, 2020) (G.10, 2018) Transparency	Reconcile and cross-check the information reported in section 1.8 and table 1.14 with information reported elsewhere in the NIR and the CRF tables and apply the notation keys "NO", "NA" and "NE", where relevant, instead of providing partial reporting. Explain why the reporting on CH_4 and N_2O emissions for the categories referred to was incomplete.	Resolved. The Party has updated NIR table 1.14 (p.37) to align with the related improvements that have been carried out. The table was completed using the notation keys "NO", "NA" and "NE", as relevant.
G.4	Recalculations (G.11, 2020) Transparency	Provide in the NIR explanatory information and justifications for the recalculations in accordance with the UNFCCC Annex I inventory reporting guidelines, paragraphs 43–45 and 50(h).	Resolved. The ERT considers that sufficient explanation has been provided for the recalculations and particularly for the categories listed in the previous review report (see ID#s E.2, E.3, E.5, E.6 and L.7 below).
G.5	Uncertainty analysis (G.12, 2020) Transparency	Report the underlying assumptions informing the uncertainty estimates in the NIR for category 1.B.2 and subcategories under categories 3.A, 3.B, 3.D, 3.G, 3.H and 5.B.1.	Not resolved. The ERT considers that the previous recommendation has not yet been addressed because the Party has not yet completed the documentation of underlying assumptions of uncertainty estimates. In response to the question of the ERT on whether Ireland could consider improving the documentation by including information on a general level, for example grouping explanations by source categories with similar approaches, the Party responded that it will consider revising the current description of uncertainties in its next submission.
Energy			
E.1	1.A Fuel combustion – sectoral approach – liquid fuels – CO_2, CH_4 and N_2O (E.21, 2020) Transparency	(a) Provide in the NIR a description of the research project on AD for off-road vehicles and other machinery and how it will be implemented in order to improve emission estimates for off-road vehicles and other machinery reported under categories 1.A.2 and 1.A.4; (b) If emissions from off-road vehicles and other machinery are reported as "IE", provide information in CRF table 9 on where these emissions are included in the inventory.	(a) Addressing. The Party indicated in its NIR (pp.91 and 114) that ongoing research is being undertaken to improve this category. However, the ERT considers that the recommendation has not yet been fully addressed because the Party has not yet reflected the results of this research in its NIR. During the review, the Party clarified that a description of the research is now included in the NIR (sections 3.2.5.6 and 3.2.7.6) and that the results of this research will be included in the 2023 submission. (b) Resolved. The Party reported "IE" in CRF table 1.A(a)s2 for emissions from off-road vehicles and other machinery with liquid fuels and explained in the NIR (p.91) that all emissions used in mobile construction are assumed to be stationary and included in category 1.A.2.g.viii, given that there are no further disaggregated data. The Party indicated in CRF table 9 where the emissions are included in the inventory.
E.2	1.A.1.a Public electricity and heat production – other fossil fuels and biomass – CO_2, CH_4 and	Expand the description of the methodology for estimating emissions from public electricity and heat production to include the	Resolved. The Party expanded the description in its NIR (p.85) of the methodology for estimating emissions from public electricity and heat production to include the AD related to the use of waste for electricity and heat production and EFs used. The ERT

ID#	*Issue/problem classification*[a, b]	*Recommendation from previous review report*	*ERT assessment and rationale*
	N_2O (E.22, 2020) Transparency	AD related to the use of waste for electricity and heat production and EFs used.	considers that the recommendation has been fully addressed because the Party has transparently described the AD.
E.3	1.A.1.b Petroleum refining – gaseous fuels – CH_4 and N_2O (E.23, 2020) Transparency	Document in the NIR the recalculations carried out for this category, including cause and impact, and demonstrate that they are applied consistently and accurately.	Resolved. The Party stated in its NIR (p.87) that there are no recalculations to emission estimates from petroleum refining in this submission. The Party also stated in its 2021 NIR that there are no recalculations for this category.
E.4	1.A.1.b Petroleum refining – gaseous fuels – CO_2 (E.2, 2020) (E.3, 2018) (E.15, 2016) (E.15, 2015) Transparency	(a) Provide an explanation of the low IEF for gaseous fuels and investigate the reason for the differences in the breakdown of fuels, especially for refinery gas and natural gas, used in refining between the EU ETS and Sustainable Energy Authority of Ireland data and report the results of the investigation in the NIR together with the proper allocation of fuels among fuel categories; (b) Transparently describe in the NIR the AD and method used for the estimation of CO_2 emissions.	(a) Addressing. The Party stated in its NIR (p.87) that the total energy and emissions reported in the national energy balance and the EU ETS are now harmonized; however, an explanation of the low IEFs and the differences in the breakdown of fuels was not provided in the NIR. During the review, the Party explained that the unusual IEFs are a result of differences between the proportion of refinery gases and natural gas that is reported in the energy balance, from where AD are sourced, and in the EU ETS. The Party also demonstrated that the total liquid and gaseous use is the same in energy terms between the two reporting systems. (b) Resolved. The ERT considers that the recommendation has been fully addressed because the Party has transparently described the AD and method used for the estimation of CO_2 emissions and because the total energy and emissions reported in the two systems are now harmonized.
E.5	1.A.2 Manufacturing industries and construction – liquid, gaseous, biomass and other fossil fuels – CO_2, CH_4 and N_2O (E.24, 2020) Transparency	Transparently document recalculations in the NIR, including the specific reasons for the recalculations, and demonstrate that they have been applied consistently and accurately. Provide information on any plans for future recalculations, including those to replace data derived from expert judgment and/or interpolation where other data are not available.	Resolved. The Party's NIR (p.91) stated that there are slight recalculation changes based on revisions to oil amounts in the historical energy balances going back as far as 1990. The Party further clarified that the oil data from the Business Energy Use Survey changed for all years in 2009–2019 and the Sustainable Energy Authority of Ireland interpolated the data from 1990 to 2008 based on the 2009 Business Energy Use Survey data. This resulted in an average recalculation of 0.03 per cent for the entire time series 1990–2020. The Party described planned improvements in section 3.2.5.6 of its NIR.
E.6	1.A.3.a Domestic aviation – liquid fuels – CO_2, CH_4 and N_2O (E.25, 2020) Transparency	Transparently document recalculations in the NIR, including the specific cause or causes of the recalculation. Transparently document in the NIR the methods and assumptions used in the model to calculate emissions for category 1.A.3.a.	Resolved. The Party described in its NIR (p.92) the methodology used to estimate emissions from this category using a tier 3b approach (2006 IPCC Guidelines, vol. 2, chap. 3, table 3.6.2) based on origin and destination data for domestic air travel provided by EUROCONTROL using an advanced emissions model to estimate fuel burned and emissions (CO_2, CH_4 and N_2O) for the full trajectory of each flight segment using aircraft- and engine-specific information. This approach replaced the previous approach (tier 3a), using data provided by the Irish Aviation Authority and the fuel consumption rates given by the *EMEP/EEA air pollutant emission inventory guidebook 2013*

ID#	Issue/problem classification[a, b]	Recommendation from previous review report	ERT assessment and rationale
			appropriate to the type of aircraft concerned, and the length of the flights within Ireland. The Party stated in its NIR (p.96) that there are no further recalculations in this submission.
E.7	1.A.3.b Road transportation – biomass – CH_4 and N_2O (E.6, 2020) (E.15, 2018) Transparency	Include in the NIR information on the COPERT calibration procedure for adjusting the average annual mileage based on the statistical fuel consumption and describe the estimation approach applied for biofuels.	Resolved. The Party included information in its NIR (p.97) on the calibration procedure, stating that appropriate blends are specified within the model inputs for the relevant vehicle categories and that in order to balance the statistical and the calculated energy consumption, the software matches the fossil/bioenergy consumption ratio defined in the statistical values by modifying the blend type and blend share then updating the average mileages. The Party has documented the estimation approach applied for biofuels.
E.8	1.A.5 Other (not specified elsewhere) – all fuels – CO_2, CH_4 and N_2O (E.9, 2020) (E.6, 2018) (E.17, 2016) (E.17, 2015) Transparency	Include the information on the allocation of emissions and the AD and resulting emissions for subcategories 1.A.5.a (stationary) and 1.A.5.b (mobile) provided during the review (i.e. fuel associated with military vehicles is included in category 1.A.3 (transport) and fuel associated with military bases is included in category 1.A.4.a (commercial/institutional)).	Resolved. The ERT considers that the recommendation has been fully addressed because the Party has included in CRF table 9 all the information concerning the allocation of emissions for category 1.A.5. The Party also indicated in its NIR (p.114) that no further disaggregation exists in the national energy statistics.
E.9	1.B.2 Oil, natural gas and other emissions from energy production – gaseous fuels – CO_2 and CH_4 (E.11, 2020) (E.7, 2018) (E.7, 2016) (E.7, 2015) (31, 2014) Transparency	Provide an explanation of where fugitive emissions of CH_4 and CO_2 from natural gas exploration and transmission are reported both in the CRF tables and in the NIR, and provide a detailed description in the NIR of how the emissions from each activity are estimated.	Resolved. The Party provided in its NIR (p.110) an explanation of where fugitive emissions from transmission are reported and justified in the NIR (p.117) that CH_4 and CO_2 emissions from exploration do not occur. The reporting in the NIR is consistent with the reporting in CRF table 1.B.2. The ERT considers that the recommendation has been fully addressed because the Party has transparently described in its NIR how the emissions from each activity are estimated.
E.10	1.B.2.b Natural gas – gaseous fuels – CO_2 (E.14, 2020) (E.9, 2018) (E.18, 2016) (E.18, 2015) Completeness	Report CO_2 emissions from natural gas exploration and processing.	Resolved. The Party justified in the NIR (p.117) that CO_2 emissions from natural gas exploration do not occur. The Party indicated in CRF table 1.B.2 that the CO_2 emissions for natural gas processing are not estimated and stated in its NIR (p.118) that the source is below the significance threshold and eligible to be reported as "NE". The ERT considers that the recommendation has been fully addressed because the Party has provided justification for not estimating emissions from this source.
E.11	1.B.2.b Natural gas – gaseous fuels – CO_2 and CH_4 (E.16, 2020) (E.19, 2018) Transparency	Estimate CO_2 and CH_4 emissions from natural gas production and CH_4 emissions from natural gas processing applying the default EFs and methodologies from the 2006 IPCC Guidelines (vol. 2, chap. 4, table 4.2.4); if any category is determined to be	Resolved. The Party indicated in CRF table 1.B.2 that CO_2 emissions from natural gas production and processing are not estimated and explained in its NIR (p.118) that the source is below the significance threshold and eligible to be reported as "NE". The ERT considers that the recommendation has been fully addressed because the Party has reported "NE" for CO_2 emissions from natural gas production and processing in CRF table 1.B.2 and documented the justification in its NIR.

ID#	*Issue/problem classification[a, b]*	*Recommendation from previous review report*	*ERT assessment and rationale*
		below the significance threshold, as defined in paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines, report "NE" for the category and provide appropriate documentation in the NIR.	
E.12	1.B.2.b Natural gas – gaseous fuels – CO_2 and CH_4 (E.17, 2020) (E.20, 2018) Transparency	Update the description in the NIR of the method, AD and EFs used to estimate fugitive CO_2 and CH_4 emissions from natural gas transmission (the estimates were revised in response to the list of potential problems and further questions from the ERT).	Resolved. The Party provided detailed information in its NIR (p.119) on the AD and EFs for CO_2 and CH_4 for category 1.B.2.b.4 (natural gas transmission and storage). The ERT considers that the recommendation has been fully addressed because the Party has transparently described in its NIR the method, AD and EFs for the estimation of this emissions source.
E.13	1.B.2.b Natural gas – gaseous fuels – CO_2 and CH_4 (E.18, 2020) (E.21, 2018) Transparency	Update the description in the NIR of the method, AD and EFs used to estimate fugitive CO_2 and CH_4 emissions from natural gas distribution (the estimates were revised in response to the list of potential problems and further questions from the ERT).	Resolved. The Party provided detailed information in the NIR (p.119) on the AD and EFs for CO_2 and CH_4 for category 1.B.2.b.5 (natural gas distribution). The ERT considers that the recommendation has been fully addressed because the Party transparently described in its NIR the method, AD and EFs for the estimation of this emissions source.
E.14	1.B.2.b Natural gas – gaseous fuels – CO_2 and CH_4 (E.26, 2020) Comparability	Use the Gas Networks Ireland data to report emissions from natural gas transmission (category 1.B.2.b.4) and distribution (category 1.B.2.b.5) separately by applying the Gas Networks Ireland splits consistently and as accurately as possible across the whole time series, document all input data and assumptions applied, and transparently describe the method used in the NIR. To ensure comparability, report the data from Vermilion Energy's underground storage facility with the emissions from natural gas transmission under category 1.B.2.b.4, and remove these data from the combined natural gas transmission and distribution estimates prior to splitting the two sources using the pipeline ratios.	Resolved. The Party reported transmission and distribution emissions separately in CRF table 1.B.2, and also reported that it now reports transmission and distribution emissions separately based on the percentage breakdown provided by Gas Networks Ireland for fugitive emissions across the transmission and distribution network. In addition, it reported the data from Vermilion Energy's underground storage facility with the emissions from natural gas transmission under category 1.B.2.b.4. The ERT considers that the recommendation has been fully addressed because the Party has disaggregated emissions and included relevant explanations in its NIR.
IPPU			
I.1	2.F.1 Refrigeration and air conditioning – HFCs (I.5, 2020) Accuracy	Report recovered HFC emissions from mobile air conditioning.	Addressing. The Party reported in its NIR (p.151) that a correction to the assumed recovery factor for mobile air conditioning in cars was made in the 2021 submission as information was received that recovery is not occurring for end-of-life vehicles in Ireland and the emissions are thus currently reported as "NO".

ID#	Issue/problem classification[a, b]	Recommendation from previous review report	ERT assessment and rationale
			During the review, the Party clarified that the inventory team is engaging with the EPA Office of Environmental Enforcement tracking an ongoing enforcement issue which requires that end-of-life shredding facilities carry out recovery of F-gases correctly. The statement in the NIR regarding finding actual recovery rates is meant to highlight that when recovery is undertaken on these sites, it will then be captured in the inventory. The ERT considers that the recommendation has not yet been fully addressed because the Party has not yet explained why the EF for disposal is currently reported to be 25–26 per cent, when emissions from disposal – in the absence of recovery – would be expected to amount to 100 per cent of the amount remaining in products at decommissioning. During the review, the Party clarified that the disposal rate reported is not correct because it was based on incorrect AD (stock) and it should be based on the amount remaining in products at decommissioning, adding that the reported emissions are correct. The Party indicated that this will be corrected in its next submission.
Agriculture			
A.1	3. General (agriculture) – CH_4 and N_2O (A.5, 2020) Accuracy	Estimate and report CH_4 and N_2O emissions from anaerobic digesters or, if data are not available, report them as "IE" instead of "NO" and indicate in CRF table 9 where in the inventory the emissions have been included.	Not resolved. In CRF tables 3.B(b) and 3.B(a)s2, the Party continued to report the use of and emissions from anaerobic lagoons and digesters as "NO". In its NIR (annex 5.1, p.481) the Party noted that more information in response to this issue would be provided in chapter 7, section 7.4.2.6. However, this section was blank. During the review, the Party clarified that it is still investigating the use of anaerobic digestion in Ireland, stating that there are currently only a small number of plants in operation and that work to obtain more information is ongoing. The ERT considers that the recommendation has not yet been fully addressed because CH_4 and N_2O emissions from anaerobic digesters or lagoons are reported as "NO" and information on the biogas industry in Ireland was not provided. Given the few and relatively small biogas plants currently in operation in Ireland, the ERT considers that the potential underestimation is far below the significance threshold for application of an adjustment in accordance with decision 22/CMP.1, annex, paragraph 80(b), in conjunction with decision 4/CMP.11 (the threshold for Ireland is 29.02 kt CO_2 eq in 2020) and therefore did not include this issue in the list of potential problems and further questions raised by the ERT.
A.2	3. General (agriculture) – CH_4 and N_2O (A.5, 2020) Transparency	Provide information on the biogas industry in Ireland (e.g. number of plants, capacity, gas production and, if available, treated amounts of manure and other biomass) in the NIR, including information on other organic fertilizers being applied to soils as part of the digestate.	Not resolved. In its NIR (annex 5.1, p.481) the Party noted that more information in response to this issue would be provided in chapter 7, section 7.4.2.6. However, this section was blank. During the review, the Party clarified that work to obtain more information is ongoing and further information would be provided in future NIRs. The ERT considers that the recommendation has not yet been fully addressed because information on the biogas industry or on other organic fertilizers applied to soils in Ireland was not provided.

ID#	*Issue/problem classification*[a, b]	*Recommendation from previous review report*	*ERT assessment and rationale*
A.3	3.A.1 Cattle – CH_4 (A.1, 2020) (A.3, 2018) Transparency	Provide in the NIR input parameter tables for various cattle subcategories, including feed digestibility, live weight, weight gain and duration before slaughter, for the entire time series.	Addressing. The Party provided in its NIR additional information on feed digestibility (in annex 3.3.J "Energy metabolism"), live weight (annex 3.3.B "Methane emission factors for enteric fermentation") and weight gain (annex 3.3.J "Energy metabolism") but additional information on duration before slaughter was not provided. During the review, the Party clarified that this information was outlined in studies by O'Mara (2006) and O'Brien and Shalloo (2019). The ERT considers that the recommendation has not yet been fully addressed because the Party has not yet included data on duration before slaughter in the NIR. The ERT suggests that this information could be provided in a table in an appropriate part of the agriculture section of the NIR.
A.4	3.A.2 Sheep – CH_4 (A.2, 2020) (A.4, 2018) Accuracy	Collect country-specific data for applying the IPCC tier 2 method for this category, and update the description of the methodology, AD and EFs in the NIR; if this is not possible, include an update on the progress of developing tier 2 EFs for enteric fermentation for sheep in the NIR.	Resolved. During the review and in the NIR (section 5.2.1.2.6) the Party provided additional information on progress towards the development of a tier 2 methodology for sheep, noting in particular difficulties in identifying and obtaining necessary data sets. The ERT noted that while enteric fermentation from sheep is listed in the NIR as a key category (p.24), it makes up only 6 per cent of total emissions from the enteric fermentation category and is not "significant" in the context of the 2006 IPCC Guidelines (in particular, vol. 4, figure 10.2, which details the criteria for determining the appropriate methodology tier for estimating emissions from livestock).
A.5	3.D.a.6 Cultivation of organic soils (i.e. histosols) – N_2O (A.6, 2020) Accuracy	Provide in the NIR a justification for the characterization of all organic grassland soils as nutrient-poor and collect country-specific data on histosols in order to improve the accuracy of the estimated emissions from organic soils by using an appropriate characterization of grassland soils as nutrient-rich and nutrient-poor.	Resolved. During the review, the Party provided additional justification for categorizing cultivated histosols in Ireland as nutrient-poor, citing two key pieces of research and noting that these references and explanation will be included in the 2023 NIR. The ERT considers this issue of accuracy resolved but notes a concern regarding transparency in the justification of classifying organic grassland soils as nutrient-poor (see ID# A.7 in table 5).
A.6	3.G Liming – CO_2 (A.4, 2020) (A.2, 2018) (A.3, 2016) (A.3, 2015) Accuracy	Collect country-specific data and apply a tier 2 method for this category for future submissions, noting that the use of tier 1 is conservative.	Addressing. The Party reported in its NIR (section 5.7.2, p.187) that it has had discussions with researchers and funding agencies on improving the estimates of emissions for this category. During the review, the Party clarified that since the publication of the 2022 NIR, a research project aimed at developing tier 2 emission estimates for liming has started. The ERT considers that the recommendation has not yet been fully addressed because the Party has not yet completed the application of a tier 2 method for liming.
LULUCF			
L.1	4. General (LULUCF) – CO_2 (L.9, 2020) Completeness	Conduct and report on in the NIR an in-depth evaluation of the land-use conversion categories other than forest land where the reporting of the areas and the associated emissions and removals start in 1990 and	Addressing. The Party reported in its NIR (section 6.3.5.2) information on reporting of emissions from mineral soils for grassland converted to forest land and emissions from mineral soils for land converted to forest land for 1970–1990, which have been demonstrated not to be significant and are therefore not reported in accordance with decision 24/CP.19, annex, paragraph 37. The Party provided information during the

ID#	*Issue/problem classification*[a, b]	*Recommendation from previous review report*	*ERT assessment and rationale*
		have been accumulated since then, for example land converted to grassland, and revise the emission estimates by taking into account emissions and removals from conversion of land prior to 1990 accordingly.	review on the rationale for its decision regarding the conversion period, including references to research and studies suggesting that carbon pools in Ireland reach equilibrium in line with the default IPCC period of 20 years. The Party also stated that CBM model simulations demonstrate ecological circumstances indicating that the transition period for soil organic carbon, litter and deadwood pools is longer than 30 years. The Party further added that the approach for the 2023 submission is to use a 30-year transition for land converted to forest land; this issue will be addressed in the next submission.
L.2	4. General (LULUCF) – CO_2 (L.9, 2020) Transparency	Document the approach chosen by providing information on methodological decisions, including the decision regarding the conversion period, with respect to land-conversion categories, and the rationale for reporting land-conversion categories starting in 1990 and maintaining the reporting of these land areas within a specific land-conversion category as a cumulative total for all future years.	Not resolved. The ERT considers that the recommendation has not yet been resolved because the Party has not yet provided information in the NIR documenting the rationale for its decision regarding the conversion period and reporting of land-use conversion areas and associated emissions and removals. The Party also continues to not report on land-use conversions prior to 1990, which prevents it from allocating reported emissions between lands converted to and remaining in a particular land use in a manner comparable with other Parties included in Annex I to the Convention.
L.3	4.A Forest land – CO_2 (L.10, 2020) Transparency	Provide further information, ideally in section 6.3 of the NIR, on: (a) The modelling approach, including the rationale for not applying the conversion period when a tier 3 methodology is used; (b) The rationale for selecting 1990 to start reporting land converted to forest land and maintaining the reporting of these land areas within land converted to forest land as a cumulative total for all future years; (c) The rationale for not considering previous carbon stocks in simulations of forest land remaining forest land; (d) The assumptions used for simulation of the dead organic matter pool and their rationale.	Addressing. See ID#s L.1 and L.2 above for (a) and (b). For (c) and (d), the Party stated in its NIR (section 6.3.5.2) that for category 4.A.1 (forest land remaining forest land) the CBM-CFS3 model does not consider previous carbon stocks and the dead organic matter pool is equilibrated to represent the initial dead organic matter pools before simulations are run. The ERT considers that the recommendation has not yet been fully addressed because the Party has not yet provided information in the NIR fully clarifying the assumptions used for simulations of the dead organic matter pool.
L.4	4.A Forest land – CO_2 (L.10, 2020) Transparency	Justify the appropriateness of the modelling approach used in relation to the national circumstances, discuss the completeness and accuracy of the modelling approach, in accordance with the UNFCCC Annex I	Resolved. The Party provided information in sections 6.3.3 and 6.10.1 of and annex 3.4.B to the NIR on the selection and appropriateness of the CBM-CFS3 model to the national circumstances and in relation to the other requirements of the UNFCCC Annex I inventory reporting guidelines, paragraph 50(a). See also ID# L.5 below.

ID#	*Issue/problem classification*[a, b]	*Recommendation from previous review report*	*ERT assessment and rationale*
		inventory reporting guidelines, paragraph 50(a), and discuss whether this approach is compatible with the 2006 IPCC Guidelines and is well documented and scientifically based.	
L.5	4.A Forest land – CO_2 (L.11, 2020) Transparency	Report on the research to validate CBM, conduct a model-specific uncertainty analysis and present the findings, including comparisons of CBM outputs against other models and/or against in situ measurements, in order to adhere to the UNFCCC Annex I inventory reporting guidelines, paragraph 50(a), regarding requirements for reporting using country-specific tier 3 models.	Resolved. The information provided by the Party satisfies the requirements of the UNFCCC Annex I inventory reporting guidelines, paragraph 50(a). The Party reported in its NIR (section 6.10.1.2) information on research to validate the CBM-CFS3 model. The same section of the NIR provides information on a comparison of the CBM-CFS3 model with the CARBWARE model used for reporting for 2008–2017. The Party also provided a reference containing information on the model-specific uncertainty analysis (https://cdnsciencepub.com/doi/10.1139/cjfr-2017-0088).
L.6	4.A Forest land – CO_2 (L.12, 2020) Transparency	Improve the methodological description of and approach to reporting forest land areas in order to clearly describe the reporting approach for young stands that were afforested just prior to 1990 and demonstrate that the reporting of land areas in category 4.A (forest land) is complete, in order to improve transparency.	Addressing. The ERT was not able to find sufficient information to describe the reporting approach for young stands that were afforested just prior to 1990 in section 6.3.5 of the NIR (following the indication on p.487 of the NIR). During the review, the Party clarified that afforested stands before 1990 are reported under category 4.A.1 (forest land remaining forest land) and provided references to its NIR (section 6.2.2.1, table 6.3, and sections 6.3.1 and 6.3.2) for information on spatial coverage of all forest land. It indicated that table 6.14 includes details of afforested areas prior to 1990 which are reported under category 4.A.1. The ERT considers that the recommendation has not yet been fully addressed because reporting of category 4.A.1 (NIR section 6.3.4) does not include a description of approaches for complete reporting of young stands that were afforested prior to 1990. NIR sections 6.2.2.1, 6.3.1 and 6.3.2 and table 6.3 provide information on the overall methodological approach of reporting forest land areas, but do not provide information on how land transitions between 1971 and 1990, for example due to the establishment of new plantations as shown in table 6.14, are methodically identified or otherwise handled by the inventory's chosen approach to ensure a time-series-consistent representation of lands with reference to the 2006 IPCC Guidelines (vol. 4, chap. 3.3). NIR table 6.14 provides information only on estimated emissions from mineral soils in historical transitions (1970–1989) in category 4.A.1 to demonstrate that these emissions are not significant. The ERT considers that, consistent with the original recommendation, provision of sufficient and transparent information on how transitions prior to 1990 are identified and handled in the inventory systems will allow future ERTs to evaluate the accuracy and completeness of the country-specific methods of estimating emissions from forest land.
L.7	4.A.2 Land converted to forest land – CO_2	Provide in the NIR a justification for the exclusion of the emissions and removals from the areas of land converted to forest	Resolved. Ireland provided in its NIR (section 6.3.5.2) justification for excluding the emissions and removals from the areas of land converted to forest land prior to 1990, confirming that emissions from mineral soils and dead organic matter on land converted

ID#	*Issue/problem classification*[a, b]	*Recommendation from previous review report*	*ERT assessment and rationale*
	(L.13, 2020) Completeness	land prior to 1990, which are currently not reported. If it is not possible to demonstrate that emissions and removals from these areas are insignificant, consistently with the UNFCCC Annex I inventory reporting guidelines, paragraph 37(b), review and update the modelling and reporting under the Convention to reflect the conversions to forest land prior to 1990 in order to report complete tracking of the national area per land-use category (complete geographical coverage), and ensure accurate modelling of emissions and removals from all land converted to forest land (also that converted prior to 1990) and forest land remaining forest land.	to forest land during 1970–1989 are insignificant. For living biomass, removals associated with tree growth are included in forest land remaining forest land. The ERT therefore considers this issue of completeness resolved but notes that concerns regarding reporting in the correct categories remain (see ID#s L.1 and L.2 above).
L.8	4.D.1 Wetlands remaining wetlands – CO_2 (L.14, 2020) Completeness	Provide complete estimates of carbon stock change in soils for off-site CO_2 emissions from peat extraction for wetlands.	Resolved. During the review of the 2020 submission, it was found that the summation of off-site emissions from the harvesting of horticultural peat was incorrect as a result of an error by the semi-state company Bord Na Mona, horticultural peat companies and private turbary. This was corrected across the time series and reported in Ireland's 2021 submission, as described in section 6.6.9 of the 2021 NIR.
L.9	4.D.1 Wetlands remaining wetlands – CO_2 (L.15, 2020) Transparency	Provide in the NIR a full and transparent description of the recalculations, for example any changes to the AD, EFs and methods used to estimate emissions from wetlands.	Resolved. The Party reported in its NIR (section 6.6.9) that the recalculations presented in the 2022 submission are due to a revised assessment of the areas of wetlands. During the review, the Party further clarified that the revision includes an assessment of the areas of wetlands that have undergone rewetting and/or have been taken out of peat production to date by Bord Na Mona, which has now stopped all harvesting of peat for energy production and horticultural use. The Party also clarified that the recalculation in the 2022 submission is not related to the issues identified in the review of the 2020 submission (see ID# L.8 above).
L.10	4.E.1 Settlements remaining settlements – CO_2 (L.6, 2020) (L.5, 2018) (L.8, 2016) (L.8, 2015) (62, 2014) Transparency	Report carbon stock change in soils for settlements remaining settlements as "NA" instead of "NO" and include an explanation for the use of the notation key in the NIR.	Resolved. The Party reported carbon stock change in soils for settlements remaining settlements as "NA" and provided an explanation in its NIR (section 6.7.2.2).

ID#	*Issue/problem classification*[a, b]	*Recommendation from previous review report*	*ERT assessment and rationale*
Waste			
W.1	5.B.1 Composting – CH_4 and N_2O (W.6, 2020) Comparability	Change the reporting of AD and the CH_4 and N_2O EFs to a dry weight basis in CRF table 5.B for the whole time series.	Resolved. The Party reported the AD and the CH_4 and N_2O EFs on a dry weight basis in CRF table 5.B for the whole time series.
W.2	5.B.2 Anaerobic digestion at biogas facilities – CH_4 (W.1, 2020) (W.6, 2018) Accuracy	Report CH_4 emissions from unintentional leakage and other unexpected events at anaerobic digestion facilities outside of the wastewater treatment area digesting other forms of waste (including agricultural waste) and explain the estimations in the NIR.	Resolved. The Party reported CH_4 emissions in CRF table 5.B for 2010–2020 (instead of as "NO", as reported in its 2020 submission) and explained the estimations in its NIR (pp.307–308), including confirmation that these emissions include unintentional leakage and other unexpected events at anaerobic digestion facilities.
W.3	5.C.2 Open burning of waste – CO_2, CH_4 and N_2O (W.7, 2020) Transparency	Report in the NIR the AD (e.g. the estimates of the amount of uncollected municipal solid waste) and assumptions used to estimate emissions from open burning of waste.	Addressing. According to the NIR (p.311), data on uncollected household waste are sourced from the EPA national waste statistics publications. The Party reported the AD (estimate of quantity of household waste burned) in its NIR (table 3.5.F in annex 3.5), but did not provide clear information on the assumptions used in the estimates. During the review, the Party explained that these estimates of quantities of waste burned were originally made using a study on persistent organic pollutant emissions carried out for EPA by AEA Technology in 2008. This methodology was briefly outlined by the Party as estimates of a national figure for uncollected household waste for each of the years 2001–2006, with 1998 and 1995 estimates being obtained from the EPA national waste reports. "Uncollected waste" refers to the waste produced by the portion of the population not provided with, or not availing themselves of, a collection service, corrected to take account of local conditions. The uncollected household waste figure was adjusted to take account of shared bin numbers based on an average regional amount for the Limerick Clare Kerry region of 7.6 per cent of total households and applied to the national figures. A value for burial of waste on land was also applied to the figures. Home composting has not been included as it is covered elsewhere and only the fraction of household waste that is combustible will be burned. The estimate of the quantity of household waste burned is based on the proportions from this previous study, which may be a conservative estimate, as the amount of household waste burned should be decreasing as waste management practices improve. The ERT considers that the recommendation has not yet been fully addressed because the Party has not yet provided in its NIR the information provided during the review on the AD and the assumptions used.
W.4	5.D.1 Domestic wastewater – CH_4 (W.3, 2020) (W.7, 2018) Transparency	Provide a reference to justify the use of a methane correction factor of 0.083 or apply the default value from the 2006 IPCC Guidelines.	Resolved. The Party provided a link to Ireland's national meteorological service in its NIR (section 7.5.1.2, p.314). The ERT considers that the new reference confirms that the soil temperature exceeds 15 °C for two months of the year and justifies the methane correction factor used by the Party.

ID#	*Issue/problem classification*[a, b]	*Recommendation from previous review report*	*ERT assessment and rationale*
W.5	5.D.1 Domestic wastewater – CH_4 and N_2O (W.5, 2020) (W.9, 2018) Transparency	Report wastewater flows including treated (aerobically and anaerobically) and untreated wastewater in the NIR.	Addressing. The Party reported in its NIR (section 7.5.1.2, p.313) information on only untreated wastewater flows, but did not report on treated (aerobically and anaerobically) wastewater. During the review, the ERT requested confirmation of the relevant information provided by the Party, or additional clarification, if available. The Party confirmed the information provided in the NIR and also referred to its response to ID# W.6 below. The ERT considers that the recommendation has not yet been fully addressed because the Party did not report sufficient information which captures Ireland's wastewater flows; for example, it did not provide a diagram showing the wastewater flows in its NIR.
W.6	5.D.1 Domestic wastewater – CH_4 and N_2O (W.8, 2020) Completeness	Report CH_4 and N_2O emissions from uncollected and untreated wastewater for the whole time series and provide an explanation in the NIR of the methods, AD and EFs used.	Not resolved. The Party reported in its NIR (section 7.5.1.2, p.313) that both CH_4 and N_2O emissions from uncollected and untreated wastewater would potentially result in emissions below the threshold of significance for 2018, 2019 and 2020. The ERT notes that in accordance with paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines, the significance threshold is applied at the level of a specific category as defined in the CRF tables. For wastewater treatment the category is CH_4 and N_2O emissions from domestic wastewater. As untreated wastewater is only a part of the entire category, application of the significance threshold cannot be applied for the purposes of excluding the activity from reporting and the ERT considers that the recommendation has not yet been addressed. The ERT notes that the underestimate resulting from exclusion of CH_4 and N_2O emissions from uncollected and untreated wastewater amounts to approximately 4.21 kt CO_2 eq, which is below the threshold for the application of an adjustment in accordance with decision 22/CMP.1, annex, paragraph 80(b), in conjunction with decision 4/CMP.11 (the threshold for Ireland in 2020 is 29.02 kt CO_2 eq); therefore, this issue was not included in the list of potential problems and further questions raised by the ERT.
KP-LULUCF			
KL.1	CM – CO_2 (KL.3, 2020) (KL.8, 2018) Transparency	Provide the numerical values for cropland area under CM in the relevant section of the NIR and verify the consistency of that information between CRF table NIR-2 and the NIR.	Addressing. The Party continues to report the numerical value for cropland area inconsistently in its NIR and CRF tables. In NIR table 11.2, "Land transition matrix", (p.343), the column for cropland shows two different values, 734.90 kha at the top and 739.99 kha at the bottom, for the total area at the end of the current inventory year. In CRF table NIR-2 the value is 743.90 kha, consistently with the total area of cropland in CRF table 4(KP-1)B.2 of 734.90 kha. However, NIR annex 3.4.D does not include the cropland area for 2020. During the review, Ireland clarified that annex 3.4.D was not updated in the 2022 NIR and provided an updated version, which includes the cropland area under CM for 2020 as 743.90 kha. The ERT is satisfied that this issue would not result in an underestimation of emissions or overestimation of removals, and is therefore not a potential problem that requires further consideration in the final review report.

ID#	*Issue/problem classification*[a, b]	*Recommendation from previous review report*	*ERT assessment and rationale*
KL.2	Harvested wood products – CO_2 (KL.5, 2020) (KL.10, 2018) Convention reporting adherence	Ensure that correct values and units are reported for harvesting activities (columns D and E) under Article 3, paragraphs 3–4, of the Kyoto Protocol in CRF table 4(KP-1)C.	Resolved. In CRF table 4(KP-1)C, columns D and E now include the correct entries.

[a] References in parentheses are to the paragraph(s) and the year(s) of the previous review report(s) in which the issue or problem was raised. Issues are identified in accordance with paras. 80–83 of the UNFCCC review guidelines and classified as per para. 81 of the same guidelines. Problems are identified and classified as problems of transparency, accuracy, consistency, completeness or comparability in accordance with para. 69 of the Article 8 review guidelines in conjunction with decision 4/CMP.11.

[b] The report on the review of the 2021 annual submission of Ireland was not available at the time of this review. Therefore, the recommendations reflected in this table are taken from the 2020 annual review report. For the same reason, 2021, 2019 and 2017 are excluded from the list of review years in which issues could have been identified.

IV. Issues and problems identified in three or more successive reviews and not addressed by the Party

9. In accordance with paragraph 83 of the UNFCCC review guidelines, the ERT noted that the issues and/or problems included in table 4 have been identified in three or more successive reviews, including the review of the 2022 annual submission of Ireland, and had not been addressed by the Party by the time of publication of this review report.

Table 4
Issues and/or problems identified in three or more successive reviews and not addressed by Ireland

ID#	*Previous recommendation for issue*	*Number of successive reviews issue not addressed*[a]
General	No issues identified.	
Energy	No issues identified.	
IPPU	No issues identified.	
Agriculture		
A.3	Provide in the NIR input parameter tables for various cattle subcategories, including feed digestibility, live weight, weight gain and duration before slaughter, for the entire time series.	3 (2018–2022)
A.6	Collect country-specific data and apply a tier 2 method for this category for future submissions, noting that the use of tier 1 is conservative.	4 (2015/2016–2022)
LULUCF	No issues identified.	
Waste		
W.5	Report wastewater flows including treated (aerobically and anaerobically) and untreated wastewater in the NIR.	3 (2018–2022)

ID#	*Previous recommendation for issue*	*Number of successive reviews issue not addressed*[a]
KP-LULUCF		
KL.1	Provide the numerical values for cropland area under CM in the relevant section of the NIR and verify the consistency of that information between CRF table NIR-2 and the NIR.	3 (2018–2022)

[a] Reports on the reviews of the 2017, 2019 and 2021 annual submissions of Ireland have not yet been published. Therefore, 2017, 2019 and 2021 were not included when counting the number of successive years for this table. In addition, as the reviews of the Party's 2015 and 2016 annual submissions were conducted together, they are not considered successive reviews and 2015/2016 is counted as one year.

V. Additional findings made during the individual review of the Party's 2022 annual submission

10. Table 5 presents findings made by the ERT during the individual review of the 2022 annual submission of Ireland that are additional to those identified in table 3.

Table 5
Additional findings made during the individual review of the 2022 annual submission of Ireland

ID#	*Finding classification*	*Description of finding with recommendation or encouragement*	*Is finding an issue/problem?*[a]
General			
G.6	Key category analysis and uncertainty analysis	The Party reported in its NIR (p.13) that owing to resource constraints, it was not possible to follow the encouragement from the previous review report to complete the work related to disaggregation of the current tier 1 uncertainty analysis as well as moving to tier 2 from tier 1 key category analysis for the 2022 submission. The Party informed the ERT that initial work, which highlighted the differences between the level of disaggregation found in the tier 1 key category analysis compared with the tier 1 uncertainty assessment, has already been carried out and that the finalization of these improvements is planned for the 2023 submission. The ERT encourages the Party to complete the improvements for the 2023 submission.	Not an issue/problem
G.7	Archiving	The Party provided information on its archiving system in its NIR (pp.8 and 11) under the description of the QA/QC system. The ERT noted that the presentation would be more transparent if all information related to archiving could be located in one dedicated chapter and include the missing information regarding hard copies and their location. During the review, Ireland informed the ERT that any paper reports/other data that have not already been digitized are stored at the offices of the national inventory focal point. The ERT recommends that Ireland improve its documentation of the archiving process in the NIR, for example by compiling information on archiving in one dedicated chapter and adding information on storage of hard copies not yet included in the electronic archiving system.	Yes. Transparency

ID#	*Finding classification*	*Description of finding with recommendation or encouragement*	*Is finding an issue/problem?*[a]
Energy			
E.15	1.B.2 Oil, natural gas and other emissions from energy production – gaseous fuels – CH_4	Emissions from exploration were reported as "NO". The Party indicated in its NIR (p.117) that there is very little exploration activity in Ireland and that CH_4 and CO_2 emissions do not occur owing to the use of heavy drilling muds preventing hydrocarbons from escaping the well during exploratory drilling. This issue is related to ID# E.9 in table 3. The ERT notes that in addition to leakage from wells, there are multiple sources of fugitive emissions in field operations from equipment above ground, such as flanges, connections, tanks, pneumatic pumps, pneumatic controllers and other sources beyond venting and flaring practices, that occur in any type of drilling operation, including drilling exploratory wells. The ERT requested the Party to provide evidence that the use of heavy drilling muds justifies the omission of fugitive emissions from this category according to the latest industry advancement. During the review, the Party provided detailed information on the onshore and offshore exploration wells drilled until 2019, demonstrating that there has been little historical activity in this category (no exploration occurred in 2020). The Party further explained that only two onshore wells were drilled in Ireland during 1990–2019 and only seven offshore wells during 2009–2019 and provided details on the wells and the operations in the country. On the basis of this information, the ERT considers that any potential emissions from exploration will be below the significance threshold for application of an adjustment in accordance with decision 22/CMP.1, annex, paragraph 80(b), in conjunction with decision 4/CMP.11 (the threshold for Ireland is 29.02 kt CO_2 eq in 2020) and therefore did not include this issue in the list of potential problems and further questions raised by the ERT. The ERT recommends that the Party estimate emissions from exploration or use the notation key "NE" for CH_4 emissions, explaining that they are below the significance threshold, rather than "NO", given the evidence that the activity does occur.	Yes. Completeness
IPPU			
I.2	2.D.3 Other (non-energy products from fuels and solvent use) – CO_2	The Party reported in its NIR (p.145) that it is assumed that a share of 76 per cent of vehicles are equipped with a selective catalytic reduction system. It was not clear to the ERT whether this share is constant over time and valid for all vehicle types. During the review, the Party clarified that the 76 per cent value is now superseded by a more detailed breakdown of selective catalytic reduction system applicability within the COPERT model to each diesel vehicle category. The percentage shares are constant each year but vary by category (e.g. cars, light commercial vehicles, heavy-duty trucks). The ERT encourages the Party to improve the reporting on methodology in the NIR by including a more detailed breakdown of the shares of selective catalytic reduction system applicability within the COPERT model to each diesel vehicle category in its next submission.	Not an issue/problem
I.3	2.D.3 Other (non-energy products from fuels and solvent use) – CO_2	The Party reported in its NIR (p.145) that CO_2 from urea use in vehicles is calculated from urea consumption data generated by the COPERT model. The ERT was convinced that the output of COPERT is CO_2 emissions from urea, not the amount of urea consumed. During the review, the Party clarified that the CO_2 emissions from urea use are in fact derived directly from the COPERT transport model.	Not an issue/problem

ID#	*Finding classification*	*Description of finding with recommendation or encouragement*	*Is finding an issue/problem?*[a]
		The ERT encourages the Party to improve its reporting by updating this specific methodology refinement in its next NIR submission.	
I.4	2.E.1 Integrated circuit or semiconductor – F-gases	The Party reported in its NIR (p.146) on the QA/QC procedures it applies for this category and stated that "This included checks on cell references and detailed calculations and checks to ensure that the sectoral emissions total in calculation sheets is the same as that in the final inventory data set that is reported to the UNFCCC." The ERT notes that this QA/QC procedure appears to be limited to calculation sheets. During the review, in response to a question from the ERT, the Party clarified that it collects company-specific data based on gas consumption and emission control technologies in use in the process. The emissions calculated and reported to the inventory team are checked and reviewed by the team. An ongoing dialogue is documented with the reporting teams from industry as to how they calculate and report these data. An update on manufacturing processes and usage of relevant substances is provided to the inventory team and the data reported by the industry are aligned with data provided to the European Semiconductor Industry Association. The ERT encourages the Party to improve the description of the applied QA/QC procedures by including a more detailed breakdown of the shares of selective catalytic reduction system applicability within the COPERT model to each diesel vehicle category in its next submission.	Not an issue/problem
I.5	2.F.2 Foam blowing agents –HFCs	The Party reported in its NIR (section 4.7.1.2) that HFC emissions from this category do not occur in Ireland, while it reported "NA" for new fillings, stock and remaining at decommissioning in CRF table 2(II)B-Hs2. During the review, the Party clarified that the incorrect notation keys were used. The ERT encourages the Party to improve its reporting by using the correct notation keys in the CRF tables.	Not an issue/problem
I.6	2.F.1 Refrigeration and air conditioning – HFCs	The Party reported in its NIR (p.150) on the methodology applied to estimate emissions from this category and explained why emissions from different subcategories are aggregated under category 2.F.1.a (commercial refrigeration). However, it was not clear how the different rates and EFs were applied across the mix of different appliances as reported in this category. As such, the ERT could not determine whether there were unexplained outliers. During the review, the Party provided a spreadsheet with additional information on the applied assumptions and rates per type of appliance used to estimate the emissions. The ERT recommends that the Party improve the transparency of its reporting by providing more details in the NIR on assumptions, rates and EFs and their sources per substance (F-gas) used at the subcategory level for estimated HFC emissions across the time series.	Yes. Transparency
I.7	2.F.1 Refrigeration and air conditioning – HFCs	In its NIR (pp.149–150), the Party provided very concise information on how time-series consistency of stocks in the subcategories of category 2.F.1 has been ensured. During the review, the Party provided an explanation on how the time series of stocks were determined for mobile air conditioning. The ERT recommends that the Party increase the transparency of its reporting by adding information on how the time series of stocks are determined, taking into account new additions and losses from operations and disposal at the subcategory level.	Yes. Transparency

ID#	*Finding classification*	*Description of finding with recommendation or encouragement*	*Is finding an issue/problem?*[a]
I.8	2.H Other (IPPU) – CO_2	The Party reported in its NIR (pp.160 and 321–322) on the AD underlying the estimation of non-methane volatile organic compounds and derived indirect CO_2 emissions for category 2.H.2. However, the Party did not report the sources of these AD. During the review, the Party clarified that bread baking data are sourced from Eurostat and are cross-checked with data from the Central Statistics Office; beer production data are sourced from the annual Irish Beer Market Report; spirit production data are sourced from the Central Statistics Office; coffee roasting data are based on AD for unroasted coffee imports obtained from the United Nations Comtrade database; meat, and fish frying and curing AD are obtained from the Central Statistics Office, with tonnes of slaughtered animal carcasses in Ireland taken to be the equivalent of meat rendered in Ireland; and for animal feedstock the tonnage of animal feed produced is sourced from the Central Statistics Office. The Party added that the sources of these data are described and given in Ireland's Informative Inventory Report 2022 (available at https://www.epa.ie/publications/monitoring--assessment/climate-change/air-emissions/Ireland-IIR-2022_mergev2.pdf). The ERT encourages the Party to improve the reporting on AD by adding their sources, as well as adding a reference to the most recent Informative Inventory Report or any other publication which contains information on AD.	Not an issue/problem
Agriculture			
A.7	3.D.a.6 Cultivation of organic soils (i.e. histosols) – N_2O)	The Party reported in the agriculture section of its NIR (p.183) that organic soils on managed agricultural land are assumed to be nutrient-poor (see ID# A.5 in table 3). However, in the LULUCF section of the NIR, the method for calculating emissions from organic soils for land recently converted to forest land (including grassland converted to forest land) assumes that these soils are a mix of nutrient-poor and nutrient-rich (see NIR section 6.3.4.6, p.217, and section 6.3.5.3, p.227), which appears to be inconsistent with the nutrient-poor assumption stated in the agriculture section. During the review, the Party clarified that a tier 1 methodology is used for the estimation of carbon stock changes in grassland soils (NIR section 6.5.2.4), while a tier 3 methodology for forest soils is used (NIR section 6.3.6) based on country-specific data at the plot level from the national forest inventory. The Party further clarified that while this kind of detail is not yet available for grassland, it is currently developing a spatially explicit land-use map for LULUCF emission and removal estimates. However, the Party did not address the inconsistency in the nutrient status of organic soils for grassland between the LULUCF and agriculture sections of the inventory. The ERT recommends that the Party provide more information in the NIR to justify the use of the nutrient-poor status of managed organic soils in the agriculture section of the NIR, and reconcile the inconsistency in the nutrient status of organic soils for grassland between the LULUCF and agriculture sections with the EFs and methods used to estimate emissions from grassland organic soils in the LULUCF section of the inventory (which assumes these soils are a mix of nutrient-poor and nutrient-rich condition (p.217)).	Yes. Transparency
A.8	3.G Liming – CO_2	The Party reported in its NIR (p.186, section 5.7), that dolomite is not used for agricultural purposes in Ireland, although no supporting evidence was provided to confirm this.	Yes. Transparency

ID#	*Finding classification*	*Description of finding with recommendation or encouragement*	*Is finding an issue/problem?*[a]
		During the review, the Party clarified that the Department of Agriculture, Food and the Marine is the key provider of data on limestone use in the inventory, which has confirmed with the inventory agency that all limestone applied to agricultural land is calcium limestone. The ERT recommends that the Party provide more information confirming that dolomite is not used in Ireland, either in the form of documented evidence from the Department of Agriculture, Food and the Marine or other research.	
LULUCF			
L.11	4(II) Emissions/removals from drainage and rewetting and other management of organic/mineral soils – CH_4	The CH_4 IEF per area for drained organic soils in wetlands used by the Party in CRF table 4(II) for 2020 (99.16 kg CH_4/ha) is the highest of all reporting Parties (0.16–99.16 kg CH_4/ha) and more than twice that of the second highest value (38.74 kg CH_4/ha). The ERT noted that this may not be in accordance with the UNFCCC Annex I inventory reporting guidelines because it indicates a likely inaccuracy in the reporting of emissions. During the review, the Party clarified that the CH_4 emissions associated with rewetting/restoration of previously extracted peatlands have inadvertently been reported owing to a transcription error along with those associated with non-forest drainage for peat extraction reported under category 4.D.1 (drained organic soils) in CRF table 4(II). Thus, there has been a misallocation of emission estimates in CRF table 4(II). The Party also provided data in a spreadsheet showing corrected EFs and emission estimates. The ERT recommends that the Party report correct data on CH_4 emissions from drained organic soils in wetlands in CRF table 4(II) in the next and subsequent submissions.	Yes. Accuracy
L.12	4(III) Direct N_2O emissions from N mineralization/ immobilization – N_2O	The Party reported N_2O emissions from N mineralization/immobilization in CRF table 4(III) as "NE", while in the NIR, section 6.3.4.7 for forest land remaining forest land and section 6.3.5.7 for land converted to forest land, N_2O emissions from N mineralization/immobilization are reported as "NO". The ERT noted that this is not in accordance with the UNFCCC Annex I inventory reporting guidelines because it represents an inconsistency in reporting between the NIR and the CRF tables. In addition, CRF table 4(III) contains no explanation on the notation key used. During the review, the Party clarified that N_2O emissions from N mineralization/immobilization are demonstrated not to be significant and, based on a recommendation from a previous review, reported as "NE" rather than "NO" in CRF table 4(III). However, NIR sections 6.3.4.7 and 6.3.4.1 for forest land remaining forest land and section 6.3.5.7 for land converted to forest land were not updated and the Party continued to report N_2O emissions from mineralization/immobilization as "NO" instead of "NE" as recommended by the previous ERT. The ERT recommends that the Party ensure consistency in the reporting of N_2O emissions from N mineralization/immobilization in both the NIR and the CRF tables in the next submission and include an explanation for the use of the notation keys in CRF table 9.	Yes. Convention reporting adherence
L.13	4(V) Biomass burning – CO_2	The CO_2 IEF used by the Party for biomass burning under category 4.D (wetlands) for 2020 (352.66 t/unit) is the highest of all reporting Parties (0.00–352.66 t/unit) and more than twice that of the second highest value (11.59 t/unit). The ERT noted that this may not be in accordance with the UNFCCC Annex I inventory reporting guidelines because the ERT could not identify a transparent explanation for such a high IEF.	Yes. Transparency

ID#	*Finding classification*	*Description of finding with recommendation or encouragement*	*Is finding an issue/problem?*[a]
		During the review, the Party clarified that the EF for biomass burning in wetlands is derived from country-specific research and provided the reference documentation for the EF (Wilson et al., 2015, section 3.5 and table 3).	
		The ERT recommends that the Party provide transparent documentation of the country-specific data supporting the high IEF for biomass burning in wetlands in the next and subsequent submissions.	
Waste		No findings for the waste sector additional to those included in table 3 were made by the ERT during the review.	
KP-LULUCF			
KL.3	FM	In its NIR (p.361), in relation to the calculation of the corrected time series (FMRL), the Party stated "fire assumptions were based on the original FMRL submission", which is 12 kt CO_2 eq. The ERT noted that this value is different from the value of the background level of fires for FM reported in NIR table 11.7, which is 69 kt CO_2 eq, and therefore considered the reported value of FMRL (112.90 kt CO_2 eq/year) inaccurate.	Not a problem
		In response to the issue raised during the review the Party resubmitted updated information on the recalculation of FMRL (NIR tables 11.9 and 11.10) reflecting the correct value of the background level for FM and corrected the estimate of FMRL (170.26 kt CO_2 eq/year). Accordingly, the Party also resubmitted CRF table 4(KP-1)B.1.1 and the CRF accounting table, reflecting the corrected value of FMRL. The ERT agreed with the updated value.	

[a] Recommendations made by the ERT during the review are related to issues as defined in para. 81 of the UNFCCC review guidelines or problems as defined in para. 69 of the Article 8 review guidelines.

VI. Application of adjustments

11. The ERT did not identify the need to apply any adjustments for the 2022 annual submission of Ireland.

VII. Accounting quantities for activities under Article 3, paragraph 3, and, if any, activities under Article 3, paragraph 4, of the Kyoto Protocol

12. Table I.5 presents the accounting quantities for KP-LULUCF reported by Ireland and the final values agreed by the ERT. The final quantities of units to be issued and cancelled are presented in table I.6.

VIII. Questions of implementation

13. No questions of implementation were identified by the ERT during the individual review of the Party's 2022 annual submission.

Annex I

Overview of greenhouse gas emissions and removals and data and information on activities under Article 3, paragraphs 3–4, of the Kyoto Protocol, as submitted by Ireland in its 2022 annual submission

1. Tables I.1–I.4 provide an overview of the total GHG emissions and removals as submitted by Ireland.

Table I.1
Total greenhouse gas emissions and removals for Ireland, base year–2020
(kt CO_2 eq)

	Total GHG emissions excluding indirect CO_2 emissions		*Total GHG emissions and removals including indirect CO_2 emissions*[a]		*Land-use change (Article 3.7 bis as contained in the Doha Amendment)*[b]	*KP-LULUCF (Article 3.3 of the Kyoto Protocol)*[c]	*KP-LULUCF (Article 3.4 of the Kyoto Protocol)*	
	Total including LULUCF	*Total excluding LULUCF*	*Total including LULUCF*	*Total excluding LULUCF*			*CM, GM, RV, WDR*	*FM*
FMRL								–142.07
Base year[d]	61 207.66	55 014.92	NA	NA	8.2299		6 891.59	
1990	61 015.92	54 823.19	NA	NA				
1995	66 301.79	59 223.60	NA	NA				
2000	76 541.71	68 937.37	NA	NA				
2010	70 007.23	62 176.45	NA	NA				
2011	64 996.05	57 978.00	NA	NA				
2012	65 264.41	59 038.38	NA	NA				
2013	65 737.95	58 837.56	NA	NA		–2 633.91	6 531.45	–3.88
2014	64 944.27	58 315.70	NA	NA		–3 021.18	6 492.99	–235.19
2015	68 034.08	60 768.09	NA	NA		–2 159.40	6 434.59	–276.15
2016	69 541.55	62 998.05	NA	NA		–3 165.77	6 407.82	–40.40
2017	70 611.94	62 379.85	NA	NA		–2 971.37	6 620.30	479.85
2018	69 509.49	62 662.10	NA	NA		–2 787.09	6 446.72	218.20
2019	67 044.94	60 158.01	NA	NA		–2 670.24	6 503.71	117.64
2020	64 958.54	58 032.34	NA	NA		–2 939.58	6 385.91	302.34

Note: Emissions and removals reported for the sector other (sector 6) are not included in the total GHG emissions.

[a] The Party did not report indirect CO_2 emissions in CRF table 6.

[b] The value reported in this column relates to GHG emissions from conversion of forests (deforestation) in 1990 as contained in the report on the review of the Party's report to facilitate the calculation of the assigned amount for the second commitment period of the Kyoto Protocol.

[c] Activities under Article 3, para. 3, of the Kyoto Protocol, namely AR and deforestation.

[d] "Base year" refers to the base year under the Kyoto Protocol, which is 1990 for CO_2, CH_4 and N_2O and 1995 for HFCs, PFCs, SF_6 and NF_3. The base year for CM and GM under Article 3, para. 4, of the Kyoto Protocol is 1990. For activities under Article 3, para. 3, of the Kyoto Protocol and FM under Article 3, para. 4, only the inventory years of the commitment period must be reported.

Table I.2

Greenhouse gas emissions and removals by gas for Ireland, excluding land use, land-use change and forestry, 1990–2020

(kt CO_2 eq)

	CO_2[a]	*CH_4*	*N_2O*	*HFCs*	*PFCs*	*Unspecified mix of HFCs and PFCs*	*SF_6*	*NF_3*
1990	32 944.42	14 180.75	7 663.43	0.59	0.12	NO	33.88	NO
1995	35 852.99	15 035.41	8 108.88	45.23	97.61	NO	79.11	4.37
2000	45 249.12	14 864.77	8 054.82	269.97	397.76	NO	51.76	49.17
2010	41 793.62	12 804.32	6 450.55	1 048.30	46.58	NO	33.09	NO
2011	38 056.38	12 751.90	6 023.93	1 084.43	15.88	NO	45.48	NO
2012	38 227.16	13 424.56	6 263.86	1 075.05	9.56	NO	37.41	0.78
2013	37 281.75	13 717.90	6 678.70	1 106.43	8.32	NO	43.55	0.90
2014	36 853.01	13 828.30	6 408.76	1 183.70	3.56	NO	37.41	0.96
2015	38 718.04	14 346.45	6 473.48	1 164.17	20.50	NO	44.49	0.96
2016	40 369.54	14 735.24	6 579.69	1 235.97	37.36	NO	39.29	0.96
2017	39 078.03	15 148.97	6 915.01	1 150.16	47.20	NO	39.21	1.26
2018	39 012.37	15 456.87	7 262.92	837.84	49.86	NO	40.92	1.32
2019	37 325.66	15 048.01	6 867.22	819.12	63.05	NO	33.57	1.38
2020	35 153.20	15 226.57	6 868.23	694.17	70.22	NO	18.49	1.46
Percentage change 1990–2020	**6.7**	**7.4**	**–10.4**	**117 158.5**	**58 526.2**	**NA**	**–45.4**	**NA**

Note: Emissions and removals reported for the sector other (sector 6) are not included in this table.

[a] Ireland did not report indirect CO_2 emissions in CRF table 6.

Table I.3
Greenhouse gas emissions and removals by sector for Ireland, 1990–2020
(kt CO_2 eq)

	Energy	*IPPU*	*Agriculture*	*LULUCF*	*Waste*	*Other*
1990	31 021.68	3 310.16	18 939.30	6 192.73	1 552.05	NO
1995	33 830.04	3 218.42	20 345.96	7 078.19	1 829.18	NO
2000	42 481.08	4 559.26	20 404.25	7 604.35	1 492.77	NO
2010	40 458.11	2 595.90	18 588.38	7 830.78	534.06	NO
2011	36 913.21	2 483.12	17 963.47	7 018.05	618.20	NO
2012	37 000.79	2 687.98	18 810.75	6 226.04	538.87	NO
2013	35 850.07	2 640.39	19 653.42	6 900.40	693.68	NO
2014	35 190.44	3 051.13	19 195.22	6 628.57	878.91	NO
2015	36 856.71	3 242.18	19 711.00	7 265.99	958.19	NO
2016	38 370.28	3 468.92	20 192.42	6 543.50	966.43	NO
2017	37 063.78	3 481.15	20 890.04	8 232.09	944.88	NO
2018	36 840.84	3 229.61	21 676.90	6 847.39	914.75	NO
2019	35 264.07	3 188.98	20 790.65	6 886.93	914.31	NO
2020	33 156.29	2 895.75	21 074.57	6 926.20	905.73	NO
Percentage change 1990–2020	**6.9**	**–12.5**	**11.3**	**11.8**	**–41.6**	**NA**

Note: Ireland did not report indirect CO_2 emissions in CRF table 6.

Table I.4
Greenhouse gas emissions and removals from activities under Article 3, paragraphs 3–4, of the Kyoto Protocol by activity, base year–2020, for Ireland
(kt CO_2 eq)

	Article 3.7 bis as contained in the Doha Amendment[a]	*Activities under Article 3.3 of the Kyoto Protocol*		*FM and elected activities under Article 3.4 of the Kyoto Protocol*				
	Land-use change	*AR*	*Deforestation*	*FM*	*CM*	*GM*	*RV*	*WDR*
FMRL				–142.07				
Technical correction				170.26				
Base year	8.2299				–96.99	6 988.58	NA	NA
2013		–3 698.96	1 065.06	–3.88	–30.38	6 561.83	NA	NA
2014		–3 282.19	261.00	–235.19	–84.14	6 577.12	NA	NA
2015		–3 505.50	1 346.10	–276.15	–89.90	6 524.49	NA	NA
2016		–3 527.74	361.97	–40.40	–109.70	6 517.52	NA	NA
2017		–3 254.39	283.02	479.85	–88.74	6 709.03	NA	NA

	Article 3.7 bis as contained in the Doha Amendment[a]	*Activities under Article 3.3 of the Kyoto Protocol*		*FM and elected activities under Article 3.4 of the Kyoto Protocol*				
	Land-use change	*AR*	*Deforestation*	*FM*	*CM*	*GM*	*RV*	*WDR*
2018		–3 062.96	275.87	218.20	–194.86	6 641.58	NA	NA
2019		–2 936.78	266.54	117.64	–134.24	6 637.95	NA	NA
2020		–3 233.33	293.75	302.34	–105.24	6 491.15	NA	NA
Percentage change base year–2020					**8.5**	**–7.1**	**NA**	**NA**

Note: Values in this table include emissions from land subject to natural disturbances, if applicable.

[a] The value reported in this column relates to 1990.

2. Table I.5 provides information on the Party's accounting quantities for reporting under Article 3, paragraphs 3–4, of the Kyoto Protocol.

Table I.5

Accounting quantities for activities under Article 3, paragraph 3, and forest management and any elected activities under Article 3, paragraph 4, of the Kyoto Protocol for Ireland

(kt CO_2 eq)

GHG source/sink activity	*Net emissions/removals*										*Accounting parameters*	*Accounting quantities*[a]
	Base year[b]	*2013*	*2014*	*2015*	*2016*	*2017*	*2018*	*2019*	*2020*	*Total*[c]		
A.1. AR		–3 698.965	–3 282.186	–3 505.503	–3 527.738	–3 254.387	–3 062.961	–2 936.779	–3 233.330	–26 501.850		–26 501.849
Excluded emissions from natural disturbances[d]		NA	NA	NA	NA	NE	NA	NA	NA	NA, NE		NA, NE
Excluded subsequent removals from land subject to natural disturbances		NA	NA	NA	NA	NE	NA	NA	NA	NA, NE		NA, NE
A.2. Deforestation		1 065.056	261.003	1 346.099	361.966	283.016	275.870	266.542	293.753	4 153.304		4 153.305
B.1. FM										562.406		336.887
Net emissions/ removals		–3.878	–235.191	–276.150	–40.405	479.848	218.200	117.645	302.338	562.406		
Excluded emissions		NA	NA	NA	NA	NE	NA	NA	NA	NA, NE		NA, NE

GHG source/sink activity	*Net emissions/removals*										*Accounting parameters*	*Accounting quantities*[a]
	Base year[b]	*2013*	*2014*	*2015*	*2016*	*2017*	*2018*	*2019*	*2020*	*Total*[c]		
from natural disturbances[d]												
Excluded subsequent removals from land subject to natural disturbances		NA	NA	NA	NA	NA	NA	NA	NA	NA		NA
Any debits from newly established forest		NO	NO	NO	NO	NO	NO	NO	NO	NO		NO
FMRL[e]											–142.070	
Technical corrections to FMRL											170.260	
FM cap											15 796.928	336.887
B.2. CM (if elected)	–96.990	–30.375	–84.136	–89.899	–109.700	–88.737	–194.863	–134.241	–105.238	–837.188		–61.271
B.3. GM (if elected)	6 988.576	6 561.827	6 577.123	6 524.492	6 517.519	6 709.035	6 641.581	6 637.946	6 491.149	52 660.672		–3 247.938
B.4. RV (if elected)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		NA
B.5. WDR (if elected)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		NA

[a] The accounting quantity is the total quantity of units to be issued or cancelled for a particular activity.
[b] Net emissions and removals from CM, GM, RV and/or WDR, if elected, in the Party's base year as established in decision 9/CP.2.
[c] Cumulative net emissions and removals for all years of the commitment period reported in the annual submission under review.
[d] The Party indicated that it does not intend to exclude emissions from natural disturbances.
[e] As inscribed in the appendix to the annex to decision 2/CMP.7 in kt CO_2 eq per year.

3. Table I.6 provides an overview of key data from Ireland's reporting under Article 3, paragraphs 3–4, of the Kyoto Protocol.

Table I.6
Key relevant data for Ireland under Article 3, paragraphs 3–4, of the Kyoto Protocol from its 2022 annual submission

Parameter	*Data*
Periodicity of accounting	(a) AR: commitment period accounting (b) Deforestation: commitment period accounting (c) FM: commitment period accounting (d) CM: commitment period accounting (e) GM: commitment period accounting (f) RV: not elected (g) WDR: not elected
Elected activities under Article 3, paragraph 4, of the Kyoto Protocol	CM and GM
Election of application of provisions for natural disturbances	Yes, for AR and FM[a]
3.5% of total base-year GHG emissions, excluding LULUCF	1 974.616 kt CO_2 eq (15 796.928 kt CO_2 eq for the duration of the commitment period)
Cancellation of AAUs, CERs and ERUs and/or issuance of RMUs in the national registry for:	
1. AR	Issue 26 501 849 RMUs
2. Deforestation	Cancel 4 153 305 units
3. FM	Cancel 336 887 units
4. CM	Issue 61 271 RMUs
5. GM	Issue 3 247 938 RMUs

Note: Values in this table reflect the accounting quantities for activities under Article 3, para. 3, and FM and any elected activities under Article 3, para. 4, of the Kyoto Protocol as reported in table I.5.

[a] The Party decided not to exclude emissions and subsequent removals from natural disturbances in its accounting for the 2022 submission.

Annex II

Information to be included in the compilation and accounting database

Tables II.1–II.8 include the information to be included in the compilation and accounting database for Ireland. Data shown are from the Party's annual submission, including the latest revised estimates submitted, adjustments (if applicable) and the final data to be included in the compilation and accounting database.

Table II.1
Information to be included in the compilation and accounting database for 2020, including on the commitment period reserve, for Ireland
(t CO_2 eq)

	Original submission	*Revised submission*	*Adjustment*	*Final value*
CPR	309 167 903			309 167 903
Annex A emissions				
CO_2	35 153 202	–	–	35 153 202
CH_4	15 226 568	–	–	15 226 568
N_2O	6 868 234	–	–	6 868 234
HFCs	694 170	–	–	694 170
PFCs	70 217	–	–	70 217
Unspecified mix of HFCs and PFCs	NO	–	–	NO
SF_6	18 487	–	–	18 487
NF_3	1 462	–	–	1 462
Total Annex A sources[a]	**58 032 341**	–	–	**58 032 341**
Activities under Article 3, paragraph 3, of the Kyoto Protocol				
AR	–3 233 330	–	–	–3 233 330
Deforestation	293 753	–	–	293 753
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				
FM	302 338	–	–	302 338
CM	–105 238	–	–	–105 238
CM for the base year	–96 990	–	–	–96 990
GM	6 491 149	–	–	6 491 149
GM for the base year	6 988 576	–	–	6 988 576

[a] The sum of the values for the individual gases and groups of gases may not match the total owing to rounding.

Table II.2
Information to be included in the compilation and accounting database for 2019 for Ireland
(t CO_2 eq)

	Original submission	*Revised submission*	*Adjustment*	*Final value*
Annex A emissions				
CO_2	37 325 663	–	–	37 325 663
CH_4	15 048 013	–	–	15 048 013
N_2O	6 867 216	–	–	6 867 216
HFCs	819 119	–	–	819 119
PFCs	63 052	–	–	63 052
Unspecified mix of HFCs and PFCs	NO	–	–	NO
SF_6	33 568	–	–	33 568
NF_3	1 381	–	–	1 381
Total Annex A sources[a]	**60 158 014**	**–**	**–**	**60 158 014**

	Original submission	*Revised submission*	*Adjustment*	*Final value*
Activities under Article 3, paragraph 3, of the Kyoto Protocol				
AR	–2 936 779	–	–	–2 936 779
Deforestation	266 542	–	–	266 542
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				
FM	117 645	–	–	117 645
CM	–134 241	–	–	–134 241
CM for the base year	–96 990	–	–	–96 990
GM	6 637 946	–	–	6 637 946
GM for the base year	6 988 576	–	–	6 988 576

[a] The sum of the values for the individual gases and groups of gases may not match the total owing to rounding.

Table II.3
Information to be included in the compilation and accounting database for 2018 for Ireland
(t CO_2 eq)

	Original submission	*Revised submission*	*Adjustment*	*Final value*
Annex A emissions				
CO_2	39 012 368	–	–	39 012 368
CH_4	15 456 873	–	–	15 456 873
N_2O	7 262 921	–	–	7 262 921
HFCs	837 836	–	–	837 836
PFCs	49 859	–	–	49 859
Unspecified mix of HFCs and PFCs	NO	–	–	NO
SF_6	40 918	–	–	40 918
NF_3	1 321	–	–	1 321
Total Annex A sources[a]	**62 662 098**	**–**	**–**	**62 662 098**
Activities under Article 3, paragraph 3, of the Kyoto Protocol				
AR	–3 062 961	–	–	–3 062 961
Deforestation	275 870	–	–	275 870
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				
FM	218 200	–	–	218 200
CM	–194 863	–	–	–194 863
CM for the base year	–96 990	–	–	–96 990
GM	6 641 581	–	–	6 641 581
GM for the base year	6 988 576	–	–	6 988 576

[a] The sum of the values for the individual gases and groups of gases may not match the total owing to rounding.

Table II.4
Information to be included in the compilation and accounting database for 2017 for Ireland
(t CO_2 eq)

	Original submission	*Revised submission*	*Adjustment*	*Final value*
Annex A emissions				
CO_2	39 078 033	–	–	39 078 033
CH_4	15 148 974	–	–	15 148 974
N_2O	6 915 013	–	–	6 915 013
HFCs	1 150 157	–	–	1 150 157
PFCs	47 195	–	–	47 195
Unspecified mix of HFCs and PFCs	NO	–	–	NO
SF_6	39 212	–	–	39 212
NF_3	1 261	–	–	1 261
Total Annex A sources[a]	**62 379 847**	**–**	**–**	**62 379 847**

	Original submission	*Revised submission*	*Adjustment*	*Final value*
Activities under Article 3, paragraph 3, of the Kyoto Protocol				
AR	–3 254 387	–	–	–3 254 387
Deforestation	283 016	–	–	283 016
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				
FM	479 848	–	–	479 848
CM	–88 737	–	–	–88 737
CM for the base year	–96 990	–	–	–96 990
GM	6 709 035	–	–	6 709 035
GM for the base year	6 988 576	–	–	6 988 576

[a] The sum of the values for the individual gases and groups of gases may not match the total owing to rounding.

Table II.5
Information to be included in the compilation and accounting database for 2016 for Ireland
(t CO_2 eq)

	Original submission	*Revised submission*	*Adjustment*	*Final value*
Annex A emissions				
CO_2	40 369 543	–	–	40 369 543
CH_4	14 735 235	–	–	14 735 235
N_2O	6 579 693	–	–	6 579 693
HFCs	1 235 970	–	–	1 235 970
PFCs	37 357	–	–	37 357
Unspecified mix of HFCs and PFCs	NO	–	–	NO
SF_6	39 294	–	–	39 294
NF_3	961	–	–	961
Total Annex A sources[a]	**62 998 053**	**–**	**–**	**62 998 053**
Activities under Article 3, paragraph 3, of the Kyoto Protocol				
AR	–3 527 738	–	–	–3 527 738
Deforestation	361 966	–	–	361 966
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				
FM	–40 405	–	–	–40 405
CM	–109 700	–	–	–109 700
CM for the base year	–96 990	–	–	–96 990
GM	6 517 519	–	–	6 517 519
GM for the base year	6 988 576	–	–	6 988 576

[a] The sum of the values for the individual gases and groups of gases may not match the total owing to rounding.

Table II.6
Information to be included in the compilation and accounting database for 2015 for Ireland
(t CO_2 eq)

	Original submission	*Revised submission*	*Adjustment*	*Final value*
Annex A emissions				
CO_2	38 718 040	–	–	38 718 040
CH_4	14 346 447	–	–	14 346 447
N_2O	6 473 481	–	–	6 473 481
HFCs	1 164 172	–	–	1 164 172
PFCs	20 497	–	–	20 497
Unspecified mix of HFCs and PFCs	NO	–	–	NO
SF_6	44 487	–	–	44 487
NF_3	961	–	–	961
Total Annex A sources[a]	**60 768 086**	**–**	**–**	**60 768 086**

	Original submission	*Revised submission*	*Adjustment*	*Final value*
Activities under Article 3, paragraph 3, of the Kyoto Protocol				
AR	–3 505 503	–	–	–3 505 503
Deforestation	1 346 099	–	–	1 346 099
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				
FM	–276 150	–	–	–276 150
CM	–89 899	–	–	–89 899
CM for the base year	–96 990	–	–	–96 990
GM	6 524 492	–	–	6 524 492
GM for the base year	6 988 576	–	–	6 988 576

[a] The sum of the values for the individual gases and groups of gases may not match the total owing to rounding.

Table II.7
Information to be included in the compilation and accounting database for 2014 for Ireland
(t CO_2 eq)

	Original submission	*Revised submission*	*Adjustment*	*Final value*
Annex A emissions				
CO_2	36 853 014	–	–	36 853 014
CH_4	13 828 295	–	–	13 828 295
N_2O	6 408 757	–	–	6 408 757
HFCs	1 183 703	–	–	1 183 703
PFCs	3 563	–	–	3 563
Unspecified mix of HFCs and PFCs	NO	–	–	NO
SF_6	37 406	–	–	37 406
NF_3	961	–	–	961
Total Annex A sources[a]	**58 315 699**	**–**	**–**	**58 315 699**
Activities under Article 3, paragraph 3, of the Kyoto Protocol				
AR	–3 282 186	–	–	–3 282 186
Deforestation	261 003	–	–	261 003
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				
FM	–235 191	–	–	–235 191
CM	–84 136	–	–	–84 136
CM for the base year	–96 990	–	–	–96 990
GM	6 577 123	–	–	6 577 123
GM for the base year	6 988 576	–	–	6 988 576

[a] The sum of the values for the individual gases and groups of gases may not match the total owing to rounding.

Table II.8
Information to be included in the compilation and accounting database for 2013 for Ireland
(t CO_2 eq)

	Original submission	*Revised submission*	*Adjustment*	*Final value*
Annex A emissions				
CO_2	37 281 750	–	–	37 281 750
CH_4	13 717 903	–	–	13 717 903
N_2O	6 678 704	–	–	6 678 704
HFCs	1 106 426	–	–	1 106 426
PFCs	8 324	–	–	8 324
Unspecified mix of HFCs and PFCs	NO	–	–	NO
SF_6	43 551	–	–	43 551
NF_3	901	–	–	901
Total Annex A sources[a]	**58 837 559**	**–**	**–**	**58 837 559**

	Original submission	*Revised submission*	*Adjustment*	*Final value*
Activities under Article 3, paragraph 3, of the Kyoto Protocol				
AR	–3 698 965	–	–	–3 698 965
Deforestation	1 065 056	–	–	1 065 056
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				
FM	–3 878	–	–	–3 878
CM	–30 375	–	–	–30 375
CM for the base year	–96 990	–	–	–96 990
GM	6 561 827	–	–	6 561 827
GM for the base year	6 988 576	–	–	6 988 576

[a] The sum of the values for the individual gases and groups of gases may not match the total owing to rounding.

Annex III

Additional information to support findings in table 2

Missing categories that may affect completeness

The categories for which estimation methods are included in the 2006 IPCC Guidelines that were reported as "NE" or for which the ERT otherwise determined that there may be an issue with the completeness of the reporting in the Party's inventory are the following:

(a) 1.B.2 oil, natural gas and other emissions from energy production – gaseous fuels (CH_4) (see ID# E.15 in table 5);

(b) 4.C.2 land converted to grassland (CO_2) (see ID# L.1 in table 3);

(c) 5.D.1 domestic wastewater (CH_4 and N_2O) (see ID# W.6 in table 3).

Annex IV

Reference documents

A. Reports of the Intergovernmental Panel on Climate Change

IPCC. 2006. *2006 IPCC Guidelines for National Greenhouse Gas Inventories*. S Eggleston, L Buendia, K Miwa, et al. (eds.). Hayama, Japan: Institute for Global Environmental Strategies. Available at http://www.ipcc-nggip.iges.or.jp/public/2006gl.

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IPCC. 2014. *2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands*. T Hiraishi, T Krug, K Tanabe, et al. (eds.). Geneva: IPCC. Available at https://www.ipcc.ch/publication/2013-supplement-to-the-2006-ipcc-guidelines-for-national-greenhouse-gas-inventories-wetlands/.

B. UNFCCC documents

Annual review reports

Reports on the individual reviews of the 2014, 2015, 2016, 2018 and 2020 annual submissions of Ireland, contained in documents FCCC/ARR/2014/IRL, FCCC/ARR/2015/IRL, FCCC/ARR/2016/IRL, FCCC/ARR/2018/IRL and FCCC/ARR/2020/IRL respectively.

Other

Aggregate information on greenhouse gas emissions by sources and removals by sinks for Parties included in Annex I to the Convention. Note by the secretariat. Available at Available at https://unfccc.int/documents/510888.

Annual status report for Ireland for 2022. Available at https://unfccc.int/sites/default/files/resource/asr2022_IRL.pdf.

C. Other documents used during the review

Responses to questions during the review were received from Paul Duffy (EPA), including additional material on the methodology and assumptions used. The following references may not conform to UNFCCC editorial style as some have been reproduced as received:

COFORD, (2021). All Ireland Roundwood Production Forecast 2021-2040 - Methodology. COFORD, Kildare St. Dublin 2.

Crutzen, P., Aselmann, I. and Seiler, W. (1986) Methane production by domestic animals, wild ruminants, other herbivorous fauna, and humans. Tellus B: Chemical and Physical Meteorology, volume 38:3–4, pages 271–284. Available at: https://doi.org/10.3402/tellusb.v38i3-4.15135.

EPA (2022), 2022 Informative Inventory Report, available at: https://www.epa.ie/publications/monitoring--assessment/climate-change/air-emissions/Ireland-IIR-2022_mergev2.pdf.

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O'Mara, F., (2006). Development of Emission Factors for the Irish Cattle Herd. Environmental Protection Agency, Johnstown Castle, Wexford, Ireland. Available at Search Results | Environmental Protection Agency (epa.ie).

O'Regan, F., (2022). Test Report. Department of Agriculture and Food, Young's Cross, Calbridge, Ireland.

Scott, N.A., Tate, K.R., Giltrap, D.J., Tattersall Smith, C., Wilde, R.H., Newsome, P.F.J. and Davis, M.R., (2002). Monitoring land-use change effects on soil carbon in New Zealand: quantifying baseline soil carbon stocks. Environmental Pollution, volume 116, pages S167-S180.

Tate, K. R., Scott, N. A., Saggar, S., Giltrap, D. J., Baisden, W. T., Newsome, P. F., Trotter, C. M. and Wilde, R. H., (2003). Land-use change alters New Zealand's terrestrial carbon budget: uncertainties associated with estimates of soil carbon change between 1990–2000. Tellus B, volume 55, pages 364-377.

Wellock M, Laperle C and Kiely G., (2011). What is the impact of afforestation on the carbon stocks of Irish mineral soils? Forest Ecology and Management, volume 262, pages 1589-1596.

Wilson, D., Dixon, S., Artz, R., Smith, T., Evans, C., Owen, H., Archer, E. and Renou-Wilson, F., (2015). Derivation of greenhouse gas emission factors for peatlands managed for extraction in the Republic of Ireland and the United Kingdom. Biogeosciences, volume 12, pages 5291–5308.

Xu, X., Liu, W., Zhang, C. and Kiely, G., (2011). Estimation of soil organic carbon stock and its spatial distribution in the Republic of Ireland. Soil Use and Management, volume 27(2), pages 156-162.