



CLIMATE CHANGE IN URUGUAY: ESTIMATED INVESTMENT NEEDS FOR ENERGY & AGRICULTURE



In Uruguay, wind generation helps to promote diversification of the electricity sector in order to reduce greenhouse gas emissions.
Photo: Morris Mac Matzen, www.wordpress.com

<http://www.undpcc.org/en/uruguay>

Selection of key sectors

For the assessment of investment and financial flows needed to address climate change in Uruguay, two sectors were selected that are considered to be of strategic importance for Uruguay: energy and agriculture/forestry.

Energy is a strategic sector from an economic point of view, based on the clear relationship between energy availability and economic development. Uruguay's energy sector is characterised by undiversified energy production, heavily dependent on imported oil (55-60% of energy supply), and a significant share of hydroelectric power (25-30% average, depending on hydrological conditions per year). The sector was analysed regarding its potential for mitigation.

The high importance of **agriculture** as the backbone of the country and for the development of Uruguay is indisputable, although the primary agricultural activity is responsible for only 10 per cent of GDP (including forestry). When the share of the agribusiness sector is included, it reaches 20-37 per cent of contribution to GDP (MGAP-DIEA), and the value of agricultural and agro-industrial products constitutes 65 per cent of the country's total exports. The sector also contributes to emissions of greenhouse gases (GHGs) in Uruguay – livestock is responsible for more than 90 per cent of sectoral emissions (DINAMA, 2009). The sector has great potential to mitigate GHG emissions and to adapt to climate change.

Institutional arrangements

The Climate Change Unit, which is part of the National Environment Directorate (DINAMA) of the Ministry of Housing, Spatial Planning and Environment, led the institutional coordination and ensured information exchange among the ministries that were involved in the process. These included the National Response to Climate Change composed of representatives of the Ministry of Housing, Spatial Planning and Environment, Ministry of

→ In Uruguay, increased climate variability is felt in the form of increased rainfall and increased frequency of storms. At the same time, during the last hundred years, there has been an increasing number of consecutive days without rain. The variability of precipitation and frequency of extreme events are two examples of how climate change affects the economy: in this case, agricultural production and the energy sector. For example, after many days without rain, if more than 70mm of rain falls, the water is not utilised because the dried soil cannot absorb the water, leading to run-off that can cause rivers to overflow, which also affects hydro-energy production.

According to a recently completed assessment of investment and financial flows (I&FF), the net present value deemed necessary to deal with climate change in these two key sectors, energy and agriculture, between now and 2030 is US\$ 2,800 million.

The assessment of investment and financial flows (I&FF) is a key component of the UNDP global project *Capacity Development for Policy Makers to Address Climate Change*. Uruguay is one of 19 countries participating worldwide. The project is funded by the governments of Norway, Switzerland, Finland, UNDP and the UN Foundation.

Foreign Affairs, Ministry of National Defense, Ministry of Industry, Energy and Mining, Ministry of Agriculture, Livestock and Fisheries, Ministry of Public Health, Ministry of Tourism and Sports, Ministry of Economy and Finance, Office of Planning and Budget, the National Emergency System and the Congress of Mayors.

The economic, environmental and social assumptions that define the scenarios of the assessment were agreed through an inter-ministerial dialogue. UNDP and the Instituto Torcuato di Tella, a Regional Centre of Excellence based in Argentina, provided technical backstopping and training to the national teams.

In Latin America, the UNDP regional initiative, *Climate Policy 2012*, funded by the government of Spain and UNDP, provided additional technical and financial support that amplified the impact of these processes.

ASSESSMENT OF THE INVESTMENT AND FINANCIAL FLOWS

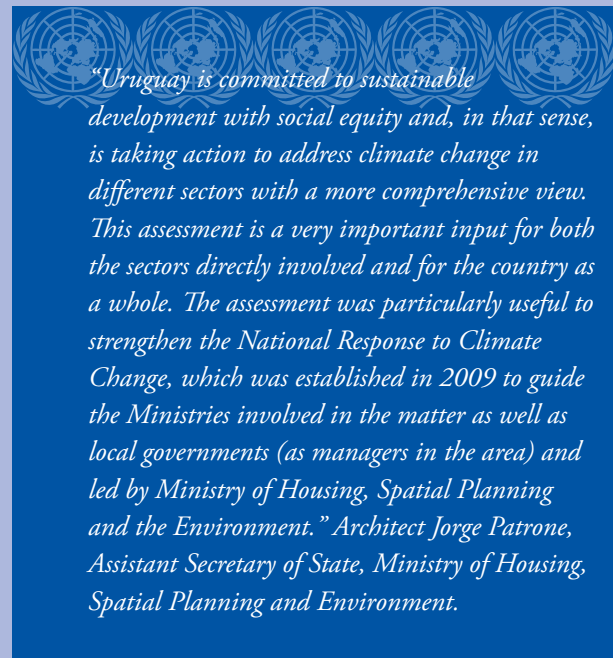
Objectives of the Investment and Financial Flows assessment

The overall objective of the I&FF assessment is to determine the extent and sources of funds needed to address climate change at the national level, and builds directly on national government strategies, plans and programmes. In essence, the assessment seeks to answer the question: *“From a development perspective, what can my country do to address climate change in selected key sectors, and what level of financial contributions will be needed to achieve these objectives?”*

In this context, the I&FF team examined the following questions:

- What are the main adaptation / mitigation measures for the selected sectors in the next 25 years?
- Who is investing in the sector / Who are the main stakeholders and sources?
- What changes / increase in I&FF will be needed in the sectors?
- What additional I&FF are needed to address climate change?

For each sector, a baseline scenario and an adaptation/mitigation scenario were developed to determine the investment flows (IF) and financial flows (FF) of the analyzed measures between 2006/07 and 2030. The values are given in constant 2005 US\$ (US\$ 1 = 19.3 UYU). Investment entities analyzed are: households (private funds), corporations (private and NGOs) and government (public funds).



For the energy sector (mitigation of greenhouse gas emissions)

Between 2007 and 2030, the sector will need approximately US\$ 1,868.32 million to implement three of the analysed mitigation measures, while a fourth measure generates net savings of US\$ 1,662.84 million, leading to a total investment requirement of US\$ 205.48 million for the four selected measures:

- **Energy efficiency:** The mitigation scenario includes the impacts of measures to increase efficiency (US\$ 35.54 million);
- **Wind power:** The mitigation scenario incorporates the establishment of 300 MW of wind power during the period 2010-2014 and an additional 300 MW during the period 2016-2030 (US\$ 1,105.35 million);
- **Biomass Generation:** The mitigation scenario incorporates an additional 200MW of installed capacity by 2015 (US\$ 727.43 million); and
- **Coal mining vs. natural gas:** It is assumed that the thermal park will be expanded through the installation of combined cycle, natural gas-fired modules of 180 MW (a net saving of US\$ 1,662.84 million).

For these measures, domestic resources of corporations will have to increase by US\$ 62.92 billion, while external resources of corporations will have savings of US\$ 910.63 million. Domestic government funds will save US\$ 1,492.36 million, while external government funding must be increased by US\$ 545.55 million.

For the agriculture/forestry sector (mitigation of emissions & adaptation to the impacts of climate change)

During the period 2006-2030, an estimated US\$ 4597.98 million will be required in the sector for the analysed measures. The three measures selected were:

- **Forestry:** Carbon sequestration in forests mainly comprises grassland afforestation on the ground, which is of special importance regarding forest species, and the replacement of existing planted forests (US\$ 1,320.48 million);
- **Intensification:** Intensification of livestock production includes extensive beef cattle and milk production (US\$ 1,837.66 million);
- **Agriculture:** Carbon sequestration in agricultural soils comprises the increase of crop rotation with pastures in dryland farming systems and rice (US\$ 1,439.84 million).

For these measures, domestic resources of corporations will have to increase US\$ 2,741.82 million, while external resources of corporations require US\$ 1,773.52 million. The domestic government funds need to increase US\$ 82.66 million, while external government funds do not require increasing.

EVALUATION OF POLICY IMPLICATIONS FROM THE I&FF ASSESSMENT

For the energy sector (mitigation of greenhouse gas emissions)

- The implementation of the mitigation actions require specific public policies aimed at overcoming investment barriers. The targets that have been set for the National Energy Policy for 2005-2030 are endorsed by the results of this I&FF assessment.
- The institutional framework related to climate change policies should be strengthened to promote proper coordination of government agencies with responsibilities in this area, as well as the participation of other public and private actors involved in governance related climate change.

For the agriculture/forestry sector (mitigation of emissions & adaptation to the impacts fo climate change)

- The proposed scenario implies a reduction in carbon footprint of products, since productivity increases

SUMMARY TABLES OF INCREMENTAL INVESTMENT COSTS

Table 1: Cumulative discounted IF, FF and O&M for all investments in each sector, by investment entity and funding source.

Incremental cumulative discounted sectoral investments (millions 2005 US\$). Period 2007-2030 (energy sector), period 2006-2030 (agriculture).

Investment entity	Source of I&FF		Energy			Agriculture/forestry		
			ΔIF	ΔFF	ΔO&M	ΔIF	ΔFF	ΔO&M
Households	Domestic	Equity and debt	-	-	-	-	-	-
Corporations	Domestic	Equity	42.14	-	-	1,122.13	1.03	584.18
		Domestic Loans	17.11	3.67	-	456.29	-	578.19
	External	Foreign Direct Investment (FDI)	-921.61	-	-	1,229.98	10.30	533.24
		External loans	10.98	-	-	-	-	-
		External assistance	-	-	-	-	-	-
Total Corporations			-851.38	3.67	-	2,808.40	11.33	1,695.60
Government	Domestic	Shareholders' equity	0.77	2.45	-1,495.58	-	54.19	28.46
	External	External loans	545.55	-	-	-	-	-
		External assistance	-	-	-	-	-	-
Total Government			546.31	2.45	-1,495.58	-	54.19	28.46
TOTAL			-305.07	6.12	-1,495.58	2,808.40	65.52	1,724.07

IF = investment flow, FF = financial flow, O & M = operation and maintenance costs
 ΔI&FF = gradual change in investment and financial flows; ΔO&M = change in operation and maintenance costs
 Negative values mean net savings
 Source: Results of I&FF assessment

more than GHG emission. Uruguay was the first country to propose the concept of emissions per output unit as a measure for mitigation activities in agriculture, and the selected measures are in line with the country's international position.

- The measure to sequester carbon in agricultural soils through the rotation of crops and pastures is part of a newly implemented policy for soil conservation. Note that the use of carbon finance can be more effective than the policy of "command and control" currently under consideration.

More broadly in the field of climate change mitigation

- At the international level, while defining a multilateral agreement to reduce emissions of GHGs from 2013, Uruguay could design a strategy for accessing carbon markets through bilateral or multilateral agreements with a small number of States.
- At the local level, the implementation of mitigation and adaptation policies requires infrastructure and technical training. For the purposes of calculating GHG emission reductions and market access, it is also necessary to strengthen the capacity of institutions to meet MRV (monitoring, reporting and verification) requirements.

Table 2: Annual IF, FF and O&M for all investments in each sector. Incremental sectoral investments (millions 2005 US\$).

Year	Energy			Agriculture/forestry		
	Δ IF	Δ FF	Δ O&M	Δ IF	Δ FF	Δ O&M
2006	-	-	-	2.95	0.13	4.94
2007	-	-	-10.04	6.00	0.23	8.40
2008	-	-	-21.53	32.74	0.54	12.24
2009	-	-	-45.21	57.88	0.85	17.23
2010	-	-	-42.78	77.53	1.12	22.68
2011	-	-	-51.32	88.62	1.34	27.10
2012	142.29	0.44	-53.82	104.70	1.64	31.37
2013	57.07	0.43	-75.01	106.83	1.77	37.33
2014	-193.12	0.42	-151.67	120.78	2.08	43.30
2015	-110.24	0.41	-126.81	119.54	2.19	49.08
2016	356.38	0.41	-104.02	132.86	2.50	55.31
2017	-117.87	0.40	-85.19	132.10	2.62	61.36
2018	-53.72	0.39	-81.66	145.21	2.95	68.23
2019	-52.74	0.38	-85.78	141.97	3.04	74.97
2020	-51.84	0.38	-68.94	153.19	3.40	84.53
2021	-50.95	0.37	-78.37	152.05	3.55	93.41
2022	-107.78	0.36	-79.96	165.75	3.96	104.34
2023	-49.22	0.36	-65.80	163.39	4.19	116.17
2024	-48.33	0.35	-67.45	177.66	4.68	129.51
2025	-47.44	0.34	-66.69	166.91	4.91	143.92
2026	-46.56	0.34	-58.64	190.64	5.37	153.85
2027	1.33	0.33	-52.93	189.39	5.43	158.01
2028	1.30	0.33	-64.86	204.64	5.89	170.09
2029	1.28	0.32	-72.00	204.36	6.10	180.72
2030	1.25	0.31	-92.06	220.80	6.54	191.20
TOTAL	-368.91	7.06	-1,702.49	3,258.49	77.01	2,039.32



Knowledge platform

The project website: www.undpcc.org contains information on activities in Uruguay, the I&FF methodology and other resources.

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IF = investment flow, FF = financial flow, O & M = operation and maintenance costs
 Δ I&FF = gradual change in investment and financial flows
 Δ O&M = change in operation and maintenance costs
 Negative values mean net savings
 Source: Results of I&FF assessment

More information on activities in Uruguay

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