Environmental problems and Development Policies for Renewable Energy in BRIC Emerging Countries

# Environmental Problems and Development Policies for Renewable Energy in BRIC Emerging Countries

One of the most relevant and compelling issues faced by emerging economies of the BRIC countries (i.e. Brazil, Russia, India and China) in the current economic climate concerns the environmental and energy fields, especially in the face of present economic stagnation.

The VI BRICS Summit[1] was devoted mainly to social inclusion and sustainable development. The debate was based on the slogan "Inclusive growth: sustainable solutions". During this summit, an Agreement on the New Development Bank was signed in order to address the "…significant financing constraints to address infrastructure gaps and sustainable development needs"[2].

One of the many commitments of New Development Bank (NDB) is:

"DESIROUS to contribute to an international financial system conducive to economic and social development respectful of the global environment;"[3]

And the Final Declaration of Fortaleza states that:

#54.. "The agenda should integrate the economic, social and environmental dimensions of sustainable development in a balanced and comprehensive manner with concise, implementable and measurable goals,…"

#55 ". We reiterate our commitment to the UN General Assembly Open Working Group on Sustainable Development Goals (SDGs) …"[4]

At a UNFCCC meeting in Bonn, BRIC countries established a financial instrument (NDB) for future challenges in a world that has just come out of a crisis; many interested contributors from both developed and developing countries have

[1] Jul 14th-16th, 2014, Fortaleza and Brasilia: 6th Summit of Heads of State and of Government of BRICS.
[2] Agreement on the New Development Bank – Fortaleza, July 15., http://brics6.itamaraty.gov.br/media2/press-releases/219-agreement-on-the-new-development-bank-fortaleza-july-15
[3] Agreement on the NDB, cited, Annex 1

[4] Fortaleza Declaration, http://brics6.itamaraty.gov.br/media2/press-releases/214-sixth-brics-summit-fortaleza-declaration

indicated that they will be making financial pledges to the Green Climate Fund (GCF).

The Fund, established during the 2010 Conference of UNFCCC States Parties (held in Cancun), was designated as an operating entity of the financial mechanism of the Convention. It will aim to make a significant and ambitious contribution to the efforts towards attaining agreed international goals on combating climate change, including promoting a paradigm shift towards low-emission and climate-resilient development pathways by providing support to developing countries.

The Initial Mobilization Resource should be around US$10billion, according to latest decisions of the GCF Board's latest decisions.

There are thus various financial instruments devoted to dealing with future challenges in sustainable development. These instruments have an impact on main environmental indicators. But, what about situation and trend of environmental main indicators in the world? GHG emission and removal is an important element amidst efforts to achieve the objective of " stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system"[5]

After COP 18 in Warsaw (Poland), in 2013, where trends were updated, and the contribution of BRIC states towards the objective of stabilization is now clear.

First of all, we must analyze the recent trends of GHG emission in BRIC, based on the UNFCCC database. [6] Unfortunately, only Annex I Parties provides "projection data", made available for 2020 and 2030 under the 'with measures', 'with additional measures' and 'without measures' scenarios[7].

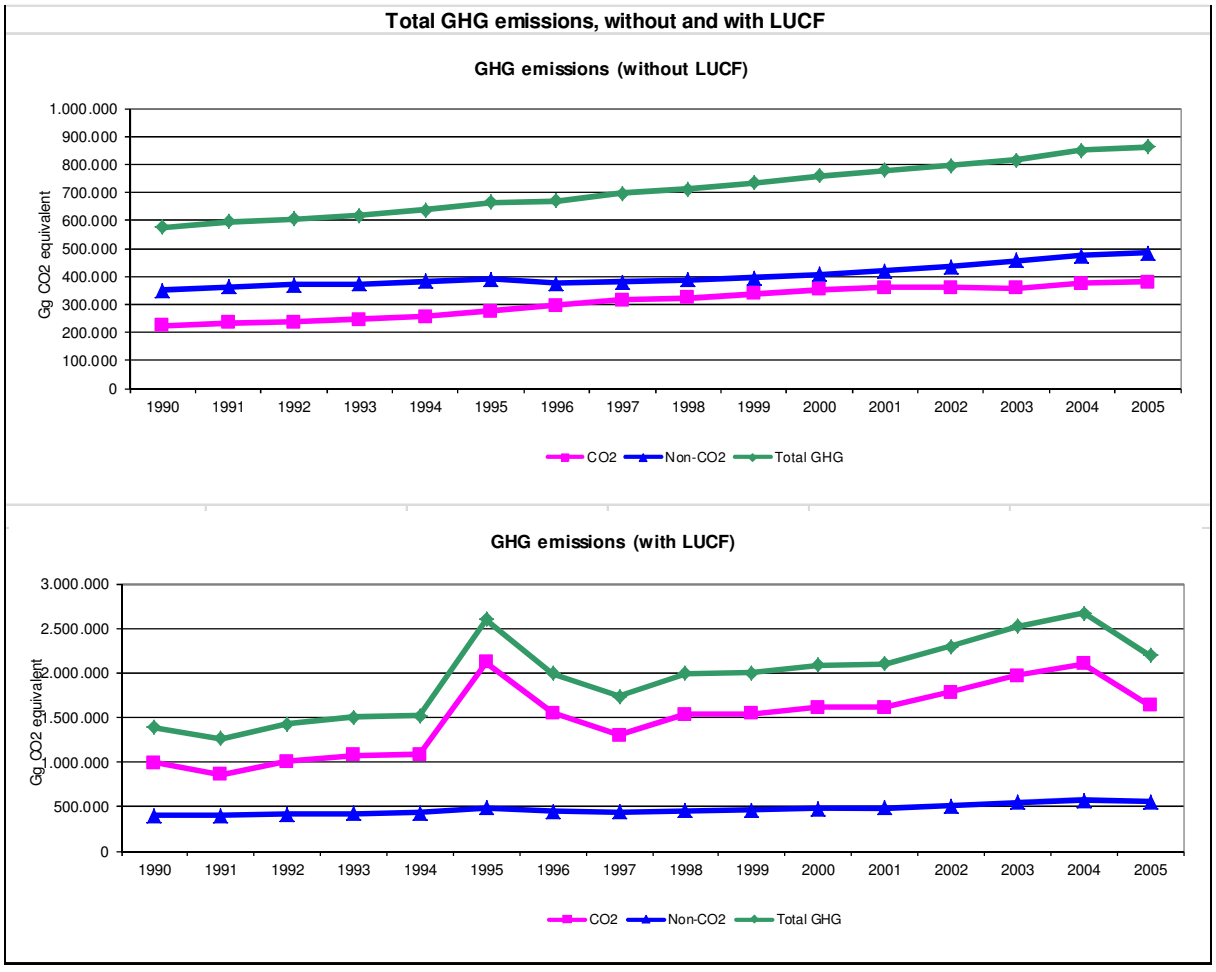
The main data are represented with or without LUCF and LULUCF (Land-use and Land-use and change forestry) . Following the definition of UNFCCC, the rate of the build-up of $CO_2$ in the atmosphere can be reduced by taking advantage of the fact that atmospheric $CO_2$ can accumulate as carbon in vegetation and soils in terrestrial ecosystems (namely, "sink"). Human activities impact terrestrial "sinks" through land use, land-use change and forestry (LULUCF) activities. As a consequence, the exchange of $CO_2$ (carbon cycle) between the terrestrial biosphere system and the

[5] Ultimate objective of the Climate Change Convention (UNFCCC)
[6] All data are available at http://unfccc.int/ghg_data/items/3800.php, updated to the latest GHG data received by the secretariat as of **28 May 2014**, which includes the 2014 national GHG inventory submissions.
[7] GHG Data Interface by UNFCCC, cited

atmosphere is altered. The role of LULUCF activities in the mitigation of climate change has long been recognized. Mitigation can be achieved through activities in the LULUCF sector that increase the removal of greenhouse gases (GHGs) from the atmosphere or decrease emissions by sources leading to an accumulation of carbon stocks. An important feature of LULUCF activities in this context is their potential reversibility and thus non-permanence of the accumulated carbon stocks.

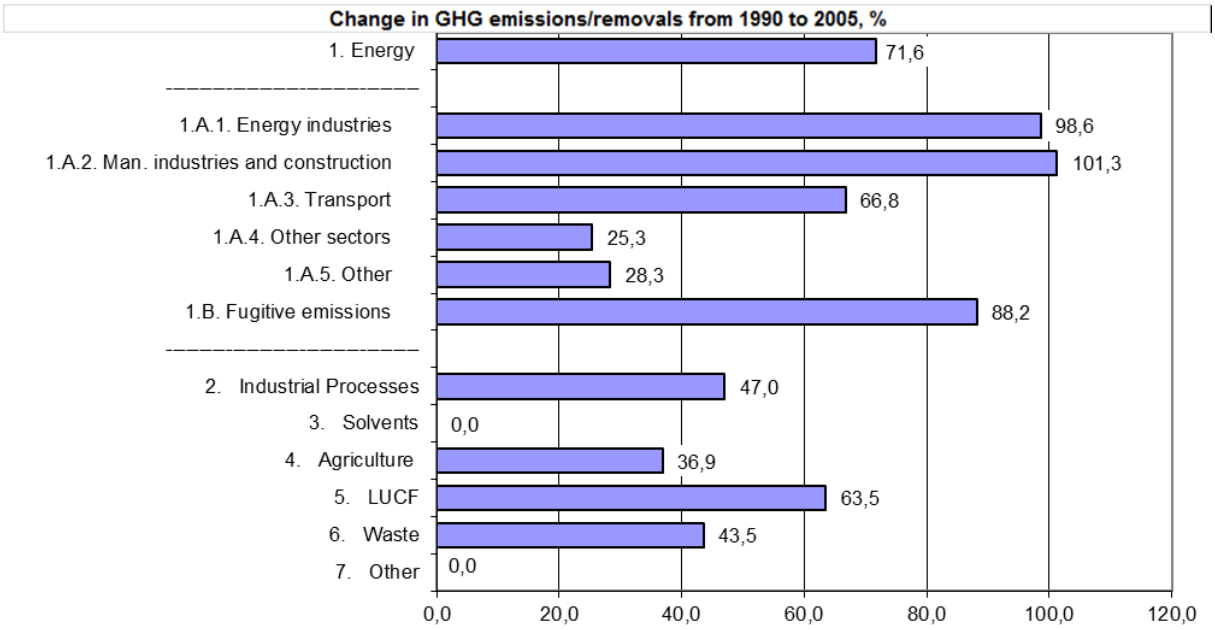
The BRIC data  demonstrates the impact and role of LULUCF activities in measuring emission trends/removal.  Country case studies will be analyzed as follows.

BRAZIL



Net GHG emission peaked in 1995 following new policies on car fuel, and subsequently decreased. According to latest data from the Observadorio do Clima[8], the decreasing trend of GHG emission reached its minimum low in 2012 since 1992 (1,48 Gigatons in 2012, 1,43Gt. in 1992).

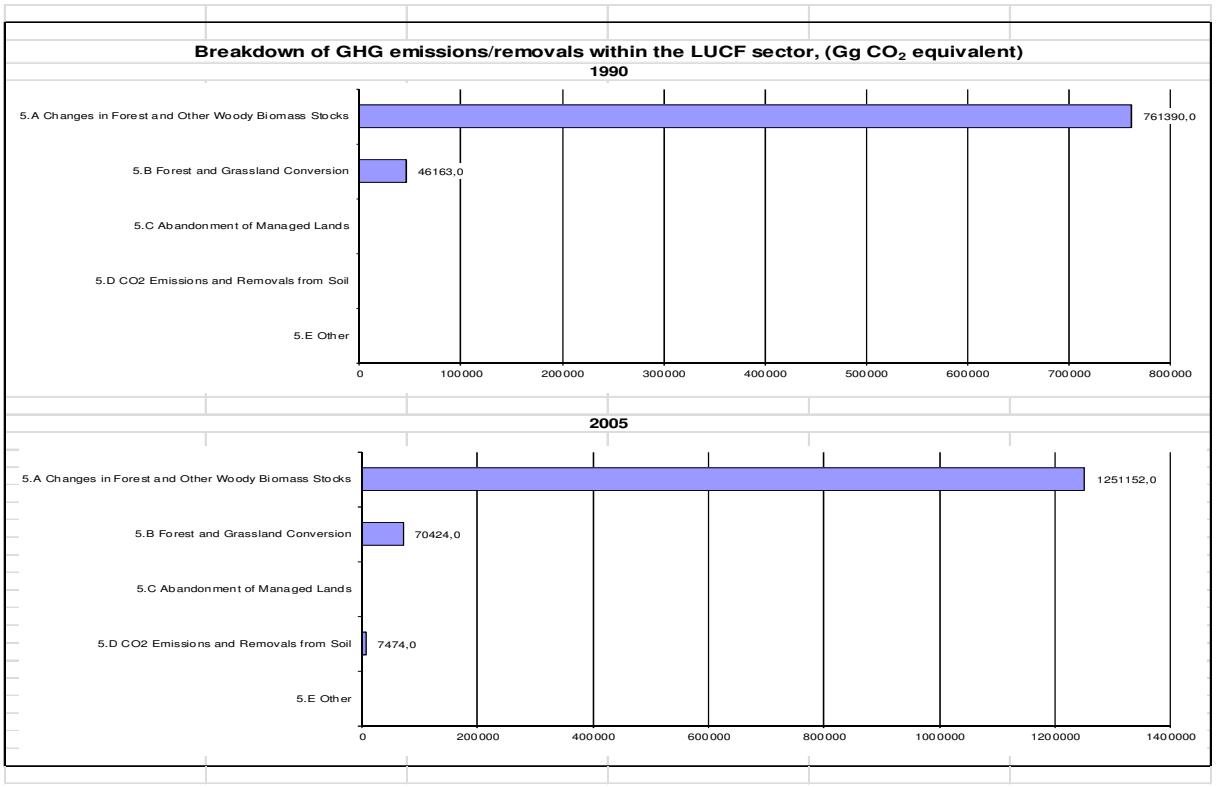
During the same period (1990-2005) change in GHG removals were as follows:




The energy sector (see total and disaggregates %) was more relevant than the industrial and other sectors.

The relevance of LUCF is given by data about the breakdownof GHG emission removals:

[8] Tasso Rezende de Azevedo and Carlos Rittl (edt.), ANÁLISE DA EVOLUÇÃO DAS EMISSÕES DE GEE NO BRASIL (1990-2012). DOCUMENTO SÍNTESE. Aug. 2014

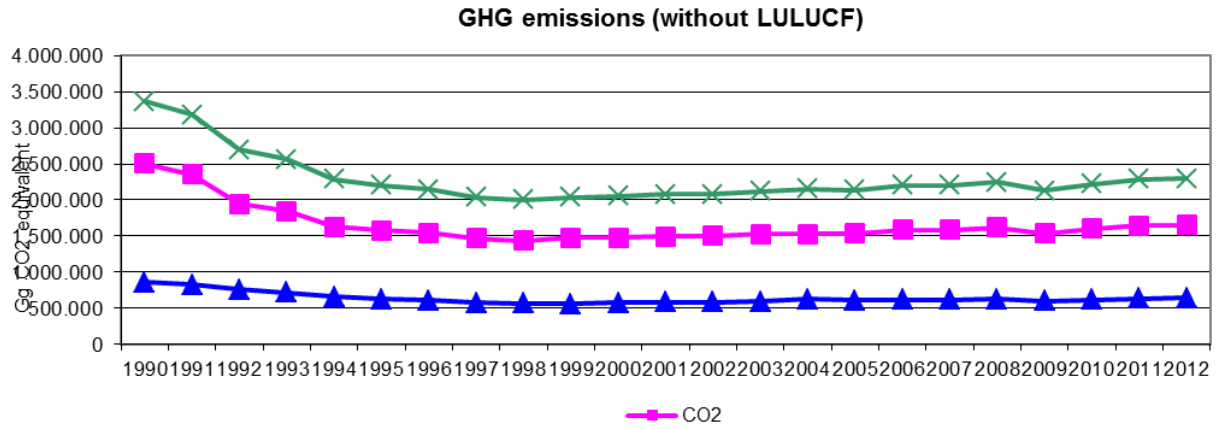


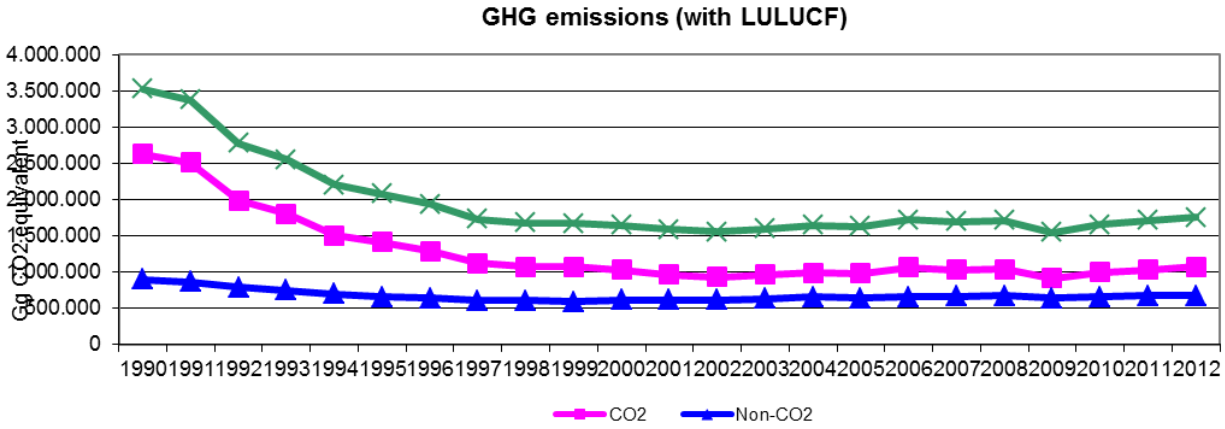

All data and figures are reported as found in the Greenhouse Gas Inventory Data by UNFCCC.

RUSSIA

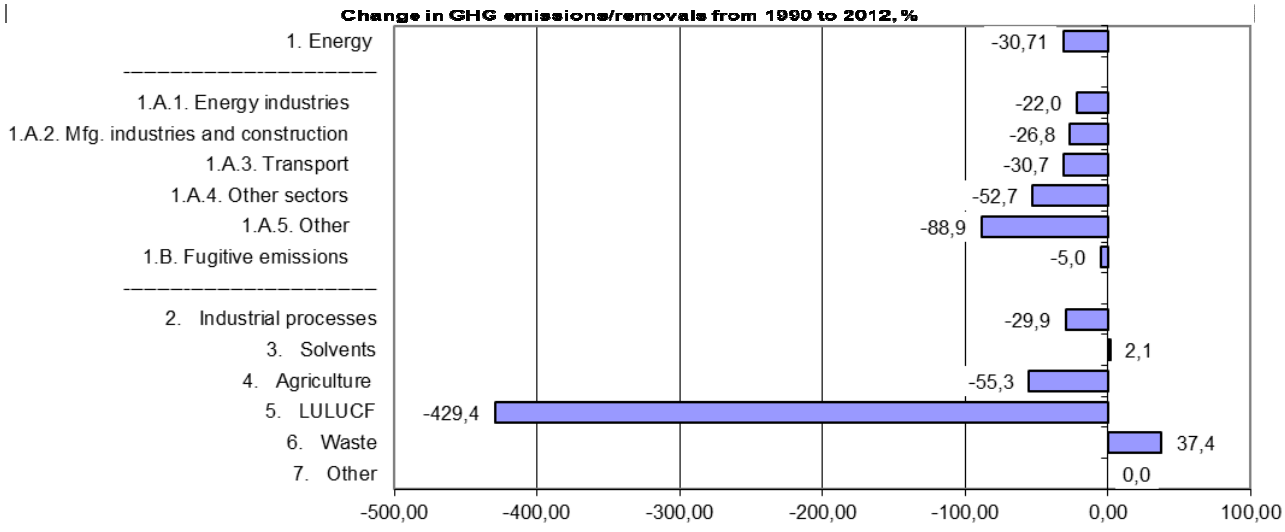
The Russian Federation shows a longer time series compared to Brazil, as well as LULUCF decreasing from the ‘90s onwards, due to different policies of Land-use and forestry management.

Activities and programs devoted to “sinks” had their impact before 2000 (see the greater decreasing trend of LULUCF data until 2000).



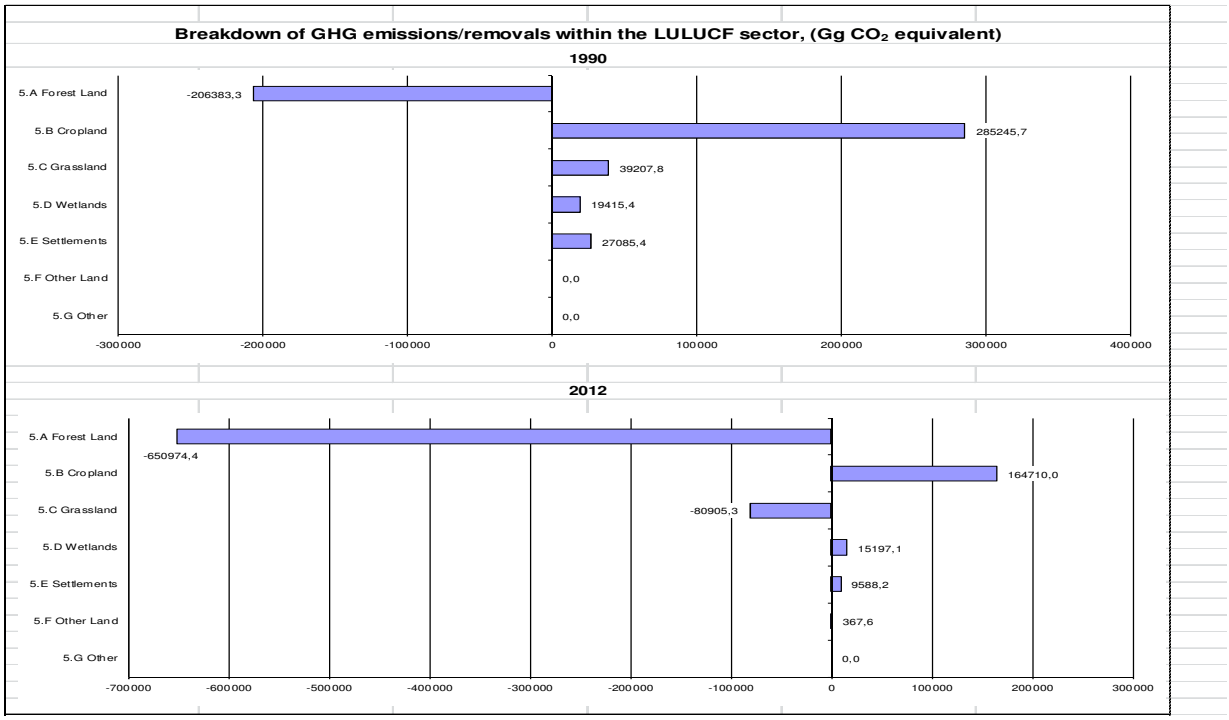




Russia puts forward the only negative net data in the above period:



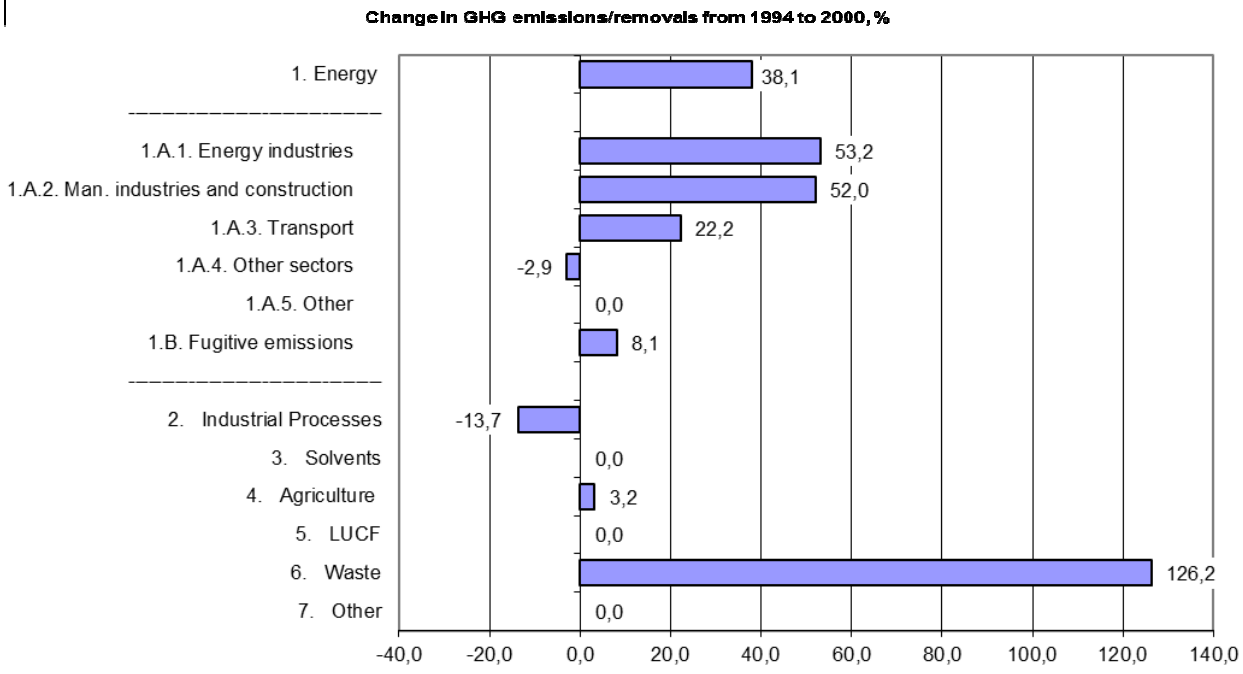
The LULUCF sector outweights all other economic sectors, and only “waste” shows a net positive trend.

In a certain way, the Russian LULUCF course presents a trend which runs counter to other BRIC countries




INDIA

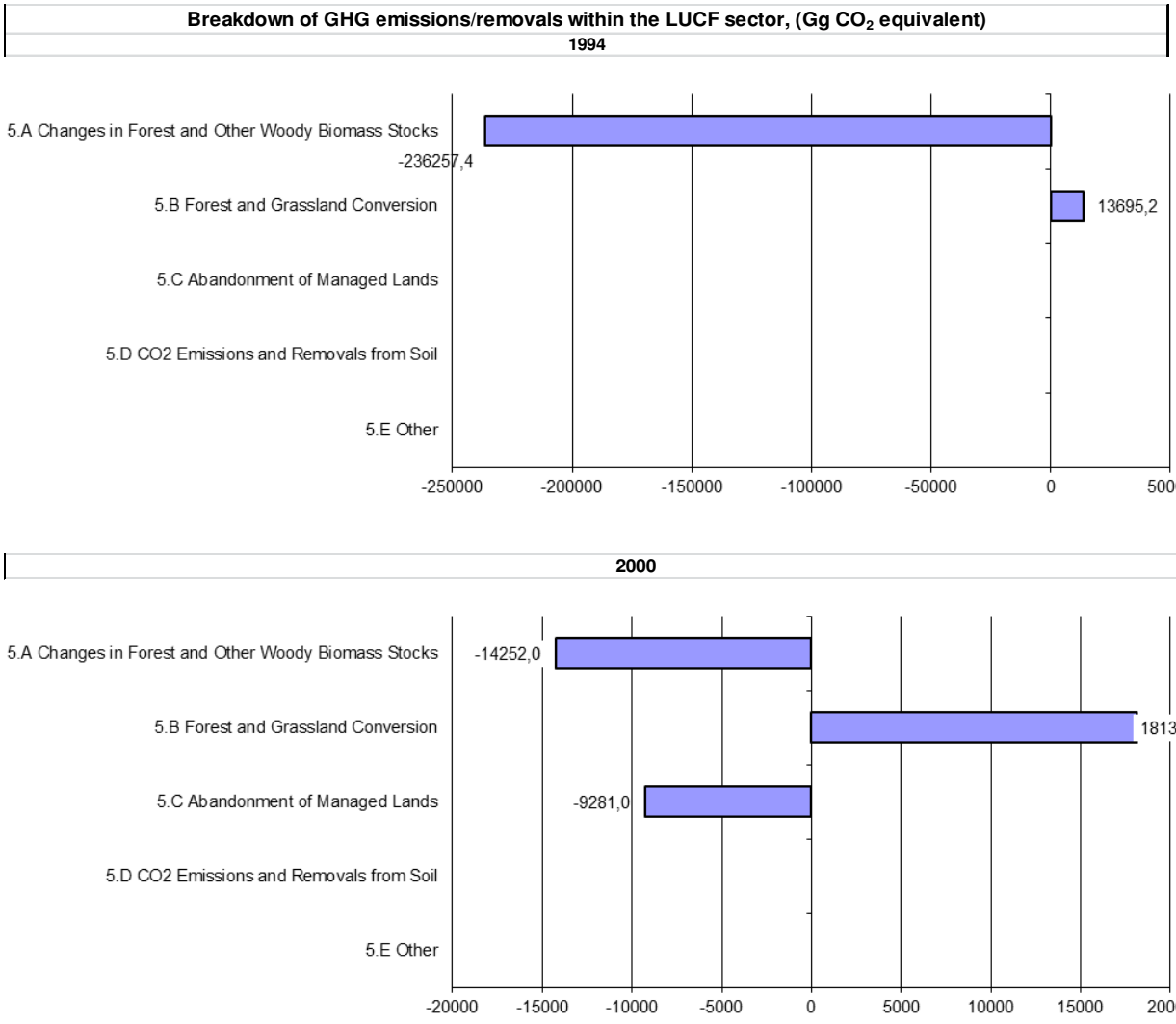
Data in India is not as readily available as in previous countries. It has not been presented by time series for the last 20 years, but only for 1994 and 2000; this is due to specific problems related to their national statistic system (harmonization of statistical techniques is an objective of UNFCCC).




Original figures help us to show the limited impact of LULUCF policies on net trend, which highlights the need for more accurate statistics to analyze India's trend.

| | Emissions, in Gg $CO_2$ equivalent | | |
|---|---|---|---|
| | 1994 | 2000 | Latest available year (2000) |
| CO2 emissions without LUCF | 779.348,0 | 1.024.772,9 | 1.024.772,9 |
| CO2 net emissions/removals by LUCF | 14.142,0 | -236.257,4 | -236.257,4 |
| CO2 net emissions/removals with LUCF | 793.490,0 | 788.515,4 | 788.515,4 |
| GHG emissions without LUCF | 1.214.248,0 | 1.523.766,6 | 1.523.766,6 |
| GHG net emissions/removals by LUCF | 14.292,1 | -222.562,2 | -222.562,2 |
| GHG net emissions/removals with LUCF | 1.228.540,1 | 1.301.204,3 | 1.301.204,3 |

Data shows the great negative net amount of forest and other biomass stock, as well as abandonment of managed lands in 2000. On the other hand, the impact of Forest and grassland conversion presented a positive trend in the same year.

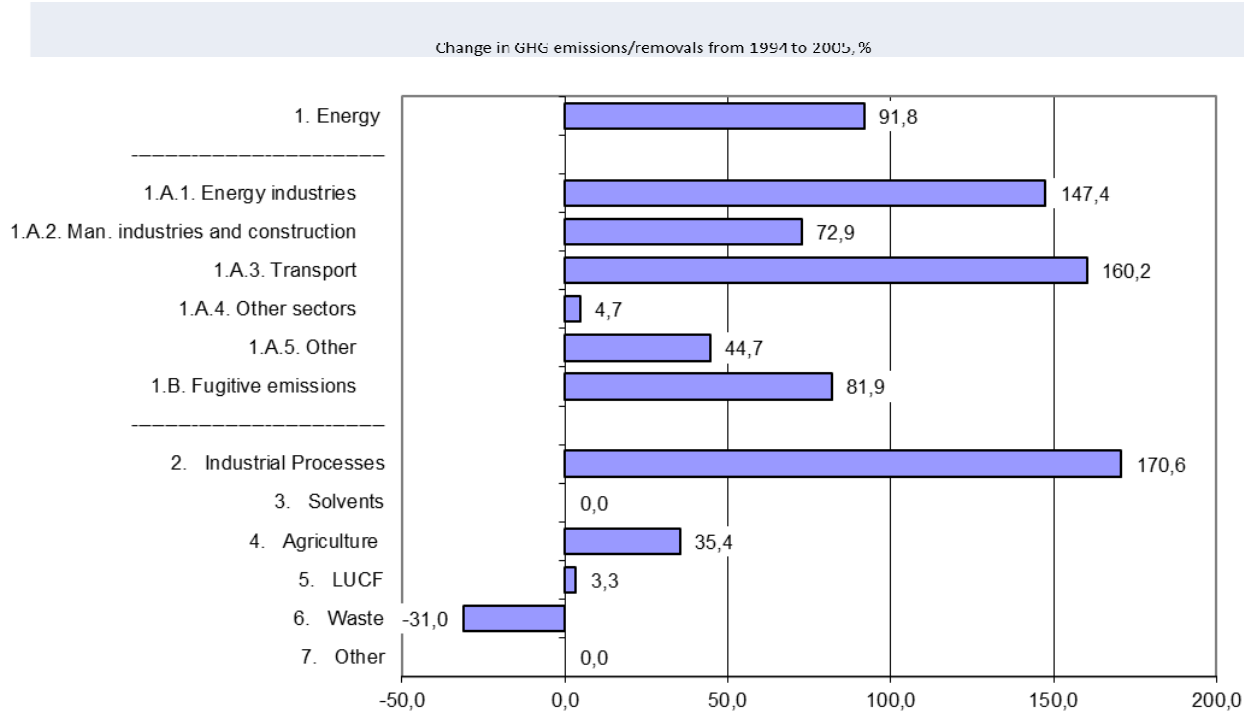



## CHINA

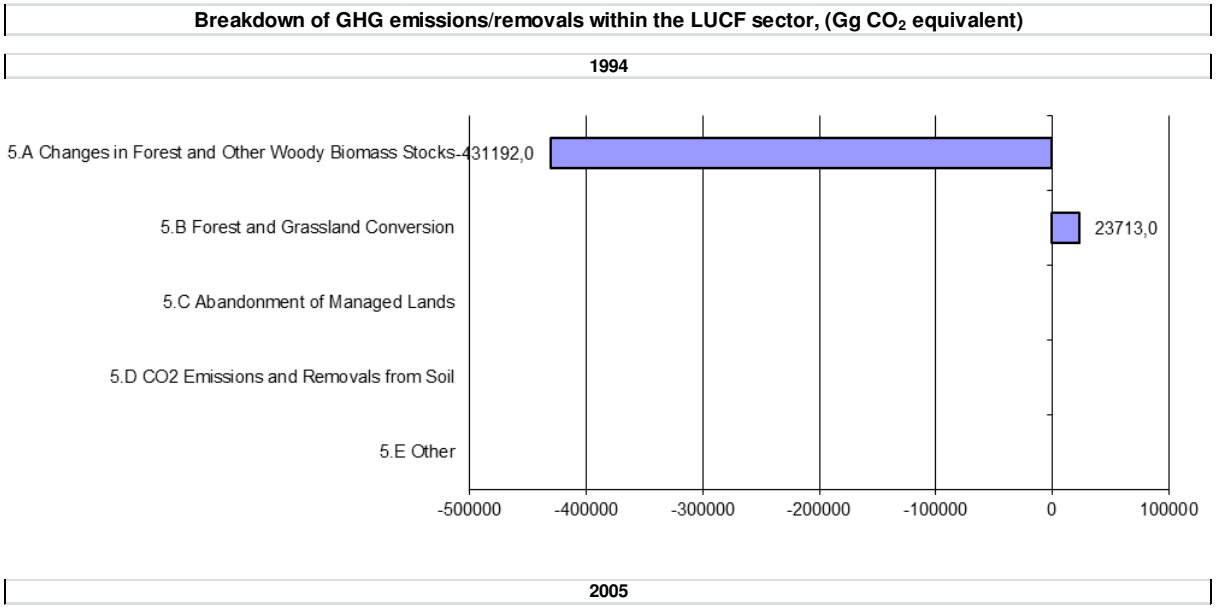
As in the case of India, China's official statistics to UNFCCC do not include an annual trend, but only present data from 1994 and 2005.

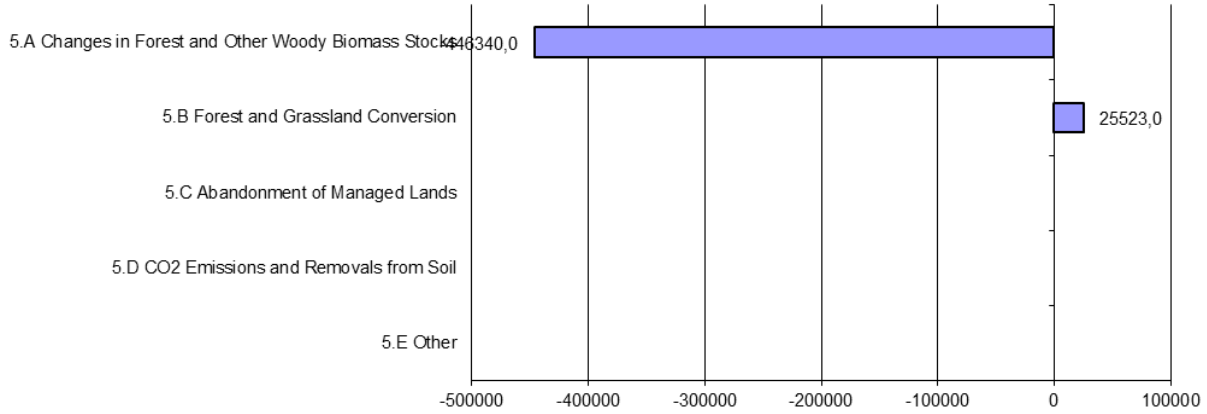
| | Emissions, in Gg $CO_2$ equivalent | | |
|---|---|---|---|
| | 1994 | 2005 | Latest available year (2005) |
| CO2 emissions without LUCF | 3.073.470,0 | 5.975.568,0 | 5.975.568,0 |
| CO2 net emissions/removals by LUCF | -407.479,0 | -421.530,0 | -421.530,0 |
| CO2 net emissions/removals with LUCF | 2.665.991,0 | 5.554.038,0 | 5.554.038,0 |
| GHG emissions without LUCF | 4.057.617,0 | 7.465.861,7 | 7.465.861,7 |
| GHG net emissions/removals by LUCF | -407.479,0 | -420.817,0 | -420.817,0 |
| GHG net emissions/removals with LUCF | 3.650.138,0 | 7.045.044,7 | 7.045.044,7 |

With a neglegible impact of LULUCF activities from 1994 to 2005




It is important to observe that the net emission has doubled in 15 years (+93%), increasing at an annual rate of
+6,2%.






There is no relevant variation in activities and policies during the considered years.

As for the Global Environment Outlook[9] and OECD forecast[10], the first challenge for BRIC countries is the of energy inputs to production in relative or absolute terms.

This effect is not evident in BRIC countries, partly because of the displacement effect and the delocalization of firms and sectors to emerging countries.

Thus, carbon and energy productivity, as well as resource productivity, are the most important factors responsible of total GHG emission.

The interdependence of the economic system means that stabilisation of emissions is a global objective, and a deep analysis of emissions related to international trade is a necessary instrument not only for analysis, but also for policy action.

For BRIC countries in particular, production-based productivity (GDP per unit of GHG emitted) and demand-based productivity (real income per unit of GHG emitted, equal to production-based plus imports embodied emission, minus exports embodied emission) is the best way of monitoring progress with the aim to "stabilize the concentration of emission of GHG's in the atmosphere at a level that would limit their adverse effect on climate system".

The consequence is that the evaluation of the impact for policy actions (environmental regulation, energy incentives/taxation) is an important element in order to guarantee the best course of action as well as feasible international agreements.

[9] UNEP, Annual Report 2013, downloadable at http://www.unep.org/annualreport/2013/docs/hr_ar2013.pdf
[10] OECD Environmental Outlook to 2050. The Consequence of Inaction. OECD Green Growth Indicators 2014.

A significant comparative study[11] applied to the situation in China shows how great and significant the consequences of a weak and strong regulation framework on total-factor energy efficiency (indirectly on emission trend) are. Regional and short v long run differences in China demonstrate that the BRIC emission trend and environmental policies must be "tailored" according to the potential increase of green technology, but also to potential environmental stress to industrial sectors.

The latest commitments of BRIC countries, as declared on COP18, show the difficulties of a general agreement. In the face of a weak pledge on final objectives, there are recommendations on the next steps that should be taken, in particular[12]:

- Brazil: reduction by at least 36.1% of greenhouse gas emissions compared to projected emissions by 2020, SUBJECT TO condition "if…"
- Russia: reduction of GHGs by 15-25% by 2020, (starting point 1990) , SUBJECT TO condition "if…"
- India**:** reduce the emission intensity of GDP by 20-25% by 2020, on 2005 levels (emissions from the agriculture sector not included).
- China: set the target to reduce its CO2 emissions per unit of GDP by 40–45 % by 2020 compared with the 2005 level. Moreover, The National People's Congress approved the Outline of the 12th Five-Year Plan, which clearly mentions that China will establish statistical and verification systems for GHG emissions.

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[11] Z. Wang, C. Feng: The impact and economic cost of environmental regulation on energy utilization in China, Applied Economics, 2014, no. 27, pp. 3362.3376

[12] Official communication of Parties to COP 18 and subsequent UNFCCC meetings

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