BRAZIL'S ACTION PLAN FOR THE PROGRESSIVE REDUCTION OF RELEASES OF UNINTENTIONALLY PRODUCED POPs FROM ANTHROPOGENIC SOURCES

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Introduction
Brazil's inventory of dioxin and furan sources and estimation of emissions, base year 2008[1] was developed in 2011 as part of Brazil's obligations under the Stockholm Convention on Persistent Organic Pollutants, in accordance with the standardized format established by UNEP[2]. It was subsequently developed the Action Plan based on this inventory, also to fulfil the obligations of Brazil to the Stockholm Convention on POPs.

Methodology
A detailed list of emission sources of dioxins and furans (PCDD/PCDF), was prepared along with the description of Best measures Environmental Practices and Best Available Techniques (BAT / BEP) according to SC/UNEP`s Guidelines on Best Available Techniques and Provisional Guidance on Best Environmental Practices Relevant to Article 5 and Annex C of the Stockholm Convention on Persistent Organic Pollutants[3] applicable to each source, exhaustively. The national situation was then described where the information was available, and proposals for the initial strategy. All the work focused on the set of emission sources with greater participation in the inventory, to maximize the benefits and reduce costs. The draft of the strategy was presented and discussed with stakeholders, at two meetings of the Institutional Technical Group (GTI) of the Minister of Environment, and with various industrial sectors and the technical team of the Minister of Environment, to obtain additional information on the status and national conditions, to generate the final Action Plan.

Results and discussion
The Action Plan focused mainly on air emissions and liquid effluents (Table 1 and 2 respectively), and then to other emission sources of interest in order to increase efficacy in the reduction of emissions in the period of implementation. Release in product is mainly from leather and textile industry. As the industry claims they do not use contaminated chemicals any more, even in the incoming raw materials, it was considered a total reduction in release in the five years period of the implementation of the Action Plan.

A need to supplemented and/or to update existing legislation to meet the proposed measures should be considered as an activity of the Action Plan. Concern about the conditions of the industry to meet higher standards (BAT) was expressed during meetings of the GTI, which occurred in March 25, 2014 and August 28, 2014.

The plenary discussions with stakeholders showed the need for joint government-industry effort to analyse the proposals of the BAT-BEP Guidance (SC/UNEP 2008)[3] and to check the difficulties of compliance in the short term, depending on local conditions. The definition of Best Available Techniques and Best Environmental Techniques (BAT-BEP) to national conditions should be an activity of the Action Plan. Measures to the reduction of PCDD/PCDF releases in the environment should take into account the size of the companies and whether they are new or existing. It should be noted that, for the analysis in this sense, there is the need for national data on emission factors for the matter to be discussed in more solid foundation.

Needs for training and infrastructure for monitoring were raised by some stakeholders and it was analysed in the process, resulting in suggestions and measures for improvement. It was verified there is a deficiency in laboratorial infrastructure and also in trained human resources for monitoring. Thus, proposals have been made to increase the existing infrastructure and capacity building, both governmental and private. The high costs of collection and analysis of samples are limiting factors to more frequent monitoring.

The strategy adopted to reduce or if possible eliminate the release of PCDD/PCDFs consists basically of the following points:

- Action on the sources detected by the National Inventory of Sources and Emissions of dioxins and furans estimate, base year 2008 (BRASIL/MMA, 2013)[1], according to their significance and growth potential in relation to releases into the air, in the waters, and in the product;
- Use of Best Environmental Practices (BEP) and/or Best Environmental Techniques (BAT) as defined by the Convention, adapted to national conditions, with scheduling requirements as size, relevance of the source and existing or new, with setting of emission limits for the presence of PCDD/PCDFs in the gaseous and liquid effluents;
- Adequate waste management;
- Monitoring of PCDD/PCDFs in the gaseous and liquid effluents and the environment;
- Awareness actions in general (institutional, industry, general population) and to encourage joint participation of the various institutions and/or agencies that can assist in the reduction of PCDD/PCDF release, or generate information to improve quantification of national PCDD/PCDFs;
- Improvement of infrastructure and national capacity building, both governmental and private, for monitoring PCDD/PCDFs;
- Updating and complementation of national legislation on the subject.

The Action Plan contains a set of goals, objectives and actions to promote the development of the support basis and the necessary infrastructure for the reduction or elimination of unintentionally formed POPs (U-POPs). To do so, eight goals were formulated along with and twenty-one actions. The Action Plan will be implemented in five years, and at the end of the period it will be revised and needs for changes will be analysed, based on a new inventory of emissions.

Implementation of the above strategies is expected to reduce the release of 1,018 g-TEQ in the period of five years. The total release will be reduced from 2,235 g-TEQ in 2008 to 1,356 g-TEQ at the final date of the Action Plan. In the final amount released it was considered change of release from one media to another, like from air so residues. The difference corresponds to 40% reduction in the total release estimated for the base year 2008.

Surveillance on other sources: Some sources not considered in the main strategy have good potential formation of PCDD/PCDFs and of growth, such as combustion of coal and biomass, secondary production of copper, zinc and lead, production EDC/VC/PVC. Thus, these sources should have an accompanying program with periodic measurements that can better characterize their release for use in the next inventory.

Cautions concerning to solid waste: The reduction of PCDD/PCDFs in wastes is an issue that deserves special care. The general recommendation is its proper management. For these pollutants, the best management practice is in the direction of preventing its generation. Once generated, the best way would be its destruction at the moment is basically thermal destruction. Disposal in landfills is only a way of storing and not elimination. Therefore, in order to effectively reduce their presence in the environment, the two first practices above mentioned should be preferred. This is a recommendation which reduction of releases was not included in the implementation period of the present Action Plan, but will undoubtedly help to increase the overall calculated release reduction. Industry should manage adequately the wastes containing PCDD/PCDFs and effort should be to the to those sources of higher amount of PCDD/F containing wastes, according to the base year 2008 Brazil's inventory.

With the implementation of the strategies and measures described, it is expected the scenery of emissions showed in Table 3. Emission per capita will decrease from 11.8 µg-TEQ in 2008 to 7.1 µg-TEQ at the end of the implementation period.

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References:
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Table 1 Source categories included in the Action Plan relative to PCDD/F air releases, amount released and relative participation in the total inventory emission in 2008.

Source	Release (g TEQ.year^{-1})	Participation in the total inventory (%)
Iron ore sintering	390.6	17.5
Open burning – biomass	300.2	13.4
Fires and open burning of wastes, accidental or not	129.8	5.8
Medical waste incineration	67.6	3.0
Iron and steel plants	57.9	2.6
Lime production	37.4	1.7
Aluminum production (secondary)	28.1	1.3
Thermal wire reclamation	24.5	1.1
Sum	1,036.0	46.4

Source: BRASIL/MMA (2013)[1]

Table 2 Absolute releases of PCDD/F in water and relative participation, in the 2008 inventory, for those sources included in the Action Plan.

Source category	Release (g TEQ.year^{-1})	Participation in the total inventory (%)
Pulp and paper production	10.1	0.5
Disposal of effluents in surface waters	9.9	0.4
Sum	20.0	0.9

Source: BRASIL/MMA (2013)[1]

Table 3 Emission projection at the end of five years of implementation of the Brazil's Action Plan for POPs release reduction

Souce Group	Source Category	Annual Release (g TEQ.year^{-1})				
		Air	Water	Soil	Product	Residues
1	Waste incineration	21.0	-	-	-	57.5
2	Ferrous and non-ferrous metal production	251.7	0.4	-	-	349.5
3	Power and heat generation	41.6	-	-	-	11.6
4	Production of mineral products	24.9	-	-	9.1	7.2
5	Transport	8.3	-	-	-	-
6	Open burning processes	240.8	-	41.6	-	-
7	Production and use of chemicals and consumer goods	2.7	1.3	-	43.6	12.9
8	Miscellaneous	0.9	-	-	-	2.7
9	Disposal and landfills	-	5.8	-	53.1	168.0
1-9	**Total**	**592**	**7.5**	**42**	**106**	**609**
	Grand Total					**1,356**
	µg-TEQ per person					**7.1**

Source: Brasil/MMA (2015)[4]