



Verification Report of the 2024 Key Performance Indicators Report of Uruguay's Sovereign Sustainability-Linked Bond.

May 2026



Verification Report of the 2024 Key Performance Indicators Report of Uruguay's Sovereign Sustainability-Linked Bond

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Introduction

Pursuant to the signing of the Agreement for the provision of development services dated September 19, 2022 (hereinafter, the Agreement), the Government of Uruguay requested the United Nations Development Programme (UNDP) to fulfill the role of external verifier of the key performance indicators (KPIs) included in the Sovereign Sustainability-Linked Bond (SSLB) Framework¹ published in September 2022.

In May 2023, UNDP published the first verification report² for KPI-1 and KPI-2 presented in the 2020-2021 KPI Report for the SSLB (2020-2021 KPIR). In May 2024 UNDP published the second KPI-1 verification report³ presented in the 2022 Indicator Report for the 2022 SSLB (2022 KPIR), and in May 2025, the third KPI-1 verification report⁴ presented in the 2022 Indicator Report for the 2023 SSLB (2023 KPIR).

During 2026, UNDP carried out the verification process of KPI-1 presented in the 2024 KPI Report for the SSLB (2024 KPIR) dated March 2026, and calculated on the basis of the SSLB Emissions Report (EMR time series 1990-2024, hereinafter, EMR)⁵. As the estimation frequency of KPI-2 is every four years, the 2024 KPIR does not contain a recalculation for this indicator.

The EMR and 2024 KPIR were provided to UNDP by the Government of Uruguay between January and April 2026, according to schedule, together with the following documents and files:

- Database with the information needed to calculate the KPIs; SSLB KPIR spreadsheet-version 2026.03.30
- Compiled methodological note on the estimation of greenhouse gas emissions for the preparation of the EMR;
- EMR auxiliary spreadsheets (quality control spreadsheets, recalculations and sectoral spreadsheets);
- KPI-1 GHG emissions estimates included in IPCC inventory software v 2.95; for the Industrial Processes and Waste sector and version 2.691 for the Energy and Agriculture sector.

The Government of Uruguay is responsible for the preparation of the 2024 KPIR, the EMR time series 1990-2024, and the other documents, database and files provided to UNDP.

As per the Agreement, the Government of Uruguay warrants to UNDP the accuracy, integrity, quality, reliability and completeness of all technical data, files, documents, test data, sample results, emission reports, databases or sheets, KPI value calculations

¹ Available at: http://sslburuguay.mef.gub.uy/innovaportal/file/30690/20/uruguay_sslb_framework_2.pdf

² Available at: https://www.undp.org/es/uruguay/projects/verificacion_externa_BIICC

³ Available at: https://www.undp.org/es/uruguay/projects/verificacion_externa_BIICC

⁴ Available at: https://www.undp.org/es/uruguay/projects/verificacion_externa_BIICC

⁵ Available at: <http://sslburuguay.mef.gub.uy/30672/20/areas/reporting-methodology-and-sslb-annual-report.html>



and technical records, as well as any other data and materials made available to UNDP pursuant to the Agreement.

Scope of verification

The verification carried out in 2026 includes the key performance indicator KPI-1 included in the Sovereign Sustainability-Linked Bond (SSLB) Framework published in September 2022 and reported in the 2024 KPIR dated March 2026 prepared by the Government of Uruguay:

KPI-1: Reduction of aggregate gross CO₂, N₂O and CH₄ emissions (in CO₂eq) per real GDP unit with respect to reference year 1990 (in %). For the calculation of this KPI, the emissions are those reported in the December 2025 EMR, which exclusively considers the emissions corresponding to the gases, sectors, categories and sources estimated and reported in the 2012 National Greenhouse Gas Inventory (NGHGI), on which the 2017 Nationally Determined Contribution's emissions intensity reduction commitment was established. For real GDP, the latest official series published by the National Accounts System (SCN, according to the Spanish acronym "Sistema de Cuentas Nacionales") of the Central Bank of Uruguay (BCU, according to the Spanish acronym "Banco Central de Uruguay") in March 2026 is used, retropolated to 1990 using the variation rate method as a statistical splicing technique.

For the 2024 KPIR there is no verification of as the estimation frequency of KPI-2 is every four years and the Agreement establishes that the external verification process of KPI-2 is carried out every four years, and it was carried out for the year 2021 contained in the 2020-2021 KPIR.

Verification Methodology

The technical review of the SSLB EMR time series 1990-2024 of CO₂, CH₄ and N₂O from Energy, Industrial Processes, Agriculture and Waste Sectors is conducted according to the methodology contained in the United Nations Framework Convention on Climate Change's (UNFCCC) Guide for Peer Review of National Greenhouse Gas Inventories (NGHGI), specifically concluding on:

- i. adherence to the 2006 Intergovernmental Panel on Climate Change (IPCC) Guidelines for National Greenhouse Gas Inventories;
- ii. whether the key Inventory requirements of Decisions 17/CP.8 (UNFCCC, 2002), 2/CP.17 (UNFCCC, 2011) and 18/CMA.1 (UNFCCC, 2018) are met, when applicable;
- iii. the quality of the EMR, assessed primarily through the review of inventory principles, Transparency, Accuracy, Consistency, Comparability and Completeness (TACCC principles), TACCC established for reporting in the IPCC 2000 and 2003 Good Practice Guidance and also incorporated into the 2006 IPCC Guidelines;



- iv. the relevance and quality of the revision of historical GHG emission values, derived from inventory adjustments, including additional data sources and recalculations due to methodological improvements.

Also, the application of the calculation methodology for KPI-1 established in the SSLB framework is verified. Methodologies are presented in detail in the corresponding technical sheets: Technical Data Sheet for KPI-1⁶ and Technical Data Sheet for Real GDP series⁷.

Declaration of Competence and Independence

The verification activities were carried out between January and May 2026 by a qualified, multidisciplinary team of UNDP experts with wide experience in technical review of NGHGI.

The verification complied with the requirements of independence, impartiality and other ethical requirements established in the UNDP Code of Ethics, which is based on the principles of integrity, accountability, transparency, professionalism, mutual respect and results orientation.

Activities performed

The technical review of the CO₂, N₂O and CH₄ emission estimates of KPI-1 was carried out according to the methodology of the United Nations Framework Convention on Climate Change (UNFCCC) Guidelines for the Peer Review of National Greenhouse Gas Inventories (NGHGI).

The following documents provided by the Government of Uruguay were analyzed: EMR time series 1990-2024, database with the information needed to calculate the KPIs, KPIR Excel spreadsheet version 2026.03.30, methodological note on the estimation of greenhouse gas emissions for EMR preparation; EMR auxiliary spreadsheets (quality control spreadsheets, recalculations and sectoral spreadsheets); KPI-1 GHG emissions estimates included in IPCC inventory software v 2.95 for the Industrial Processes and Waste sector and version 2.691 for the Energy and Agriculture sector.

The calculation of the KPI-1 indicator contained in the 2024 KPIR was reviewed, replicating its calculation according to the methodology described in the technical data sheet of KPI-1, Gross aggregate GHG emissions intensity/GDP.

For the revision of real GDP, its calculation was replicated using the methodology described in the technical data sheet Real Gross Domestic Product Series for Uruguay at constant prices since 1990.

⁶ Available at: <http://sslburuguay.mef.gub.uy/innovaportal/file/30671/19/technical-data-sheet-co2-equivalent-english.pdf>

⁷ Available at: <http://sslburuguay.mef.gub.uy/innovaportal/file/30671/19/technical-data-sheet-real-gdp-english.pdf>



Virtual consultations were held with those responsible for preparing the reports, from the NGHG Inventory Working Group and the pMRV Working Group of the National Climate Change Response System.

The technical review reports of the SSLB EMR and SSLB KPIR are presented in the Annex⁸ of this report.

Verification Results

KPI-1

Transparency, Completeness, Consistency, Comparability, and Accuracy

KPI-1 estimation **complies with the principles of quality in terms of Transparency, Completeness, Consistency, Comparability, and Accuracy**, established for reporting in the Good Practice Guidance incorporated into the 2006 IPCC Guidelines. In the next paragraphs, the compliance with each principle is explained:

- KPI-1 2024 **complies with the principle of transparency**, as the SSLB EMR (1990-2024) and its methodological note present sufficient detailed and clear documentation so that it is possible to understand how emissions were estimated, including the sources of information, assumptions, expert opinion, and methodologies used, as well as the processes and justification for the selection of methodologies. The SSLB EMR includes sufficient and clear documentation to enable the understanding of the circumstances in each sector and their accurate reflection in KPI-1 2024.
- KPI-1 2024 **complies with the principle of completeness**, as the scope of KPI-1 2024 is clearly defined and aligned with the scope of Uruguay's first NDC. The emissions estimates presented in the SSLB EMR (1990-2024) effectively cover all gases, sources, and categories within the scope of the KPI-1 2024 and cover the full time series from 1990 to 2024. Any exclusion of emissions from the SSLB EMR (1990-2024) with respect to Uruguay's NGHGI is clearly identified, and therefore, no omissions are identified in KPI-1 2024.
- KPI-1 2024 **complies with the principle of consistency**, as the same methods and data sources are used for the estimation of emissions for the different years, gases, and categories, using appropriate splicing techniques in accordance with the 2006 IPCC Guidelines. Recalculations are properly performed according to IPCC good practices under a continuous improvement framework.
- KPI-1 2024 **complies with the comparability principle**, as the estimation of emissions covered by the KPI-1 2024 fully employs the guidance, classifications, definitions, methodologies and reporting formats of the 2006 IPCC Guidelines. The

⁸ Annex:

- Technical review of the Emissions Report (EMR) and the KPIs Report (KPIR) for the KPI-1 of the Sovereign Sustainability-Linked Bond (SSLB) of Uruguay



SSLB EMR 1990-2024 is comparable with Uruguay's NGHGI in terms of definitions, nomenclature, assumptions, data sources, methodology and categorization of gases and sources by category, clearly indicating any deviation in the scope of the KPI-1 2024 with respect to the NGHGI.

- KPI-1 **complies with the accuracy principle**, as KPI-1 2024 contains no under- or over-estimates by using appropriate methods from the 2006 IPCC Guidelines with high quality country-specific data and default emission factors appropriate to the circumstances in Uruguay, incorporating improvements in data quality as they become available and performing time series recalculations as appropriate.

Requirements for the Inventories under Decisions 17/CP.8 and 18/CMA.1

The EMR time series 1990-2024 of KPI-1 2024 **fully complies with the fundamental inventory requirements included in Decisions 17/CP.8 and 18/CMA.1⁹**, as detailed below:

- The SSLB EMR 1990-2024 of the KPI-1 2024 complies with the requirements of the NGHGI of national communications as stipulated in paragraphs 6-24 of Decision 17/CP.8 'Guidelines for the preparation of national communications from Parties not included in Annex I to the Convention'.
- The SSLB EMR 1990-2024 of KPI-1 2024 fulfils the requirements for NGHGI reporting of the biennial transparency reports, as defined in paragraphs 17-58 of Decision 18/CMA.1 'Modalities, procedures and guidelines for the transparency framework for action and support referred to in Article 13 of the Paris Agreement'.

Compliance with the 2006 IPCC Guidelines for the Development of National Greenhouse Gas Inventories

The emissions covered by KPI-1 comply with all good practices of the 2006 IPCC Guidelines at cross-sectoral and cross-cutting level concerning data collection, method selection, verification processes, documentation processes, and recalculations. Furthermore, the SSLB EMR and the development of KPI-1 comply with sector-specific good practices for the Energy sector, the Industrial Processes sector, the Agriculture sector and the Waste sector.

The KPI-1 2024 estimation process **has a robust institutional framework** that enables effective planning, oversight, management, and implementation of annual KPI-1 estimation, including its documentation, archiving, quality control and technical review for continuous improvement, following the good practices of the 2006 IPCC Guidelines.

The KPI-1 2024 estimation process **demonstrates a strong commitment to continuous improvement enabled by a robust quality assurance and quality control system**. This system incorporates the review and recalculation of historical values to improve the quality of KPI-1 according to the good practices of the 2006 IPCC

⁹ Decision 18/CMA.1 applies as of December 2024

Guidelines, as methodological improvements and access to better quality data emerge. It also enables the planning of future improvements to the KPI-1 estimation process.

This continuous improvement is reflected in several elements incorporated into the SSLB EMR 1990–2024, such as editorial refinements that enhance the comprehensibility, readability, and appearance of the SSLB EMR and its methodological note, the use of the most up-to-date versions of the IPCC inventory software, the use of a bot for the automatic upload of National Energy Balance (BEN, in Spanish) data into the IPCC inventory software, the inclusion of the most up-to-date BEN as activity data for the energy sector, the refinement of activity data for the metals industry in collaboration with companies, and the calculation of emissions from solid waste disposal sites at the departmental level, capturing subnational differences in greater detail.

Application of the calculation methodology for KPI-1 established under the SSLB reporting framework

According to the review procedures carried out, KPI-1 2024 complies with the guidelines established in its technical data sheet, both in the selection of sources and in the application of the calculation methodology.

The technical review confirms that the real GDP series continuously covers the period 1990–2024 and incorporates values at constant 2016 prices, following the methodological approach defined by the Central Bank of Uruguay (BCU, in Spanish) for estimating real GDP; no abrupt jumps or obvious inconsistencies are identified in the real GDP series, and the year-on-year variations adequately reflect relevant economic events during the period, such as the COVID-19 crisis.

The calculation procedure followed in the Excel file is in accordance with the KPI-1 technical data sheet and reflects good practices in terms of transparency, traceability, and methodological consistency.

In summary, KPI-1 2024 has been correctly compiled, and the inputs used (emissions and real GDP) are consistent with official sources and with the methodologies defined in the technical reference documents.

Conclusions

In UNDP's opinion, KPI-1 reported in the 2024 Key Performance Indicators Report for the Sovereign Sustainability-Linked Bond has been prepared in accordance with the methodologies established in Uruguay's Sovereign Sustainability-Linked Bond (SSLB) Framework.

The Government of Uruguay submitted the Emissions Report 1990-2024 and the 2024 KPI Report, complying with the frequency and timelines established in the SSLB Framework.



KPI-1 adheres to the methodology and good practices established in the 2006 IPCC Guidelines for the preparation of National Greenhouse Gas Inventories and to the requirements of Decisions 17/CP.8 and 18/CMA.1.

The Emissions Report 1990-2024 and the 2024 KPI Report comply with the quality principles in terms of Transparency, Accuracy, Consistency, Comparability and Completeness established by the 2006 IPCC Guidelines.

The process of developing KPI-1 2024 reflects a commitment to continuous improvement through the integration of methodological advances, updated tools, process automation and better regional disaggregation of sectoral activity data into the SSLB EMR 1990–2024.

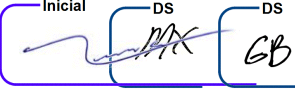
The institutional arrangements for inter-ministerial coordination through the SSLB, pMRV and NGHGI Working Groups of the National Climate Change Response System for the development of the SSLB EMR and SSLB KPIR follow the good practices outlined in the 2006 IPCC Guidelines, providing a robust institutional framework for the annual estimation of KPI-1 and ensuring the effective implementation of the reporting and verification processes established in the Framework for the issuance of the Sovereign Sustainability-Linked Bond.

DocuSigned by:

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For UNDP

Lyes Ferroukhi
Manager, Regional Hub for UNDP Latin America and the Caribbean
Panama City, May 14, 2026

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ANNEX

Technical review of the Emissions Report (EMR) and the Key Performance Indicators Report (KPIR) for the KP1-1 of the Sovereign Sustainability-Linked Bond (SSLB) of Uruguay

May 2026

Technical review of the Emissions Report (EMR) and the Key Performance Indicators Report (KPIR) for the KPI-1 of the Sovereign Sustainability-Linked Bond (SSLB) of Uruguay

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First edition, May 2026.

This report covers the technical review of the Emissions Report (EMR) and the Key Performance Indicators Report (KPIR) for the KPI-1 of the Sovereign Sustainability-Linked Bond (SSLB) of Uruguay and is part of the technical documents used for the preparation of the Verification Report prepared by UNDP on the 2024 KPI for the SSLB.

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Executive summary

The Oriental Republic of Uruguay has requested the United Nations Development Programme (UNDP) to act as the external verifier of the Key Performance Indicators (KPIs) of the Sovereign Sustainability-Linked Bond (SSLB). Within this framework, three external verifications of KPI-1 have been carried out and published, corresponding to the KPIs for the years 2020-2021, 2022, and 2023. The present review covers the evaluation of the most recent KPI-1, corresponding to the year 2024.

The KPI-1 of the SSLB:

- Presents the intensity of gross aggregate greenhouse gas (GHG) emissions with respect to the real gross domestic product (GDP), used to assess the reduction (in %) of aggregate carbon dioxide (CO₂), nitrous oxide (N₂O), and methane (CH₄) emissions expressed in carbon dioxide equivalent (CO₂e) emissions per unit of real GDP with respect to 1990.
- Employs the 100-year Global Warming Potential (GWP) metric established in the Fifth Assessment Report (AR5) of the Intergovernmental Panel on Climate Change (IPCC) to express the emissions of CO₂, N₂O, and CH₄ in CO₂e.
- Exclusively considers the emissions corresponding to the gases, sectors, categories, and sources estimated and reported in the national greenhouse gas inventory 1990-2012 (NGHGI 2012), from which the GHG emissions reduction commitments of the first Nationally Determined Contribution (NDC) of Uruguay were established in 2017.

The KPI-1 2024 is calculated based on the 1990-2024 GHG emissions encompassed in the Emissions Report (EMR) prepared in December 2025, which exclusively estimates the emissions over the 1990-2024 period corresponding to the gases, sectors, categories, and sources estimated and reported in the NGHGI 2012, from which the intensity reduction commitment of Uruguay's first NDC was established in 2017.

The KPI-1 2024 is also calculated based on the latest official GDP series published by the National Accounts System (SCN, according to the Spanish acronym "Sistema de Cuentas Nacionales") of the Central Bank of Uruguay (BCU, according to the Spanish acronym "Banco Central de Uruguay), back-casted to 1990 using the variation rate method as a statistical splicing technique. The GDP is based on 2016, and a back-casting of the series between 1990 and 2015 was performed by the Ministry of Economy and Finance using available public information of National Accounts published by the BCU. The calculation of KPI-1 2024 is reported under the Key Performance Indicators Report (KPIR) prepared in March 2026.

This document presents the results of the technical review of the EMR series 1990-2024 for the Energy, Industrial Processes, Agriculture and Waste sectors, as well as the results of the technical review of the KPIR of KPI-1 2024.



The technical review of the EMR series 1990-2024 followed the methodology of the United Nations Framework Convention on Climate Change (UNFCCC) Guidelines for the Peer Review of National Greenhouse Gas Inventories, to specifically draw conclusions on:

- The adherence to the 2006 IPCC Guidelines for the preparation of NGHGs.
- The fulfilment of the inventory requirements stipulated in Decision 17/CP.8 for national communications and Decision 18/CMA.1 for biennial transparency reports (BTRs).
- The quality of emissions reporting, assessed primarily through examination of the TACCC inventory principles set out under the Good Practice Guidance of the 2006 IPCC Guidelines, namely the principles of transparency, accuracy, completeness, consistency, and comparability.
- The relevance and quality of the recalculation of historical GHG emission values, derived from inventory adjustments, including additional data sources and methodological improvements.

During the months of January to March 2026, the technical review of GHG emission estimates for the 1990-2024 series of KPI-1 2024 under the Energy, Industrial Processes, Agriculture and Waste sectors was carried out using the following materials:

- EMR series 1990-2024, prepared by the NGHGI Group of the National System for Climate Change and Variability Response (SNRCC, according to the Spanish acronym “Sistema Nacional de Respuesta al Cambio Climático y Variabilidad”).
- Methodological note of the EMR series 1990-2024 (hereinafter referred to as “methodological note”).
- Auxiliary emissions calculation spreadsheets (quality control spreadsheets, recalculations, and sectoral spreadsheets).
- Emissions estimates in the IPCC v 2.95 inventory software for the Industrial Processes and Waste sector and v. 2.691 for the Energy and Agriculture sector.

The technical review concluded that the EMR series 1990-2024 for KPI-1 2024:

- Fully adheres to the quality principles of transparency, accuracy, completeness, consistency, and comparability.
- Fully adheres to the 2006 IPCC Guidelines.
- Adheres to the requirements of Decisions 17/CP.8 and 18/CMA.1.
- Has a robust quality control system and review process for historical values under a continuous improvement framework for the inclusion of enhancements and implementation of recalculations.

The technical review of the KPIR of KPI-1 2024 evaluated the application of the calculation methodology defined in the technical data sheets to calculate real GDP and KPI-1. Specifically, the review consisted of:



- Verifying the proper application by the BCU of the methodology for calculating real GDP according to the technical sheet “Uruguay's Real Gross Domestic Product Series at Constant Prices, since 1990” (“Serie del Producto Interno Bruto Real de Uruguay a Precios Constantes, desde 1990” in Spanish), and reproducing the calculation of real GDP following the established instructions to detect any discrepancies in the application of the methodology.
- Verifying the proper application of the methodology to calculate KPI-1 according to the technical sheet “Intensity of Gross Aggregate GHG Emissions/GDP” (“Intensidad de Emisiones Agregadas Brutas de GEI/PIB” in Spanish) and the technical sheet “Technical Sheet of KPI-1: Reduction in Gross Aggregate GHG Emissions per Unit of Real GDP, with Respect to 1990, Established in the SSLB framework” (“Ficha Técnica del KPI-1: Reducción de las Emisiones Brutas Agregadas de GEI por Unidad de PIB Real, con Respecto al Año 1990, Establecida en el Marco de Emisión del BIICC” in Spanish), and reproducing the corresponding calculations using the indicated methodology to detect any discrepancies in the application of the methodology.

The review was carried out during the second half of April 2026 using the following materials:

- KPIR of KPI-1 2024 prepared by the pMVR Group (programming, monitoring, reporting and verification group of the National System for Climate Change and Variability Response (SNRCC, according to the Spanish acronym “Sistema Nacional de Respuesta al Cambio Climático y Variabilidad”).
- KPI-1 Excel spreadsheet called “Cálculo KPIs BIICC 1990 - 2024 FINAL (2026.03.30)”.

The technical review of the KPIR of KPI-1 2024 concludes that:

- No deficiencies are detected in the methodology defined for calculating KPI-1 2024 or in the estimation of the real GDP.
- No errors are identified in the implementation of the KPI-1 2024 calculation methodology or in the process of calculating the real GDP.
- No discrepancies are detected when comparing the values of GHG emissions, GDP, and the KPI-1 2024 indicator across the Excel files, the EMR, and the KPIR.
- The KPI-1 2024 adequately reflects the annual economic and emissions trends and variations that represent the national context.
- Minor differences are identified in the historical real GDP series across previous versions of the KPI-1 calculation files (1990-2022, 1990-2023 and 1990-2024), attributable to statistical updates of the National Accounts System of the BCU, with no material impact on the calculation or interpretation of KPI-1.



Background

The Oriental Republic of Uruguay has implemented a pioneering framework for the issuance of a Sovereign Sustainability-Linked Bond (SSLB)¹⁰, a premium and penalty structure of symmetrical rates, linking the country's cost of capital to the achievement of its greenhouse gas (GHG) mitigation and native forest protection targets set out in the commitments adopted under the Paris Agreement. SSLB performance is monitored through two key performance indicators (KPIs) aligned with the objectives of Uruguay's first Nationally Determined Contribution (NDC) submitted to the United Nations Framework Convention on Climate Change (UNFCCC) in 2017, namely:

SSLB Indicator		SSLB Target	
KPI	Description	STP	Description
KPI 1	Reduction of aggregate gross GHG emissions (CO ₂ , CH ₄ , and N ₂ O) expressed in CO ₂ e per real gross domestic product (GDP) unit ¹¹ , with respect to the 1990 reference year (in %). ¹²	STP 1.1	<u>NDC commitment</u> : Achieve at least 50% reduction by 2025.
		STP 1.2	<u>Overperformance of NDC commitment</u> : Achieve a reduction of more than 52% by 2025.
KPI 2	Maintenance of native forest area (in hectares) with respect to the 2012 reference year (in %). ¹³	STP 2.1	<u>NDC commitment</u> : Maintain at least 100%.
		STP 2.2	<u>Overperformance of NDC commitment</u> : Achieve an increase higher than 3%.

The value of KPI-1 is measured annually with a one-year lag. Uruguay publishes annual SSLB reports no later than May 31st of the year after the KPI observation is made, supported by the emissions report (EMR) and the key performance indicators report (KPIR). Therefore, KPI-1 2024 is published in May 2026.

¹⁰ The SSLB framework is available at:

<http://sslburuguay.mef.gub.uy/30694/20/areas/framework-for-the-sovereign-issuance-of-sslb.html>

¹¹ The GDP technical fact sheet is available at: <https://sslburuguay.mef.gub.uy/innovaportal/file/30671/20/real-gdp-technical-data-sheet.pdf>

¹² The KPI-1 technical fact sheet is available at: <https://sslburuguay.mef.gub.uy/innovaportal/file/30671/20/co2-equivalent-technical-data-sheet.pdf>

¹³ The KPI-2 technical fact sheet is available at: <https://sslburuguay.mef.gub.uy/innovaportal/file/30671/20/native-forest-technical-data-sheet.pdf>



Under the SSLB verification framework, Uruguay conducts quality assurance and quality control defined by the Intergovernmental Panel on Climate Change (IPCC) as:

- **Quality Control (QC):** A system of routine technical activities implemented by the team elaborating the GHG estimates for the purpose of measuring and controlling the quality of the estimations as they are being conducted.
- **Quality Assurance (QA):** A planned system of review processes conducted by personnel not involved in the process of estimating the GHG emissions.

For quality control of the SSLB KPIs, internal sectoral reviews are carried out by each Ministry, whereby the Ministry of Environment also performs a global quality control of the estimates and reports.

Under the SSLB KPI quality assurance framework, Uruguay has requested the United Nations Development Programme (UNDP) to act as external verifier of the two KPIs on an annual basis. The quality assurance process is managed through UNDP by contracting external reviewers to perform the technical review of the KPIs.

Within this framework, three external verifications of KPI-1 have been carried out and published, corresponding to the KPIs for the years 2020-2021, 2022, and 2023. The present review covers the evaluation of the most recent KPI-1, corresponding to the year 2024.



Scope

This consultancy is part of the external verification activities carried out by the UNDP and specifically constitutes the annual technical review of KPI-1.

The annual external verification of KPI-1 focuses on the technical review of:

- SSLB Emissions Report (EMR) prepared by the National Greenhouse Gas Inventory (NGHGI) Group of the National System for Climate Change and Variability Response (SNRCC, according to the Spanish acronym “Sistema Nacional de Respuesta al Cambio Climático y Variabilidad”).
- SSLB KPIs Report (KPIR) containing the calculation of KPI-1, prepared by the pMRV (programming, Monitoring, Reporting, and Verification) Group of the SNRCC.

To support the technical review, the process also refers to:

- The methodological note on the estimation of GHG emissions for the preparation of the SSLB EMR (hereinafter referred to as “methodological note”).
- Auxiliary emissions calculation spreadsheets (quality control spreadsheets, recalculations, and sectoral spreadsheets).
- Emissions estimates in the IPCC v 2.95 inventory software for the Industrial Processes and Waste sector and v. 2.691 for the Energy and Agriculture sector.
- KPI-1 Excel spreadsheet called “Cálculo KPIs BIICC 1990 - 2024 FINAL (2026.03.30)”.

This document summarizes the findings of the technical review of the EMR series 1990-2024 covering the review of Cross-Cutting Aspects, and the Energy, Industrial Processes, Agriculture and Waste sectors associated with the development of KPI-1 2024. Likewise, this document details the technical review of the KPIR of KPI-1 2024, a metric that assesses the reduction (in %) with respect to 1990 of gross aggregate CO₂, N₂O and CH₄ emissions in CO₂e estimated under the EMR per unit of real GDP emitted by the Central Bank of Uruguay (BCU, according to the Spanish acronym “Banco Central de Uruguay”).

The KPI-1 exclusively considers the GHG emissions corresponding to the gases, sectors, categories, and sources estimated and reported in the 2012 national greenhouse gas inventory (NGHGI 2012), on which the emissions intensity reduction commitment of the first NDC of Uruguay was established covering emissions of three direct GHGs (CO₂, CH₄ and N₂O) from the Energy, Industrial Processes, Agriculture, and Waste sectors.

The NGHGI 2012 was prepared based on the Revised 1996 IPCC Guidelines, which provided methodologies for estimating GHG emissions from the following sectors: Energy, Industrial Processes, Solvent Use and Use of Other Products, Agriculture, Land Use and Land Use Change and Forestry, and Waste.

Uruguay adopted the 2006 IPCC Guidelines to prepare the national GHG inventory starting from the NGHGI 2014 onwards, estimating emissions derived from the Energy, Industrial Processes and Product Use, Agriculture, Forestry and Other Land Use, and Waste sectors. The change in the Guidelines not only implied a change in the denomination of the sectors, but



also the incorporation of new gases, categories, and emission sources with respect to those encompassed by the first NDC of Uruguay.

In addition, due to the continuous improvement process of the Uruguayan GHG inventory system, categories and gases that were not estimated in the NGHGI 2012 to establish the NDC commitments are currently estimated under recent editions of the NGHGI. Therefore, KPI-1 only considers direct GHG emissions of CO₂, CH₄ and N₂O from the categories covered by NGHGI 2012. Direct GHG emissions of HFCs, PFCs, and SF₆, indirect or precursor GHGs (CO, NO_x, NMVOC and SO₂), as well as any other categories included and estimated in Uruguay's national inventories subsequent to the NGHGI 2012 are outside the scope of the KPI-1.

This means that the SSLB EMR does not correspond to Uruguay's national GHG inventory and thus requires its own quality assurance and control processes under the KPI-1 framework.

On the other hand, the KPI-1 is also calculated using the real GDP with base year 2016, calculated by the Ministry of Economy and Finance using the latest official GDP series published by the System of National Accounts (SCN, according to the Spanish acronym "Sistema de Cuentas Nacionales") of the Central Bank of Uruguay (BCU, according to the Spanish acronym "Banco Central de Uruguay). The series has been back-casted to 1990 using the variation rate method as a statistical technique for linking historical series. As such, the calculation of the real GDP used also requires its own quality assurance and control processes under the framework of KPI-1.



Methodology of the technical review

Technical review of the EMR series 1990-2024

This document presents the results of the technical review of the EMR series 1990-2024 covering the review of Cross-Cutting Aspects, as well as the Energy, Industrial Processes, Agriculture and Waste sectors associated with the elaboration of the KPI-1 2024.

The technical review was conducted during the months of January to March 2026 by international reviewers in collaboration with the UNDP and in consultation with sectoral stakeholders involved in the compilation of the EMR series 1990-2024.

The approach of the technical review followed the methodology of the UNFCCC Guidelines for Peer Review of NGHGs. The technical review evaluated the estimation of GHG emissions for the 1990-2024 series for the sectors, categories, sources, and gases included in KPI-1 according to the following criteria:

- The adherence to the 2006 IPCC Guidelines for the preparation of NGHGs.
- The fulfilment of the TACCC principles set out in the Good Practice Guidance incorporated in the 2006 IPCC Guidelines, taking into account the methods, activity data, emission factors, and parameters used, and the estimated emissions:
 - Transparency: Verify whether there is sufficient documentation and clear references to understand how the GHG emissions estimate for KPI-1 was conducted.
 - Completeness: Confirm if all gases and all relevant emissions categories of KPI-1 are included throughout the national territory, whether notation keys are used appropriately, and how the absence of estimates is justified.
 - Consistency: Assess the consistency of estimates between different years, gases, and categories, including the review and recalculation of historical values, and verifying whether annual trends are calculated using the same method and the same data sources in all years, without being subject to changes resulting from methodological differences.
 - Comparability: Confirm if the guidelines, classifications, definitions, methodologies, and values of the 2006 IPCC Guidelines are used.
 - Accuracy: Assess whether each sector contains over- nor under-estimations of GHG emissions.
- The relevance and quality of the revision and recalculations of historical GHG emission values, derived from inventory adjustments, including additional data sources and methodological improvements.



- The fulfilment of the fundamental requirements for GHG inventories stipulated in Decision 17/CP.8 for national communications and Decision 18/CMA.1 for biennial transparency reports (BTRs).¹⁴

In each category included in KPI-1, the following aspects were reviewed:

- **Method:** An evaluation was conducted on what information was collected, how the data was obtained, and what methods were used. The evaluation also assessed whether the best method was used for each category, according to the available information and whether the assumptions used in the cases that were used are appropriate. The methodological and data changes in EMR series 1990-2024 that presented divergences with respect to the EMR series 1990-2023 were verified and how the recalculations were justified and carried out. The emissions estimation methodologies used and the adequacy of the methodological level (tier) to the relative weight of the category in the overall inventory, the emission factors applied and their comparison with the default emission factors, the completeness and consistency of the emission data series, the interannual differences in emissions, and the justifications provided were evaluated. This determined the degree of quality related to the inclusion of the best possible emission estimates, given the current state of scientific knowledge and data availability.
- **Activity data:** Activity data at the national level was reviewed. The comparability in magnitude with respect to international parameters was reviewed and it was assessed whether the time series data are consistent by, in particular, observing the presence of outliers. The assumptions and criteria for the selection of activity data was reviewed, as well as the consistency of the data across categories. The temporal consistency in the input data for each category was verified, as well as the consistency in the method used for the calculations. At the same time, any unusual or unexplained trends reported for the activity data or other parameters across the time series was checked. The level of quality control performed by the stakeholders responsible for the preparation of the NGHGI was reviewed. Alternative data sources, such as data presented in the national energy balance, were considered, comparing activity data from multiple references whenever possible.
- **Emission factors:** The use of default IPCC tier 1 emission factors was assessed. It was determined whether appropriate emission factors were used and the justifications for their use. The relevance of the IPCC default factors as well as country-specific factors were assessed by reviewing the quality of the data used and comparing them with the IPCC default values. The emission factors used were also compared with those of other Latin American countries which have submitted their BTRs. Consistency was additionally evaluated through the time series, and the value of the implied emission

¹⁴ The two first external reviews of the KPI-1 2020-2021 and the KPI-1 2022 also assessed adherence to the national GHG inventory reporting requirements under the biennial update reports (BURs) stipulated in Decision 2/CP.17. Under the enhanced transparency framework of the Paris Agreement, the BURs have been replaced by the BTRs as of 31 December 2024, which implies stricter reporting requirements for Uruguay, as a Party to the Paris Agreement. In this sense, Decision 2/CP.17 no longer applies to Uruguay. Therefore, the external review process of KPI-1, from KPI-1 2023 onwards, focuses solely on adherence to Decisions 17/CP.8 and 18/CMA.1, given that these are the two GHG inventory reporting requirements currently in force for Uruguay.



factors (aggregate emissions divided by the activity data) were verified through the time series.

- Parameters: The use of IPCC default parameters was evaluated, and the justification of the values used was checked in order to assess transparency. Parameters that are common among various categories were identified in order to verify consistency. It was verified that the same data set is used for categories that share common data.
- Emissions: The manner in which the data was documented, the calculation tools used in the development of emissions estimates, and the systems for producing the information and disaggregated data were evaluated. The completeness of the categories in the 1990-2024 series was verified. It was verified whether the estimates are presented for all categories present in the country which are included in KPI-1. It was verified whether there is a clear definition of the “Other” type categories. It was also checked that data whose unavailability is known, resulting in incomplete emissions estimates for a category, were documented (e.g., subcategories classified as “not estimated”). Estimates for each category were compared over the 1990-2024 series. If there were significant changes or deviations from expected trends, the estimates were rechecked, and the relevant stakeholders were asked to provide explanations for the differences. The consistency of the time series was assessed by further reviewing significant changes (>10%) in annual estimates for categories and subcategories and their justifications. Estimates made with top-down and bottom-up approaches were compared to verify that they were of similar orders of magnitude. It was verified that emissions are reported consistently, in terms of significant digits or decimal places, in the categories and that emissions data are aggregated correctly from the lowest to the highest reporting levels. Estimates were compared with other national or international estimates at the sector, sub-sector, gas, or national level, where possible. Intensity indicators were compared between countries of similar circumstances in order to check the accuracy of emissions. Measurements of biogas recovery at landfills were also reviewed and documentation and justification for any significant discrepancies were verified.

For each of the elements described above, it was evaluated whether:

- There is deviation from the general good practices of the IPCC.
- There are problems of transparency, accuracy, consistency, comparability, or completeness.
- There is satisfactory compliance with the requirements and reporting suggestions established both for the submission of national communications under Decision 17/CP.8, as well as for the submission of the Biennial Transparency Reports (BTRs) under the Paris Agreement’s modalities, procedures and guidelines (MPGs) as stipulated in Decision 18/CMA.1. A requirement is any provision drafted with the auxiliary “shall”, whereas a suggestion is understood to be any provision drafted with the auxiliary “should” or with the verb “may” and “encourages”.



It should be noted that the scope of the technical review carried out is similar to the reviews officially carried out by the UNFCCC for the inventories of Annex I Parties¹⁵. This far exceeds the reporting and review requirements for Uruguay under the requirements of national communications for non-Annex I Parties to the UNFCCC, and even the requirements of BTRs for developing country Parties under the Paris Agreement.

Technical review of KPIR for KPI-1 2024

This document presents the conclusions of the technical review of the KPIR of KPI-1 2024, an indicator that represents the reduction (in %) of the gross aggregate GHG emissions intensity (CO₂, CH₄ and N₂O) expressed in CO₂e per unit of real GDP, with respect to the reference year 1990. This technical review includes a detailed verification of the methodology used, comparisons with official data and documents, and recommendations to improve the accuracy and transparency of the process of calculating and presenting results.

The technical review was carried out during the second half of April 2026 by international reviewers in collaboration with the UNDP and in consultation with the sectoral actors involved in the compilation of the KPIR of KPI-1 2024.

The review focused on evaluating the application of the calculation methodology defined in the technical data sheets for calculating real GDP and KPI-1. Specifically, the review encompassed:

- Verifying the proper application by the BCU of the methodology for calculating real GDP according to the technical sheet “Uruguay’s Real Gross Domestic Product Series at Constant Prices, since 1990” (“Serie del Producto Interno Bruto Real de Uruguay a Precios Constantes, desde 1990” in Spanish)¹⁶, and reproducing the calculation of real GDP following the established instructions to detect any discrepancies in the application of the methodology.
- Verifying the proper application of the methodology to calculate KPI-1 according to the technical sheet “Intensity of Gross Aggregate GHG Emissions/GDP” (“Intensidad de Emisiones Agregadas Brutas de GEI/PIB” in Spanish) and the technical sheet “Technical Sheet of KPI-1: Reduction in Gross Aggregate GHG Emissions per Unit of Real GDP, with Respect to 1990, Established in the SSLB framework” (“Ficha Técnica del KPI-1: Reducción de las Emisiones Brutas Agregadas de GEI por Unidad de PIB Real, con Respecto al Año 1990, Establecida en el Marco de Emisión del BIICC” in Spanish)¹⁷,

¹⁵ The Parties of Annex I are presented on page 25 of the UNFCCC in the following link:

<https://unfccc.int/resource/docs/convkp/convsp.pdf>

¹⁶ The GDP technical fact sheet is available at: <https://sslburuguay.mef.gub.uy/innovaportal/file/30671/20/real-gdp-technical-data-sheet.pdf>

¹⁷ The KPI-1 technical fact sheet is available at: <https://sslburuguay.mef.gub.uy/innovaportal/file/30671/20/co2-equivalent-technical-data-sheet.pdf>



and reproducing the corresponding calculations using the indicated methodology to detect any discrepancies in the application of the methodology.

During the review, a comprehensive comparison was conducted among the numerical values of emissions, the percentages of emission reductions, GDP and the KPI-1 2024 indicator values presented between the EMR series 1990-2024, the KPIR of KPI-1 2024 and the Excel calculation file “Cálculo KPIs BIICC 1990 - 2024 FINAL (2026.03.30)”. The explanations of the annual trends and variations in emissions, GDP and the KPI-1 2024 indicator, was evaluated in comparison with the national information presented in official documents such as Uruguay's National Greenhouse Gas Inventory 1990-2022 submitted to the UNFCCC under the country's first Biennial Transparency Report of 2024¹⁸, as well as the 2021 economic study carried out by the Economic Commission for Latin America and the Caribbean (CEPAL, “Comisión Económica para América Latina” in Spanish), based national official statistics.

¹⁸ The first BTR de Uruguay is available at: <https://unfccc.int/sites/default/files/resource/URY-BTR%202024%20-%202024.12.31.pdf> and its corresponding 1990-2022 national GHG inventory is available at: <https://unfccc.int/sites/default/files/resource/URY-NID%202022%20-%202024.12.31.pdf>



Adherence to the 2006 IPCC Guidelines

The main conclusions of the technical review of the EMR series 1990-2024 corresponding to the Energy, Industrial Processes, Agriculture and Waste sectors of KPI-1 2024 are presented below, concerning the cross-cutting aspects of the 2006 IPCC Guidelines, namely: institutional arrangements, application of best practices and continuous improvement.

Aspects of the 2006 IPCC Guidelines	Conclusions
<p>Institutional arrangements</p>	<p>The SSLB has a robust institutional framework that enables effective planning, oversight, management, and implementation of annual KPI-1 development, including documentation, archiving, quality control and technical review for continuous improvement.</p> <p>This institutional framework is formalized by the Interministerial Coordination and Cooperation Agreement for the Issuance of Sovereign Sustainability-Linked Bonds of 19 September 2022. This defines the assignation of roles and responsibilities, as well as the work schedule of the different institutions involved in the elaboration of the KPI-1 within the institutional framework of the SSLB, which ensures timely compliance with the legal and contractual commitments established for the sovereign issuance of the SSLB. The elaboration of KPI-1 is underpinned by three main working groups: SSLB Group, pMRV Group, and NGHGI Group.</p> <p>The design and operationalization of the SSLB is carried out through the SSLB Group, the inter-ministerial group within the SNRCC framework composed of representatives from the Ministry of Economy and Finance (MEF, “Ministerio de Economía y Finanzas” in Spanish), Ministry of Environment (MA, “Ministerio de Ambiente” in Spanish), Ministry of Industry, Energy and Mining (MIEM, “Ministerio de Industria, Energía y Minería” in Spanish) and Ministry of Livestock, Agriculture and Fisheries (MGAP, “Ministerio de Ganadería, Agricultura y Pesca” in Spanish), and with the support of the Ministry of Foreign Affairs (MRREE, “Ministerio de Relaciones Exteriores” in Spanish). The SSLB Group is tasked with coordinating between ministries, establishing concrete and measurable objectives, timelines, and responsibilities, and ensuring that the goals are communicated and understood throughout the public sector throughout the life of the bond. Among these responsibilities, the SSLB Group oversees progress on the estimation, monitoring, and timely reporting and external verification of the KPI-1. Having a single institution taking full responsibility and coordination of KPI-1 development ensures retention of knowledge and application of reporting requirements, good practices, and use of correct methodologies, as well as effective and efficient work.</p> <p>The NGHGI Group, formalized by Decree No. 181/020, of 24th June 2020, prepares the EMR with the GHG emissions values reported by MA, MGAP, and MIEM, together with the methodological note and auxiliary tools supporting the GHG estimates of KPI-1 (data bases and auxiliary spreadsheets).</p> <p>More concretely, the Ministry of Environment (MA) estimates emissions and their evolution for the Industrial Processes and Waste sectors, the Ministry of</p>



	<p>Agriculture, Livestock and Fisheries (MGAP) does the same for the Agriculture sector and the Ministry of Energy and Mines (MIEM) does the same for the Energy sector, each one preparing its sectoral emissions report with its databases and auxiliary spreadsheets. The Ministry of Environment (MA) conductees the general coordination, compilation of the sectoral information presented by the other ministries, quality control, and the preparation of the EMR and its methodological note.</p> <p>Based on the emissions reported in the EMR, and together with the real GDP data provided by the Central Bank of Uruguay, the pMRV group calculates the value of KPI-1 and prepares the KPIR.</p> <p>Both the EMR and the KPIR are submitted to the SNRCC Coordination Group for approval and quality assurance, which is carried out by an external verifier in coordination with the UNDP. Finally, the BIICC Group prepares the final Government Report on the SSLB Indicators based on the final versions of the EMR and KPIR.</p> <p>All relevant institutions that collect the necessary data for the estimation of KPI-1 emissions are involved in its elaboration. The existence of a common and adequate understanding of data needs and communication between the working groups involved in the development of the KPI-1 (SSLB Group, pMRV Group, and NGHGI Group) has been verified, which are crucial elements for the formulation of a quality indicator that complies with all TACCC principles.</p> <p>In addition, there is an agreed annual cycle that includes a detailed work plan addressed to all institutions and experts involved in the process of developing the EMR and KPRI.</p>
<p>Good practices</p>	<p>The emissions covered by KPI-1 are estimated based on all the good practices of the 2006 IPCC Guidelines at an intersectoral and cross-cutting level regarding data collection, method selection, verification processes, documentation processes, and recalculations.</p> <p>The KPI-1 complies with the following good practices for data collection:</p> <ul style="list-style-type: none"> • Data collection at a level of detail appropriate to the method used, with a focus on improving the quality of the key categories of KPI-1. • Selection of data collection procedures with the aim of improving the sources, level of detail and reliability of data contributing to KPI-1. • Optimisation and automation of data collection and entry processes to improve efficiency and reduce transcription errors. Notably, from 2024 onwards, the process of uploading energy sector activity data to the IPCC software was automated through the development of a bot that retrieves the data directly from the National Energy Balance matrices. • Documentation of data collection activities. • Inclusion of agreements with data providers to ensure consistent, high-quality and continuous data flows. • Confirmation and documentation of temporal consistency in the use of different data sources, as well as the selection of appropriate splicing techniques.



- Use of country-specific data disaggregated to the sub-national level or by emission source to the greatest extent possible, based on reliable and official sources.

The KPI-1 complies with the following good practices for method selection:

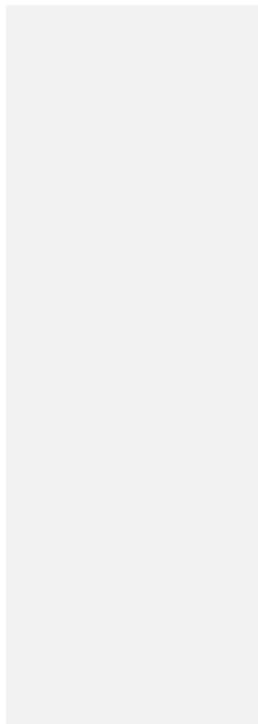
- Use of the 2006 IPCC Guidelines decision trees to select the methodological tier according to data availability and national circumstances.
- Emphasis on use of more advanced methods (tier 2 or higher) for key categories, including the use and refinement of country-specific data.
- Description of the reasons why it is only possible to use a tier 1 method for key categories, as appropriate, and inclusion of its methodological advancement in the improvement plan.
- Selection and use of the most appropriate splicing techniques from the 2006 IPCC Guidelines to ensure consistency in the time series.
- Use of the most recent versions of the IPCC inventory software available for the compilation of all emissions within the scope of KPI-1.

The KPI-1 complies with the following good practices for verification processes:

- Operation of a robust quality assurance and quality control (QA/QC) framework in accordance with the 2006 IPCC Guidelines, which seeks higher quality, higher accuracy, and lower uncertainty in the KPI-1, balanced with the need for timely KPI-1 submission and cost-effectiveness.
- A robust quality control framework tailored to each sector and to cross-cutting issues, which includes: quality control procedures, sector-specific quality control checklists, a compilation checklist, a reporting document checklist, and a list of observations and sector-specific corrective actions. Of particular note is the parallel estimation of emissions using spreadsheets and IPCC software to cross-check results, as well as peer review by members of the NGHGI Group.
- A robust quality assurance framework using external reviewers contracted with the support of the UNDP.

The KPI-1 complies with the following good practices for documentation processes:

- The EMR and its methodological note includes extensive detailed and clear documentation to provide a transparent understanding of how KPI-1 emissions were estimated.
- The sources of information, assumptions, methodologies used, as well as the procedures for their selection and the input of expert judgment are clearly documented.
- There is a centralised database at the Ministry of the Environment's (MA) premises containing all the information, activity data and emission factors for all sectors covered by KPI-1. This information is stored in the IGHG inventory system's Electronic Document Management System, which is managed by the MA. In addition, each sector maintains, within its respective ministry (MA – Industrial Processes and Waste, MGAP –



Continuous improvement

Agriculture, MIEM – Energy) its own sectoral archive and database where activity data, emission factors and the sources of both are recorded.

Recalculations of the entire KPI-1 time series are performed in accordance with good practice and the requirements of the 2006 IPCC Guidelines, providing a transparent indication of any recalculations performed and their impact on previously reported KPI-1 values. These recalculations are properly performed when:

- There are improvements in the availability of activity data, emission factors, and other parameters.
- Needed corrections of errors are identified.
- A category becomes a key category.
- Capacity for KPI-1 development has grown.
- Improvements have been incorporated into the NGHGI, which are introduced in a consistent manner in the improvement of the emissions estimate under the scope of the KPI-1.

The results of the technical review conclude that the EMR and the development of KPI-1 also comply with the specific good practices for the Energy sector, the Industrial Processes sector, the Agriculture sector and the Waste sector.

The KPI-1 has a robust quality control and quality assurance system and a continuous improvement plan, which includes ongoing review of historical values and recalculations of the time series, as appropriate, to improve the KPI-1 quality in accordance with the procedures and good practices of the 2006 IPCC Guidelines.

It is worth noting the alignment of the continuous improvement of the EMR with the incorporation of improvements of the NGHGI of Uruguay for the gases, sources, and categories under the scope of KPI-1. This includes immediate correction of items identified during the KPI-1 development, as well as planning for future KPI-1 improvements in the short, medium, and long term.

The quality control system for the emissions used in Uruguay's KPI-1 has robust quality control procedures, sectoral quality control checklists, compilation checklist, reporting document checklist and list of observations found and corrective actions taken by sector. Internal sectoral reviews are performed by each Ministry, additionally the MA performs an overarching quality control check of the estimates and the final reports. Quality control checks are implemented annually to avoid errors due to oversights and/or inconsistencies in the estimation of emissions and in the presentation of the EMR. Quality control activities include:

- Accuracy checks during data collection and processing and the use of approved standardised procedures for emissions calculations.
- Rigorous technical reviews of each of the categories, activity data, emission factors and other parameters and calculation methods, identifying calculation errors that are corrected before the presentation of the GHG emission estimates used in KPI-1.
- Analysis of the consistency of the time series for each category, where the values of the auxiliary spreadsheets are exhaustively corroborated with



the original data with respect to the data extracted from the IPCC Software, for the entire time series.

- Analysis of possible errors and inconsistencies in the data and parameters of the entire series which, if found, are modified and reported in the corresponding recalculation spreadsheet.

The quality assurance system for the emissions used in Uruguay's KPI-1 includes external technical reviews currently managed by the UNDP.

Compared with the previous edition of the EMR series 1990–2023, the current EMR series 1990–2024 includes the following improvements:

- Editorial refinements to enhance the clarity, readability and presentation of the EMR and its methodological note, as well as to minimise typographical errors.
- Use of the most up-to-date versions of the IPCC inventory software.
- Use of a bot for the automatic upload of the national energy balance data into the IPCC inventory software.
- Inclusion of the most up-to-date national energy balance as activity data for the energy sector.
- Refinement of activity data for the metals industry in collaboration with companies.
- Calculation of emissions from solid waste disposal sites at departmental level, capturing sub-national differences in greater detail. Refinement of activity data for domestic and industrial wastewater.



Adherence to the inventory TACCC principles

The main conclusions of the technical review of the EMR series 1990-2024 series for KPI-1 2024 are presented below in accordance with the principles of transparency, completeness, accuracy, consistency and comparability (TACCC) covering the Energy, Industrial Processes, Agriculture and Waste sectors.

Quality Principle	Conclusions
<p>Transparency</p>	<p>The EMR methodological note documents in a clear, transparent, and rigorous manner the methodologies, and all data and underlying assumptions used to estimate KPI-1 emissions, using an appropriate combination of text, tables, and diagrams to facilitate understanding for each sector of Energy, Industrial Processes, Agriculture, and Waste.</p> <p>The EMR methodological note clearly and rigorously documents all sources of activity data, emission factors, parameters, and assumptions used in the different time series ranges for the estimation of emissions for each sector covered by the KPI-1, including the harmonization of country-specific data with the units and categorizations of the 2006 IPCC Guidelines. This includes detailed documentation of the reference documents, databases, and expert judgment used.</p> <p>In the methodological note, the EMR clearly and rigorously documents all the methods adopted to systematize the data and estimate KPI-1 emissions, as well as the process of selecting these methodologies according to the decision trees of the 2006 IPCC Guidelines, the availability of information, and assumptions. This includes a comprehensive and transparent documentation of:</p> <ul style="list-style-type: none"> • The conditions that are (and are not) met for the selection of methodological tiers according to the decision trees of the 2006 IPCC Guidelines. • The conditions and assumptions for the applicability and selection of splicing techniques to fill data gaps and/or ensure time series consistency. <p>The EMR includes sufficient and clear documentation to effectively understand the circumstances of each sector and their appropriate reflection by the KPI-1.</p>
<p>Accuracy</p>	<p>Uruguay uses the methodologies of the 2006 IPCC Guidelines, its auxiliary spreadsheets, the IPCC inventory software version 2.691 for the Energy and Agriculture sectors, as well as the IPCC inventory software version 2.95 for the Industrial Processes and Waste sectors.</p> <p>The IEM-BIICC rigorously analyses the different elements considered in the use of the decision trees of the 2006 IPCC Guidelines for the appropriate selection of the methodological tiers for each subcategory of emissions, adopting more advanced tiers (tier 2 and tier 2/3) for the vast majority of key categories. Improvements have been made to the simplest methodological levels (tier 1) of non-key categories to include</p>



	<p>country-specific data at the subnational level and even at the level of emission sources in order to improve accuracy under tier 1/2. For the few key categories that still use a tier 1 or tier 1/2, as part of the NGHGI improvement plan, Uruguay aims to strengthen the availability and quality of data to move to a tier 2 in all key categories in the medium term.</p> <p>The EMR uses country-specific activity data in all emission categories of KPI-1 2024, using disaggregated data at the subnational level and even at the level of each emitting source. All activity data comes from official and reliable sources, whose values are within the default ranges of the 2006 IPCC Guidelines defined for the region and are comparable against other countries with similar circumstances.</p> <p>The IEM-BIICC uses emission factors and other predefined parameters from the 2006 IPCC Guidelines, selected appropriately and adequately representing national circumstances. For certain categories in the Energy, Industrial Processes and Agriculture sectors, country-specific or source-specific emission factors are used, selected appropriately and adequately representing national circumstances, which increases the accuracy of the emissions calculations. Uruguay uses the results of the industrial national useful energy balance for a better selection of the CH₄ and N₂O emission factors of some fuels according to their main use in each industrial energy consumption subsector. Emission factors are adjusted to the specific conditions of the country's cement plants. Likewise, country-specific emission factors are used for enteric fermentation and manure management of cattle.</p> <p>Uruguay demonstrates a strong commitment to continuous improvement by incorporating updated and more representative activity data at the subnational level and/or by emission source and by performing the corresponding recalculations for all affected years in the time series.</p> <p>No underestimates or overestimates have been identified in the emissions covered by the KPI-1 2024.</p>
<p>Completeness</p>	<p>Notation keys according to the 2006 IPCC Guidelines have been used appropriately. The EMR clearly describes the scope of gases and categories of KPI-1 2024 according to the scope of Uruguay's first NDC based on the NGHGI 2012 according to the 2006 IPCC Guidelines. All the categories existing in the country and forming part of KPI-1 for the time series 1990-2024 have been estimated and reported.</p> <p>Notation keys are used correctly according to the 2006 IPCC Guidelines and there are no omissions in the KPI-1 2024 emissions.</p>
<p>Consistency</p>	<p>Uruguay uses the same methods, methodological rationale and a coherent approach for the selection and systematisation of activity data and emission factors to estimate the annual emission trends of KPI-1 in each year of the period 1990 to 2024. No changes are made to the calculation methodology on an annual basis, but rather the data used is updated to obtain accurate and consistent results over time. Likewise, the changes and transformations in KPI-1 emissions adequately reflect the evolution of the national context and the variations do not reflect inconsistencies in the time series.</p>



	<p>The EMR demonstrates a robust framework for selecting and applying splicing techniques to fill gaps in the activity data and ensure time series consistency for each category of the KPI-1 by employing the various splicing techniques in accordance with the 2006 IPCC Guidelines.</p> <p>When new sources of information or more advanced methods are incorporated during the time series, emissions are recalculated using the methods of the 2006 IPCC Guidelines. The EMR series 1990-2024 clearly presents an explanation of the impact of each of these recalculations on the previously reported KPI-1 values, as well as the reasons for the need for each of these recalculations. In all cases, there is no recalculation that has a significant impact over the entire time series.</p> <p>Moreover, the common data sources across KPI-1 categories, gases, sources and sectors remain consistent with each other.</p>
<p>Comparability</p>	<p>The calculation of GHG emissions included in KPI-1 2024 is consistent with Uruguay's NGHGI in terms of definitions, nomenclature, assumptions, data sources, methodology and categorization of gases and sources by category. The improvements incorporated in the EMR emissions estimates that have implied recalculations of KPI-1 are fully extracted from the NGHGI and are fully consistent with the improvements incorporated in the NGHGI of Uruguay for the gases, sources, and categories within the scope of KPI-1.</p> <p>For the calculation of GHG emissions of the categories included in the KPI-1, Uruguay employs the 2006 IPCC Guidelines, including its allocation of categories, IPCC inventory software version 2.691 and 2.95, auxiliary spreadsheets and the TACCC principles' definitions. No misallocations, omissions, or double counting of gases and sources according to IPCC categories are detected.</p> <p>The EMR uses the same reporting formats and methodologies recommended by the IPCC Guidelines.</p>



Compliance with the fundamental inventory requirements of Decisions 17/CP.8 and 18/CMA.1

Based on the information presented in the EMR series 1990-2024, an evaluation was made of the current compliance of the calculation and reporting of the emissions included in KPI-1 2024 for the Energy, Industrial Processes, Agriculture and Waste sectors in relation to the GHG inventory reporting requirements of national communications and BTRs stipulated Decisions 17/CP.8 and 18/CMA.1, respectively.

National communication inventory chapter requirements

As illustrated below, the EMR series 1990-2024 of the KPI-1 2024 complies with the requirements of the national GHG inventory chapter of national communications stipulated in paragraphs 6-24 of Decision 17/CP.8 ‘Guidelines for the preparation of national communications from Parties not included in Annex I to the Convention’.

Decision 17/CP.8 Paragraph	Requirement	Results
6, 7	The last year of the time series is no more than 4 years prior to the EMR submission date.	Complies
8	The EMR is based on the methodologies of the IPCC Guidelines	Complies
9	The EMR uses the different Tiers of the IPCC Guidelines, prioritising those considered to be able to produce the most accurate estimates, according to national circumstances and data availability. National methods are used when they better reflect the national circumstances, provided that these methodologies are coherent, transparent and well documented.	Complies
10	The EMR is based on activity data and emission factors updated using the best available information.	Complies
11, 12	The EMR is based on the good practices of the IPCC Guidelines to improve the transparency, consistency, comparability, completeness and accuracy of the KPI-1.	Complies
13	The EMR includes information on the procedures and arrangements for gathering information and archiving the GHG emissions encompassed within the KPI-1, as well as the efforts to implement a continuous process and the roles and responsibilities of the institutions involved.	Complies
14	The EMR presents information on the gases CO ₂ , CH ₄ , and N ₂ O.	Complies
15	The EMR presents information on the fluorinated gases HFCs, PFCs, and SF ₆ .	Not applicable
16	The EMR presents information on the precursors CO, NO _x , and NMVOC.	Not applicable



17	The EMR presents information on SOx.	Not applicable
18	The EMR presents information on CO ₂ emissions from fuel combustion using the sectoral and the reference approaches and explains significant differences between the results of the two approaches.	Not applicable
19	Emissions from international aviation and maritime vessels are reported individually and separately from national emissions, and are not included (added) in the total emissions of KPI-1.	Not applicable
20	The EMR presents the aggregate emissions in CO ₂ equivalent using the appropriate global warming potentials.	Complies
21	The EMR provides information on the methodologies used, explains the sources used for the emission factors, explains the sources used for the activity variables, and identifies areas for future improvement.	Complies
22	When numerical data is not available, the EMR uses the standardised notation keys indicated.	Complies
23	The EMR presents a text and reporting tables.	Complies
24	The EMR presents an analysis of uncertainty, explaining their methodologies and assumptions.	Not applicable

BTR inventory chapter requirements

As illustrated below, the EMR series 1990-2024 of the KPI-1 2024 fulfils the requirements for the reporting of national inventories of anthropogenic emissions by sources and anthropogenic removals by sinks of GHGs, as defined in paragraphs 17-58 of Decision 18/CMA.1 ‘Modalities, procedures and guidelines for the transparency framework for action and support referred to in Article 13 of the Paris Agreement’.

Decision 18/CMA.1 paragraph	Requirement	Results
17	The EMR principles are in line with the definitions of the 2006 IPCC Guidelines.	Complies
18	A framework of institutional arrangements and a legal and procedural framework for the ongoing work of the EMR is established and maintained	Complies
19	The EMR presents information on the planning, preparation, and management of the EMR, including: <ul style="list-style-type: none"> a) the entity in which the overall responsibility for the EMR lies; b) the process of preparing the EMR; c) the archiving of all information with respect to emission factors and activity data, data generation and aggregation, QA/QC processes, results of reviews, and planned improvements; and d) the processes followed for formal review and approval. 	Complies



20	The 2006 IPCC Guidelines are used for the preparation of the EMR.	Complies
21	The EMR uses the recommended methods (tiers) for the key categories according to the 2006 IPCC Guidelines are used, the rationale for the selection of methodological tiers for each category is clearly explained.	Complies
22	If national methodologies are used, the EMR transparently explains its use as most appropriate to national circumstances.	Complies
23	If, due to a lack of resources, a tier 1 method is used for key categories, the EMR clearly documents the reasons for its use and assigns priority for the improvement of the key category to a higher level tier in the future.	Complies
24	Wherever possible, country-specific emission factors and activity data are used.	Complies
25	The EMR identifies the key categories for the first and last year reported.	Not applicable
26	The EMR ensures time series consistency by using the same methods and a consistent approach to the time series.	Complies
27	The EMR uses splicing techniques from the 2006 IPCC Guidelines to ensure time series consistency to address missing activity data, emission factors, and other parameters.	Complies
28	The EMR incorporates recalculations appropriately.	Complies
29	The EMR quantitatively estimates and qualitatively analyses uncertainty for all categories for at least the first and last reporting year, at least a qualitative analysis of uncertainty for the key categories.	No applicable
30	The EMR clearly identifies the categories, sources, and gases excluded from the scope of the KPI-1 with respect to the 2006 IPCC Guidelines, along with an explanation of the reasons why they have not been taken into account.	Complies
31	Notation keys are used when completing common tables for the presentation of information.	Complies
32	When the notation key “NE” (not estimated) is used to report insignificant emissions, the EMR provides a justification in compliance with the established insignificance thresholds.	Complies
33	Once emissions are estimated for a particular category, the EMR provides continuous reporting of emissions in the posterior communications if such emissions from that category continue occurring.	Complies
34, 35	The EMR uses a QA/QC plan in accordance with the IPCC Guidelines.	Complies
36	The EMR compares the bottom-up estimates of CO2 emissions from combustion obtained against those obtained through the reference method according to the 2006 IPCC Guidelines.	Not applicable
37	The EMR uses the values of global warming potential for a 100-year time horizon given in the IPCC Fifth Assessment Report.	Complies
38	The EMR consists of an inventory document and common reporting tables.	Complies



39, 40	The EMR presents information on the methods used, including the reasons why they were chosen, in accordance with the good practice developed in the IPCC Guidelines, including descriptions, assumptions, references, and sources of information used for emission factors and activity data, broken down as much as possible by category and gas.	Complies
41	The EMR provides a description of the key categories, with information on the method used to identify them by their contribution to both level and trend.	Not applicable
42	The EMR provides the cumulative individual percentage contributions of the key categories with respect to both level and trend in accordance with the 2006 IPCC Guidelines.	Not applicable
43	The EMR reports recalculations, explaining and justifying them, and indicating any relevant changes and their impact on emission trends.	Complies
44	The EMR reports the results of uncertainty analyses, including the methods used, for at least the first and last year of the time series.	Not applicable
45	The EMR provides the reasons for any lack of completeness.	Complies
46	The EMR communicates the QA/QC plan.	Complies
47	The EMR reports emissions for all categories, gases, and sources covered by KPI-1, disaggregated by gas.	Complies
48	EMR provides information on seven gases: CO ₂ , CH ₄ , N ₂ O, HFCs, PFCs, SF ₆ , and NF ₃ , at a minimum, with CO ₂ , CH ₄ , and N ₂ O at a minimum for a developing country that need flexibility in light of its capabilities.	Complies
49	If HFCs, PFCs, SF ₆ and NF ₃ are reported, the actual emissions of these gases shall be reported, providing data broken down by chemical and category, in units of mass and CO ₂ equivalents.	Not applicable
50	The EMR reports information on the following sectors: energy, industrial processes and product use, agriculture, land use, and waste, in accordance with the IPCC Guidelines.	Complies
51	The EMR reports information on the following precursors: CO, NO _x , SO _x and NMVOC.	Not applicable
52	The SSLB EMR reports indirect CO ₂ emissions resulting from atmospheric oxidation of CH ₄ , CO, and NMVOC.	Not applicable
53	The EMR reports emissions from international aviation and marine bunker fuel in two separate entries and is not included in the national totals.	Not applicable
54	The EMR clearly indicates how feedstocks or non-energy uses of fuels in the energy sector and industrial processes are reported according to the IPCC Guidelines.	Complies
55	The EMR provides detailed information on emissions and removals from natural disturbances on cultivated land.	Not applicable
56	The EMR provides information on harvested wood products according to the IPCC Guidelines.	Not applicable



57	The EMR provides a consistent annual time series starting in 1990.	Complies
58	The last year of the time series is no more than 2 years prior to the EMR submission date.	Complies

Compilation of the KPI-1

The KPI-1 2024 complies with the guidelines established in its technical data sheet, both in the selection of data sources and in the application of the calculation methodology. The technical review confirms that:

- The real GDP series covers the period 1990–2024 continuously.
- This series incorporates values at constant 2016 prices, following the methodological approach defined by the BCU for estimating real GDP. The backward extension to 1990 is carried out using the statistical technique of the year-on-year rate of change, in line with official back-casting practices.
- No abrupt jumps or obvious inconsistencies are identified in the real GDP series. Year-on-year variations adequately reflect relevant economic events during the period, such as the COVID-19 crisis.
- Minor differences are identified in certain years (mainly 2018–2022) when comparing historical versions of the GDP series used in previous KPI-1 files, consistent with routine statistical revisions of the BCU’s National Accounts System. These differences do not affect the overall consistency of the series nor the calculation of the indicator.
- The real GDP series is used as the denominator for calculating the intensity of aggregate gross GHG emissions per unit of real GDP, complying with the requirements and methodology established for KPI-1.
- The calculation procedure followed in the Excel file is in accordance with the KPI-1 technical data sheet and reflects good practices in terms of transparency, traceability and methodological consistency.

In summary, KPI-1 2024 has been compiled correctly and the inputs used (emissions and real GDP) are consistent with official sources and with the methodologies defined in the technical reference documents.

The minor differences identified in the historical GDP series have no material impact on KPI-1 results.

The verification table used during the technical review process is presented below:



Dimension	Aspects verified	Results	Observations/Evidence
1. Source and methodology	<p>The real GDP series originates from the BCU.</p> <p>The official methodology for constant-price chain-linking is applied.</p> <p>The type of index used is clearly indicated.</p>	<p>Complies</p> <p>Complies</p> <p>Complies</p>	<p>The GDP data used in KPI-1 calculations matches official data published by the BCU.</p> <p>Series constructed by chain-linking to 2016 based on multiple base years (1983, 1997, 2005, 2016).</p> <p>Technical sheet describes constant prices, back-casting, and variation rate method.</p>
2. Base year	<p>The latest base year is 2016.</p>	<p>Complies</p>	<p>Units are correctly expressed in real terms (billions of pesos at constant 2016 prices).</p>
3. Time series	<p>The series covers 1990 to 2024 without interruption.</p> <p>The methodology for splicing series with different base years is documented.</p>	<p>Complies</p> <p>Complies</p>	<p>No breaks, duplications, or arbitrary interpolations detected.</p> <p>The methodological sheet includes details of the splicing and back-casting techniques used.</p>
4. Internal Consistency	<p>Annual GDP variations are reasonable and aligned with the country's economic history.</p>	<p>Complies</p>	<p>Year-to-year variations are consistent and are explained by known events (e.g., COVID-19).</p>
5. Reproducibility of calculation	<p>GDP formulas in the Excel file are visible and auditable.</p> <p>Calculation using raw data and formulas reproduces the same results as in the official file.</p>	<p>Complies</p> <p>Complies</p>	<p>Calculation formulas are accessible and easy to review.</p> <p>GDP is replicable using the shared Excel file and the methodology described in the technical sheet.</p>



6. Consistency with technical sheet	The spreadsheet implements the methodology described in the technical sheet.	Complies	The formula for calculating KPI-1 complies with the methodology defined in the technical data sheet, both for emissions and GDP.
7. Transparency and traceability	Data sources are documented, and transformation steps are clearly explained.	Complies	<p>It is verified that the values used come from the BCU and that the adjustment steps are documented and replicable.</p> <p>Minor differences are observed across historical versions of the GDP series used in previous KPI-1 files, attributable to routine statistical updates of the BCU, with no material impact on the indicator.</p>

Conclusions of the review

Technical review conclusions of the EMR series 1990-2024

The KPI-1 2024 complies with the principle of transparency, as the EMR series 1990-2024 and its methodological note present sufficient detailed and clear documentation so that it is possible to understand how emissions were estimated, including the sources of information, assumptions, expert judgment, and methodologies used, as well as the processes and justification for the selection of methodologies.

The KPI-1 2024 complies with the principle of completeness, as the scope of KPI-1 2024 is clearly defined and aligned with the scope of Uruguay's first NDC. The emissions estimates presented in the EMR series 1990-2024 effectively cover all gases, sources, and categories within the scope of the KPI-1 2024 and cover the full time series from 1990 to 2024. Any exclusion of emissions from the EMR series 1990-2024 with respect to Uruguay's NGHGI is clearly identified, and therefore, no omissions are identified in KPI-1 2024.

The KPI-1 2024 complies with the accuracy principle, as KPI-1 2024 contains no under- or over-estimates by using appropriate methods from the 2006 IPCC Guidelines with high quality country-specific data and default emission factors appropriate to the circumstances in Uruguay, incorporating improvements in data quality as they become available and performing time series recalculations as appropriate.

The KPI-1 2024 complies with the principle of consistency, as the same methods and data sources are used to estimate the different years, gases, and categories, using appropriate



splicing techniques in accordance with the 2006 IPCC Guidelines. Recalculations are properly performed according to IPCC good practices under a continuous improvement framework.

The KPI-1 2024 complies with the comparability principle, as the estimation of emissions covered by the KPI-1 2024 fully employs the guidance, classifications, definitions, methodologies and reporting formats of the 2006 IPCC Guidelines. The EMR series 1990-2024 is comparable with Uruguay's NGHGI in terms of definitions, nomenclature, assumptions, data sources, methodology and categorization of gases and sources by category, clearly indicating any deviation in the scope of the KPI-1 2024 with respect to the NGHGI.

The EMR series 1990-2024 complies with the reporting requirements of national communications stipulated in Decision 2/CP.17 with regard to GHG emissions.

The EMR series 1990-2024 complies with the reporting requirements of BTRs stipulated in Decision 18/CMA.1 with regard to GHG emissions.

The KPI-1 2024 complies with the good practice of the 2006 IPCC Guidelines at both cross-cutting and sectoral levels.

The KPI-1 2024 has a robust institutional framework that enables effective planning, oversight, management, and implementation of annual KPI-1 development, including its documentation, archiving, quality control and technical review for continuous improvement, following the good practices of the 2006 IPCC Guidelines.

The KPI-1 2024 demonstrates a strong commitment to continuous improvement enabled by a robust quality assurance and quality control system, which integrates the review and recalculation of historical values to improve the quality of KPI-1 according to the good practices of the 2006 IPCC Guidelines as methodological improvements and access to better quality data emerge, as well as planning for future improvement of the KPI-1 development process.

Technical review conclusions of the KPIR of KPI-1 2024

No deficiencies are identified in the methodology defined by the technical data sheets detailing the calculation processes of KPI-1 2024 or in the estimation of real GDP.

No shortcomings are detected in the application of the methodology defined for the calculation of KPI-1 2024 or in the process of calculating real GDP.

No inconsistencies or discrepancies are detected between the numerical and percentage values of emissions, GDP and the KPI-1 2024 included in the Excel calculations, the EMR files, and the KPIR files.

The trends and annual variations of emissions, GDP, and KPI-1 indicator are consistent with the evolution of the country's economic context and emission trends and align with the national context according to the official national information presented in official documents submitted by Uruguay to the UNFCCC.



The minor differences identified in historical versions of the GDP series are consistent with routine statistical revisions and do not affect the robustness, consistency or interpretation of KPI-1.



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