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KPI Report for the Sovereign Sustainability-Linked Bond (KPIR) for 2020 and 2021

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Introduction

This report outlines the KPIs calculated as part of the Framework for issuing Sovereign Sustainability-linked Bonds (SSLBs) published in September 2022.

These indicators are linked to the 2025 mitigation targets set by Uruguay in its first Nationally Determined Contribution to the Paris Agreement (NDC).

KPI-1 aggregates greenhouse gases (CO_2, CH_4, and N_2O) emissions per unit of GDP under the 100-year Global Warming Potential (GWP) metric established in the Fifth Assessment Report (AR5) of the Intergovernmental Panel on Climate Change (IPCC).

The emissions reported under the December 2022 Annual GHG Emissions Report for the SSLB (EMR) are used to calculate this KPI. This report only looks at the emissions from the gases, sectors, categories, and sources estimated and reported under the 2012 NGHGI, which were used to set the intensity reduction target of the First NDC.

For GDP was used the latest official series published by the National Accounts System (SCN) of the Central Bank of Uruguay (BCU), extrapolated to 1990, using the variation rate as the statistical splicing technique.

This report outlines the 2020 and 2021 indicators and their evolution since 1990.

KPI-2 refers to preserving the native forest area through native forest mapping based on Sentinel 2 satellite images.

The areas reported in the December 2022 Native Forest Report (NFR) are used to calculate this KPI.

This report outlines the indicator for 2021 and its evolution since 2012.

The database with all the information for calculating the indicators is an integral part of this KPIR[1]

Methodology

The methodology for calculating the performance indicators is described in: KPI-1 Data Sheet, Real GDP Series Data Sheet, and KPI-2 Data Sheet to be found on the SSLB2 website[2] and in the Annex of this Report.

1 Calculation of SSLB KPIs 1990 - 2021.
2 https://www.mef.gub.uy/30686/21/areas/bonos-indexados-a-indicadores-de-cambio-climatico-biicc-de-uruguay.html

Results

KPI - 1 for 2020 and 2021

Table 1 shows emissions by gas, aggregated emissions under the GWP100AR5 metric, GDP, intensity, and KPI-1 calculation for the 1990 - 2021 series.

The aggregate emissions intensity in 2020 was 21.13 Gg CO_2-eq/billions of Uruguayan Pesos 2016, accounting for a 43% reduction with respect to the 1990 baseline year; in 2021, it was 21.67 Gg CO_2-eq/billions of Uruguayan Pesos 2016, accounting for a 41% reduction.

TABLE 1. Evolution of KPI-1 for the 1990 - 2021 period

Year	CO_2 (Gg)	CH_4 (Gg)	N_2O (Gg)	Aggregate GHG emissions (CO_2eq GWP 100 AR5)	Real GDP (billions of pesos at constant 2016 prices)	Aggregate GHG emissions / Real GDP (Gg CO_2eq/billions of pesos at constant 2016 prices)	KPI-1 Reduction of aggregate gross GHG emissions (in CO_2eq) per unit of real GDP, with respect to 1990 baseline year (%)
1990	3,839	682	24	29,219	792	36.88	
1994	4,207	755	26	32,140	975	32.96	-11%
1998	5,858	741	26	33,460	1,114	30.04	-19%
2000	5,510	724	25	32,296	1,071	30.15	-18%
2002	4,327	739	24	31,456	950	33.10	-10%
2004	5,499	783	27	34,592	1,006	34.38	-7%
2006	6,451	788	28	35,876	1,125	31.88	-14%
2008	7,928	773	28	36,919	1,285	28.73	-22%
2010	6,365	764	27	34,979	1,444	24.22	-34%
2012	8,613	751	31	37,988	1,572	24.16	-34%
2014	6,601	774	30	36,105	1,699	21.26	-42%
2016	6,714	788	28	36,137	1,734	20.84	-43%
2017	6,297	789	28	35,698	1,764	20.24	-45%
2018	6,751	772	27	35,625	1,767	20.16	-45%
2019	6,543	759	25	34,395	1,780	19.32	-48%
2020	6,502 *	764	28	35,256	1,668	21.13	-43%
2021	8,141	777	31	38,060	1,756	21.67	-41%

* Emissions value corrected for category 1.A.1.a.i - Electricity generation after recalculation by simulation of the electricity dispatch for domestic demand supply, assuming an average hydropower generation scenario. See note in KPI-1 Data Sheet.

In 1990, CH_4 emissions accounted for 65%, N_2O for 22%, and CO_2 for 13% of aggregate emissions. Of these, 84 % came from the AFOLU sector, 13 % from the Energy sector, 2 % from the Waste sector, and 1 % from the IPPU sector.

In the 1990 - 2020 period, there was a 21% increase in aggregate emissions (6,036 Gg CO_2-eq) and an increase in real GDP of 111%.

The Energy sector is responsible for 42% of this increase in emissions, the AFOLU sector for 38%, the Waste sector for 16%, and the IPPU sector for 4%. Figure 1 shows the corresponding absolute values.

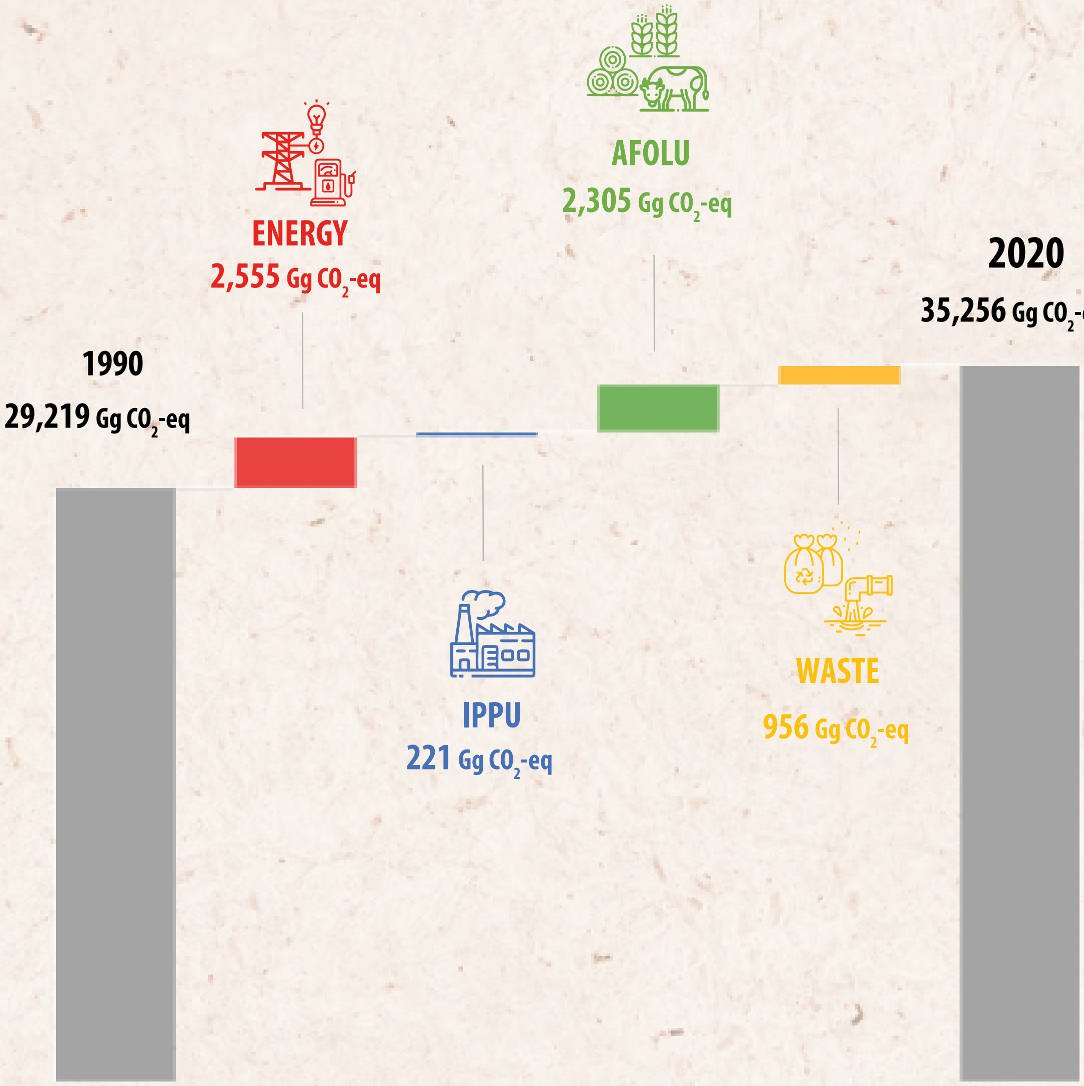


FIGURE 1. Aggregate emissions change over the 1990 - 2020 period

Due to these increases, by 2020, CH_4 emissions accounted for 61%, N_2O 21%, and CO_2 18% of aggregate emissions. Seventy-six percent were generated in the AFOLU sector, 18% in the Energy sector, 4% in the Waste sector, and 1% in the IPPU sector.

In 2021, there was an 8% increase in aggregate emissions (2.805 Gg CO_2-eq) over 2020, while real GDP increased by 5%. Thus, the reduction in emissions intensity over the baseline year was down 2%.

The Energy sector is responsible for 54% of the increase in aggregate emissions, the AFOLU sector for 40%, the Waste sector for 1%, and the IPPU sector for 5%. Figure 2 shows the corresponding absolute values.

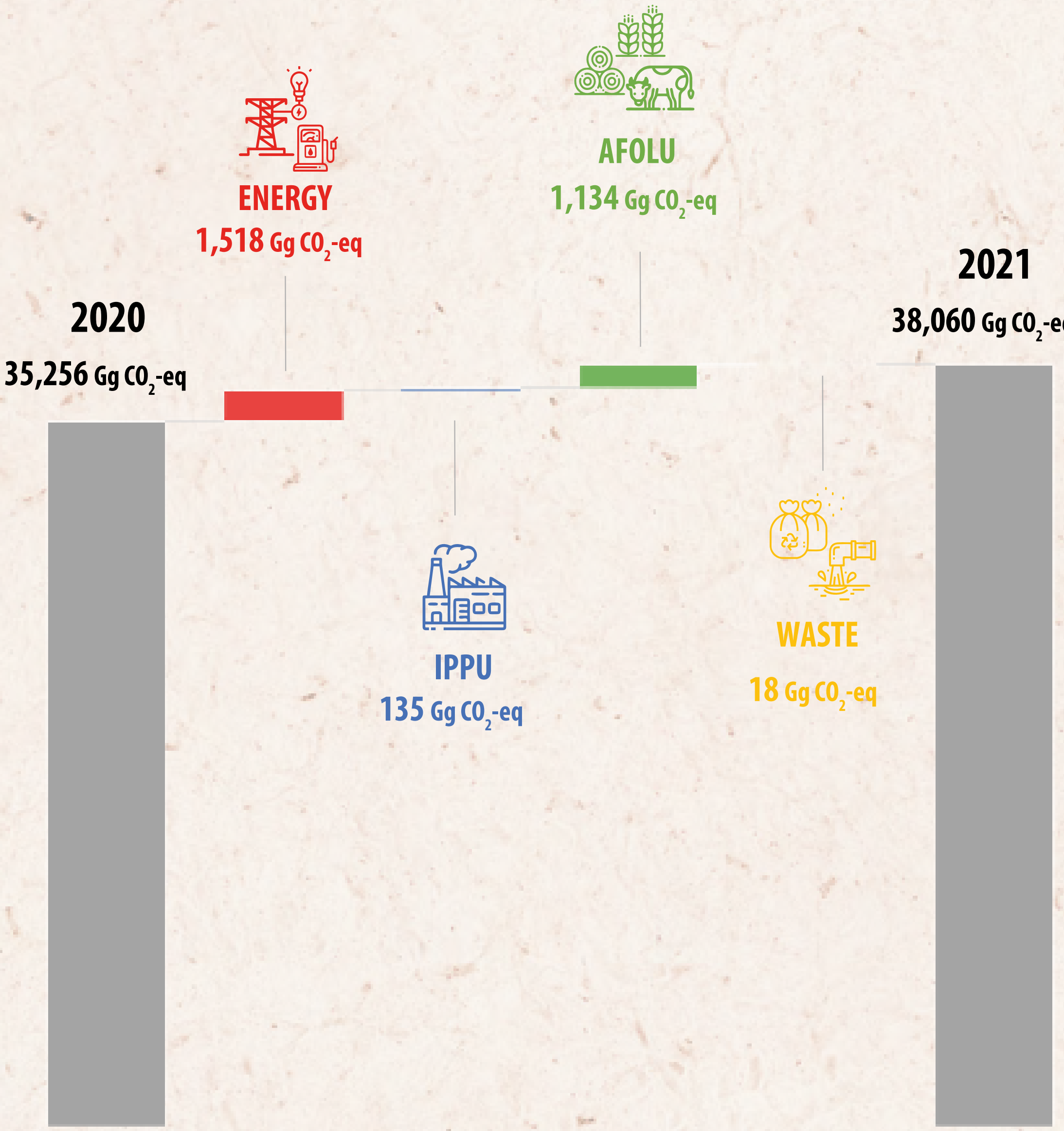


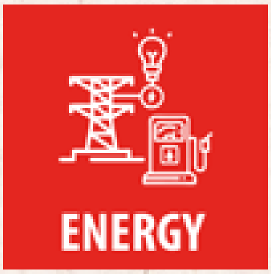
FIGURE 2. Aggregate emissions change over the 2020 - 2021 period

Table 2 shows the emissions for 1990, 2020, and 2021 of the emission sources that contributed most to the variation in aggregate emissions.

TABLE 2. Emissions from sources with the highest contribution to the variation in aggregate emissions

Sector	Source of emissions	1990 Emissions (Gg CO_2-eq)	2020 Emissions (Gg CO_2-eq)	2021 Emissions (Gg CO_2-eq)	1990 - 2020 Percentage change	1990 - 2021 Percentage change
Energy	Fossil fuel consumption in road transportation	1,392	3,557	3,914	156%	181%
Energy	Electricity generation	299	412 *	1,445	80%	383%
Energy	Fossil fuel consumption by manufacturing industries and construction	588	912	1,009	55%	72%
Energy	Consumption of fossil fuels for oil refining	209	395	404	89%	93%
IPPU	Cement production	178	358	464	101%	160%
IPPU	Lime production	31	70	100	130%	227%
AFOLU	Non-dairy cattle	17,478	22,070	22,574	26%	29%
AFOLU	Use of synthetic nitrogen fertilizers	133	1,101	1,770	730%	1234%
AFOLU	Sheep farming	5,245	1,388	1,352	-74%	-74%
AFOLU	Dairy cattle	796	1,260	1,247	58%	57%
AFOLU	Agricultural residues in soils	91	280	300	208%	229%
Waste	Waste Urban solid waste disposal	455	1,332	1,335	193%	193%

* Emissions value corrected for category 1.A.1.a.i - Electricity generation after recalculation by simulation of the electricity dispatch for domestic demand supply, assuming an average hydropower generation scenario. See note in KPI-1 Data Sheet.



In the energy sector, road transportation is the emissions source with the most significant increase in fossil fuel consumption. This increase was due to the substantial growth in the vehicle fleet over the period under study. It should be noted that the rise in emissions was lower than the increase in energy consumption, which could be explained by improvements in efficiency and the diversification of the energy sources in this category, among which we can find electricity and biofuels.

Emissions from road transportation increased by 10% in 2021 compared to 2020 due to the increase in fossil fuel energy consumption. However, 2020 was an atypical year due to mobility restrictions due to the COVID-19 pandemic.

CO_2 emissions from electricity generation show great variability in the period due to greater or lesser consumption of fossil fuels associated with the water supply conditions in the basins (and therefore the availability of hydropower) in a scenario of progressive growth in electricity demand. However, it should be noted that introducing renewable sources (wind, biomass, and solar) has contributed significantly to mitigating this correlation.

Both 2020 and 2021 were years of low rainfall. However, total power generation in 2021 increased by 18% compared to 2020, with a growth of 148% in power exports. Brazil was the primary destination as it suffered a drought that brought its water reserves to minimum levels.

The electricity generation matrix for 2021 was 85% renewables, and in 2020 it was 94%. Emissions from fossil fuel consumption for electricity generation increased 251% compared to the 2020 emissions value corrected for average rainfall, mainly due to exports to tackle the critical drought in the region.

The manufacturing and construction industry increased its energy demand in the 1990 – 2021 period, mainly due to the construction of two pulp mills, which are highly intensive in energy consumption. Since these industries consume mostly black liquor, a biomass residue (CO_2 emissions from renewable sources that do not add to total emissions), emissions increased at a lower extent. Between 2020 and 2021, emissions increased by 11%, mainly due to increased fuel consumption in cement production.

Finally, emissions from the consumption of fuels for oil refining varied by 93% across the period. Still, their contribution to the variation in KPI-1 was lower than that of the sources mentioned above.

In the IPPU sector, cement production is responsible for the largest increase in emissions. In the 1990 - 2021 period, emissions increased by 160% due to the increase in clinker production, with a 29% increase between 2020 and 2021, due to the start-up of a new plant.

Between 2020 and 2021, emissions from lime production increased by 42% due to the same percentage increase in production. It should be noted that lime production in 2021 is at similar levels to those of 2019, after having experienced a 30% drop in 2020.

In the AFOLU sector, aggregate emissions from non-dairy cattle farming eased 29% in the 1990 - 2021 period and 2% between 2020 and 2021, in line with changes in livestock heads. However, the emissions increase over the series was much lower than the growth in meat production due to a sustained increase in productivity.

Aggregate emissions from dairy cattle increased 57% in the 1990 - 2021 period, with a similar percentage increase in the number of heads. However, milk production increased significantly (97% in the 1996 - 2021 period) due to improved productivity. In 2021 compared to 2020, emissions fell 1% due to a decrease in the dairy cattle stock.

Aggregate emissions from sheep farming went down by 74% between 1990 and 2021 as a result of an equal decrease in herd size, with a 3% reduction between 2020 and 2021.

Emissions from synthetic nitrogen fertilizers and nitrogen available in soils from agricultural residues increased significantly over the period, in line with the country's farming activity.

Emissions from urban solid waste disposal increased by 193% due to increased waste generated by population growth and per capita generation in the 1990 - 2021 period.

Evolution of KPI-1 for the 1990 - 2021 period

Figure 3 shows the evolution of KPI-1 in the 1990 - 2021 period. It reflects Uruguay's progressive decarbonization of the economy, reaching a 48% reduction in emissions intensity in 2019 with respect to the 1990 baseline.

The country's economy contracted by 6% due to the impact of the COVID-19 pandemic. This led to a significant increase in emissions intensity per real GDP by 2020, bringing the indicator down to 43%.

The country's economic activity bounced back in 2021. Real GDP grew 5% but failed to recover the loss experienced in the previous year. In addition, emissions increased significantly, mainly due to the droughts in the region. This is why intensity increased in 2021 compared to 2020, and, therefore, KPI-1 increased 2% in 2021 over the previous year (from -43% to -41%).

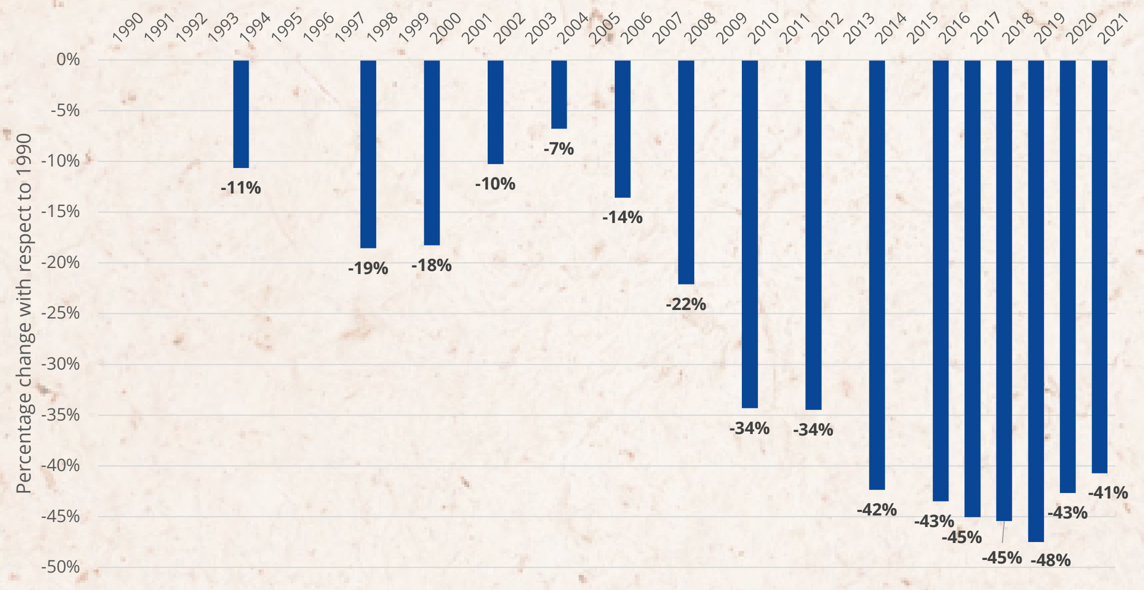


FIGURE 3. Emission intensity reduction per real GDP for the 1990 - 2021 period

KPI-1 recalculations

As a result of the improvements in emissions estimation methodologies, as outlined in the 2020 and 2021 EMR, the annual emissions estimate for the previous series included in the SSLB Reference Framework (1990 - 2019) was modified.

The GDP series used in this KPIR differs from that published in the Framework. Therefore, the results of the KPI-1 values for the 1990 - 2019 period are also different. Table 3 shows a comparison of the aggregate emissions, as well as a comparison of KPI-1 results.

TABLE 3. KPI-1 Recalculations 1990 - 2019 Series

Year	Aggregate emissions included in the SSLB Reference Framework (CO_2eq GWP 100 AR5)	Aggregate KPIR 2020 - 2021 emissions (CO_2eq GWP 100 AR5)	Real GDP included in the SSLB Reference Framework (in billions of pesos at constant 2016 prices)	Real GDP used in 2020 - 2021 IR (in billions of pesos at constant 2016 prices)	KPI-1 included in the SSLB Reference Framework	KPI-1 KPIR 2020 - 2021
1990	29,074	29,219	789	792		
1994	31,953	32,140	971	975	-11%	-11%
1998	33,269	33,460	1,109	1,114	-19%	-19%
2000	32,103	32,296	1,067	1,071	-18%	-18%
2002	31,252	31,456	946	950	-10%	-10%
2004	34,372	34,592	1,002	1,006	-7%	-7%
2006	35,625	35,876	1,121	1,125	-14%	-14%
2008	36,589	36,919	1,280	1,285	-22%	-22%
2010	34,976	34,979	1,438	1,444	-34%	-34%
2012	37,185	37,988	1,566	1,572	-36%	-34%
2014	35,634	36,105	1,691	1,699	-43%	-42%
2016	36,050	36,137	1,726	1,734	-43%	-43%
2017	35,528	35,698	1,755	1,764	-45%	-45%
2018	35,556	35,625	1,763	1,767	-45%	-45%
2019	34,417	34,395	1,769	1,780	-47%	-48%

The variation in aggregate emissions in the series does not exceed 2.2%, resulting in a variation of up to 1.1% in the indicator. However, due to KPI-1 rounding, these differences are 1 and 2% in 2012, 2014 and 2019.

KPI-2 for 2021

KPI-2 is based on estimates of the native forest area (in hectares) from a map developed using satellite images and remote sensing techniques. The Native Forest Report for the SSLB (NFR 2021) outlines the estimated results.

As shown in Table 4, the value of KPI-2 for 2021 with respect to 2012, the baseline year, is 100%.

No recalculations apply to this indicator.

TABLE 4. KPI-2 values for 2004, 2012, 2016 and 2021

Year	Native Forest Area (ha)	KPI-2: Preservation of the native forest area with respect to baseline year 2012 (%)
2004	752,158	88%
2012	849,960	100%
2016	835,349	98%
2021	847,181	100%