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ENVIRONMENTAL AND SOCIAL RISKS INHERENT IN URBAN SOLID WASTE BURNING PROCESSES

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Abstract: The National Solid Waste Policy (PNRS) in Brazil is not a simple waste disposal policy (garbage), but a complex legal apparatus that encompasses strategic principles with a view to Sustainable Development. Therefore, the disposal of waste must meet the three important and inseparable pillars, the environmental, the social and the economic, strictly observing the Precautionary Principle, which requires an analysis that aggregates the expanded view of the most varied sectors of knowledge, without which the objectives of this policy (PNRS) will not be achieved. In this sense, the present study, which uses bibliographic and documentary sources for the analytical basis and the authors' experience in the areas of social and environmental law and in the inspection and operation of incinerators, critically seeks to present the incurable bottlenecks of the incineration of urban solid waste with or without energy recovery (*waste-to-energy*), considering the current state of technology and knowledge, and pointing out sustainable paths for its destination and treatment.
Keywords: Incineration, URE, MSW, CDR, *Waste-to-energy*.

INTRODUCTION

Created in 2010 to guide regional and local governments in the management of waste and tailings (henceforth waste), the National Solid Waste Policy - PNRS (Federal Law No. 12,305 of August 2, 2010: is essential for environmental preservation and health care for people and populations, preventing the proliferation of diseases arising from the release of dangerous toxic chemicals and the spread of infected pathogenic organic materials. According to the PNRS, solid waste is any material, substance, object or good discarded resulting from human activities in society, and this definition includes urban solid waste (MSW) and domestic solid waste (RSD), commonly treated like garbage.

In the present work we will treat both MSW and MSW as MSW. There is in the PNRS a list of priorities and hierarchy for waste management: No generation; Reduction; reuse; Recycling; Treatment of solid waste and environmentally appropriate final disposal of waste. 12 years after the publication of the PNRS, it appears that there is no implementation in the country of an effective policy to meet these five priorities.

The only action has been to send it to dumps or sanitary landfills with almost no type of use of the residue, continuously creating unhealthy deposits of solid residues. Therefore, dumps and sanitary landfills are not the ideal solutions for waste disposal. Added to the fact is the inefficiency and ineffectiveness of managers in this matter, since, on average, recycling in Brazil does not reach 5% of the waste generated in the country.

The PNRS is not limited to a simple waste disposal policy, but encompasses a complex legal apparatus that articulates key principles of Social and Environmental Health: environment, health, prevention, precaution and health promotion. It also reaffirms the objectives of Sustainable Development in its three inseparable pillars: environmental, social and economic.

Nowadays, recycling is one of the few ways that many families and people in situations of extreme social vulnerability or living on the streets (free areas) have to support themselves. For these people, the collection of recyclables is one of the few ways to maintain their most basic needs, which is an essential activity for the most fragile segments of society.

Urban Solid Waste (MSW) can be fully reused, the organic part, such as food, vegetable and other organic materials, can generate biofertilizers and biogas, for example. Plastics, papers, fabrics, among others, can be reused or recycled and as for the waste that is generated in this process, they challenge the search for new technological routes to treat and reuse them or eliminate their production.

The London Assembly Environment Commission (2018) states in its report that the linear model (production-use/consumption-disposal), when adopting energy generation from the burning of MSW, prevents recyclables from participating in a circular economy, which contributes to further depleting natural resources. The report maintains that generating energy from burning materials eliminates financial incentives for recycling, and such incentives are essential for the development of the recycling chain.

Finally, this Commission points out, in a negative way, that investments in incinerators with an energy recovery unit (w*aste-to-energy*) must be covered by guaranteeing a flow of payments, usually through contracts with local municipalities. Contracts are often long - most are over 20 years old. Contract terms may include: minimum annual payments or a flat fee even if there is a low tonnage of waste, which could undermine local authorities' efforts to reduce waste production, or send it to other destinations, such as recycling, composting and anaerobic biodigestion (ECO-CYCLE, 2011; XIAONING *et al*, 2019).

Thus, this article aims to present the insurmountable bottlenecks in the incineration of urban solid waste, considering the current stage of technology and knowledge, as well as pointing out sustainable ways for its destination and treatment. In this process, bibliographic and documentary research and the authors' professional experience in the areas of socio-environmental health, environmental law, environmental control, industrial operations and waste incineration were used.

MSW IN CDR PRODUCTION

Opening up the contradictory trend of resuming incineration in Brazil, a process that has been fought worldwide for decades, in 2017 there was the edition and publication of the Resolution of the State Secretariat for the Environment of São Paulo, SMA nº 38 of May 31, 2017, which established guidelines and conditions for the licensing and operation of the energy recovery activity from the use of Fuel Derived from Urban Solid Waste (CDRU) in Clinker Production Kilns (Cement Kilns, Cement Plants).

In the federal administration, the Ministries of Environment, Mines and Energy and Regional Development edited and published the Interministerial Ordinance Number: 274 of April 30, 2019, which deals with the energy recovery of urban solid waste in Energy Recovery Units (URE), referred to in § 1 of art. 9 of Law Number: 12,305 of 2010 and in art. 37 of Decree Number: 7,404 of 2010. However, it must be noted, provided that its technical and environmental feasibility has been proven.

Three years later, this trend deepens with the edition and publication of the Resolution of the Secretariat of Infrastructure and Environment of São Paulo, SIMA Number: 047 of August 29, 2020, which, by revoking Resolution SMA Number38/2017 and establish new guidelines and conditions for the licensing of units for the preparation of Fuel Derived from Solid Waste (CDR), with the pretext of recovering energy from the use of CDR, ended up expanding this activity to other types of furnaces and waste.

For the harmonization of state and federal legislation, in 2020, CONAMA Resolution No. 499 of October 6, 2020 was edited and approved, which, like São Paulo, authorizes the burning of urban waste in cement kilns, complementing Interministerial Ordinance No. 274 of April 30, 2019, which authorizes the burning of MSW in UREs, and this Ordinance defines the URE as any unit dedicated to the thermal treatment of municipal solid waste with recovery of thermal energy generated by combustion, with a view to reducing volume and hazard, preferably associated with the generation of thermal or electrical energy.

IMPLICATIONS OF MSW-DERIVED CDR

Urban Solid Waste (MSW) is composed of inert and non-inert waste, where the chemical components contained in these wastes are under normal conditions of temperature and pressure, which give them some stability. However, the MSW treatment process for the production of CDR is limited only to its crushing and moisture elimination, not removing the precursor elements of dangerous pollutants. Thus, when introduced into ovens at high temperatures, the structures of the molecules of these residues are broken and a significant part becomes or recombines, giving rise to other dangerous chemical agents, such as: hexachlorobenzene, polychlorinated biphenyls, chlorinated and brominated dioxins and furans and the fumes of high molecular weight metals, the so-called heavy metals that have harmful effects on human health (LOBO, 2011; MARTINS & GRISWOLD, 2009). In summary, incineration transforms inert and non-inert waste into hazardous waste.

These agents, now harmful after thermal exposure, reach the atmosphere directly, or aggregate in fine particles of 10 microns or ultrafines equal to or smaller than 2.5 microns, which are not fully retained in fabric filters or electrostatic precipitators, some improvement is obtained with more expensive special filters (USEPA, 1999c *apud* FORMOSINHO *et al*; 2000; SANTOS, 2020[a]).

Reducing, reusing, reusing and recycling saves more energy than burning in URE (w*aste-to-energy*) and cement kilns and will only result in fuel savings, recovering a comparatively small amount of energy, if there is waste with the burning of recyclables., that is, contrary to the PNRS and the principle of adopting the best available technology and environmental practices.

In the documentary analysis, a project in the environmental licensing phase was selected, whose intention is to install in a city located on the coast of the State of São Paulo, a waste burning equipment with the capacity to generate 50MW/h of electric energy by burning the MSW, of which 42MW/h will be negotiated with the National Energy System. According to the company, such a unit would be legal, supposedly meeting the quality standards and tolerance levels established by Brazilian standards, and contradictorily claiming that URE (*Waste-to-energy*) is not an incinerator and that CDR is not garbage, it is boiler fuel.

In the present analysis, the definition of European Parliament Directive nº 2000/76/EC was taken as incineration, which considers incineration to be any unit and fixed or mobile technical equipment dedicated to the thermal treatment of waste, with or without recovery of the thermal energy generated by combustion. This definition includes the incineration of waste by oxidation and other heat treatment processes, such as pyrolysis, gasification and plasma, insofar as the substances resulting from the treatment are subsequently burned.

The MSW incineration process provided with an Energy Recovery Unit (*Waste-to-energy*), requires materials that are guided by the PNRS, especially for non-generation, reduction, reuse and recycling, and these materials are those that have a lower calorific value (PCI) sufficient to justify the reduction in fuel consumption, which would not be possible only with (unserviceable) tailings, normally inert and wet. Waste, which in turn, is generated by lack of management, adequate

MMM	ORGANIC MATERIAL	PLASTIC	PAPER CARDBOARD	METALS	GLASSES	WASTE
min.	28	7.7	4.7	0.8	1.2	7.4
Average	44.95	14.15	11.68	2.57	2.87	23.77
Max.	55.1	23	21	3.3	5	33.9

Table 01 - Garbage Gravimetry in 33 Brazilian cities.

Source: LIMA *et al*, 2018 (adapted).

practices, technique and technology for its proper treatment and reuse in the recyclables chain.

ENERGY INEFFICIENCY WHEN BURNING MSW-DERIVED CDR

In addition to the integrated environmental analysis, it is necessary to exercise a complex look[1] to understand the energy losses when burning fuel derived from urban solid waste, since, in addition to environmental and social aspects, it is necessary to analyze the economic perspective from the socio-environmental health point of view, always considering the application of best technologies and best environmental practices. Based on Lima *et al.* (2018) the composition was determined through the average gravimetry estimated in 33 municipalities from north to south of the country, according to table 01.

To calculate the lower calorific value (PCI) of each type of waste, data from the scientific literature and the study carried out by the Institute of Technological Research (IPT-SP) were used, which presented the gravimetric composition of waste from Baixada Santista in the State of São Paulo, Brazil. The average of the tested PCI was adopted, and the IPT study is more detailed in relation to the types of waste (Chart 02) and has similarities with the table by Lima *et al.* (2018), so it will be used to verify the energy recovery potential in URE (*Waste-to-energy*) and Cement Plant when burning urban solid waste (MSW).

In relation to the polluting potential, the specialized literature searched the reasons why - despite being within the standards required by the legislation - hazardous emissions from incineration processes remain, focusing studies on metals and persistent organic pollutants (POPs). Regarding energy recovery, it was observed in the literature that only waste with a lower calorific value (PCI) greater than 2,000 kcal/kg is considered technically viable for energy generation. That is, only drying the material will not be able to raise its calorific value without materials with PCI equal to or greater than 2,000 kcal/kg. In addition, drying waste means spending more energy, which is an incurable situation, since with PCI below 1,675 kcal/kg, energy recovery is unfeasible, as it requires the significant addition of auxiliary fossil fuel.

To comply with the National Solid Waste Policy, it is necessary to observe the integrated management of solid waste, considering the political, social, economic, environmental and cultural dimensions, with social control (Article 3, item XI of the PNRS). Since the law has among its principles sustainable development, prevention, precaution, the polluter pays, respect for local and regional diversities, society's right to information

1. It is understood as complex, what is part of the same fabric, "what is woven together" (MORIN, 2001, P.14), is the thought that does not separate and isolate, but rather distinguishes, unites and articulates to know the object or fact beyond its appearance, and thus understand it in its entirety, as well as the totality that expresses them.

Garbage/Waste Fraction	Composition gravimetric	PCI kcal/kg	Contribution to total PCI kcal/kg	% of PCI Total
organic	40.40%	957	386,628	11.97%
plastics	20.40%	7317	1492,668	46.20%
Long life	1.30%	5074	65,962	2.04%
Cardboard	4.20%	3597	151.074	4.68%
Paper	6.60%	3597	237.402	7.35%
*Metals	two%	0	0	0.00%
Wood	1%	2505	25.05	0.78%
*Glass	2.50%	0	0	0.00%
Rubber	0.90%	7706	69,354	2.15%
textiles	4.80%	3458	165,984	5.14%
**Log. reverse	0.10%	0	0	0.00%
***Waste	15.80%	4030	636.74	19.71%
Total	**100.00%**	**38241**	**3230,862**	**100%**

* Non-combustible: residue that does not burn in the process;

**Reverse logistics: electronic waste, batteries, fluorescent lamps, tires, agrochemical packaging and lubricating oils;

***Waste: biologically contaminated waste – sanitary papers, absorbents, cotton swabs, cotton, among others (*can be treated and biodigested anaerobically).*

Table 02 - Calculation of Total Lower Calorific Power

Sources: BRAZIL, 2014; ISLAM, 2016; SOARES, 2011; SP/IPT, 2018; MILK, 2019.

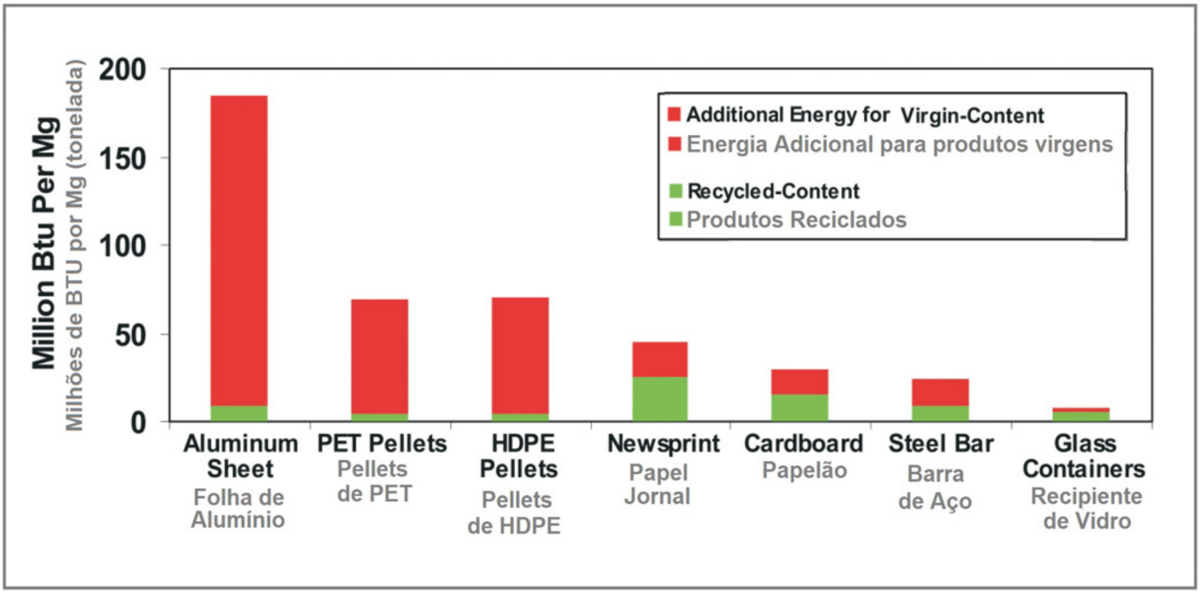
and social control, reasonableness and proportionality (Art. 6, items I, II, IV, IX, X, XI of the PNRS).

To fully comply with the PNRS, it will be necessary to remove the most commonly recyclable materials, that is, paper, cardboard and plastics. By doing this, the PCI of leftover waste drops to 1,349.7 kcal/kg, which makes the much-vaunted power generation unfeasible. If we further explore the possibilities of recycling, for example, treating organic material through more sustainable and economically viable routes, the PCI of the leftover material drops to 963 kcal/kg.

If the National Solid Waste Policy is fully adopted, removing and treating textiles, long-life packaging and tailings (which must be treated in advance) and eliminating the production and use of non- recyclable packaging, to continue generating energy it will practically be necessary to complementary use of fossil fuel at full load, which makes incineration with ERU impractical from an environmental and economic point of view.

Among the documents analyzed, it appears that the burning of MSW in incinerators or cement factories (cement plants) contains several contradictions, such as the one in the energy recovery item, a clearly unfeasible objective, since the activity proposed in these projects is in confrontation with Federal Law Number: 12,305/2010. Projects with URE (*Waste-to-energy*) define that energy recovery takes place through the use of heat from the gases in the boilers, after combustion in the incineration oven in which the waste is processed.

Projects of this type omit that instead of burning the waste, they were actually recycled, reused or sent to composting and anaerobic biodigestion, following a route in line with the priority of waste management of the PNRS, this would result in energy savings superior to that generated by burning in the incinerator.



Graph 01 - Energy savings with manufacturing from recycled materials (MORRIS, 2005)

It can be observed in graph 01 that in each group of materials the green part of the bar means the lowest energy expenditure with products made from recycled materials and the red part the greater energy expenditure when the same product is manufactured from recycled materials. raw virgin extracted from nature. In this respect, conserving the energy of recyclable materials is much more economically and environmentally beneficial than burning them in URE (w*aste-to-energy*) or cement (cement) ovens.

The high temperatures of cement kilns, around 2,000º C, ended up causing companies to use industrial waste, including hazardous waste, as a substitute for raw material and/or fuel, calling this process co-processing (WCA, [nd]; SANTOS *et al*., 2020a). Co-processing deviated from its purpose, starting to incinerate waste without being a substitute for fuel or a useful component in the formulation of cement, calling this new process co-incineration. Some undesirable agents of this activity, such as heavy metals, are incorporated into the crystalline structure of cement, with part being released into the atmosphere in the form of metallic fumes (SANTOS *et. al*., 2020a).

It must be noted that the entry of chlorine, bromine or any other halogenated organo-halogen into the cement kiln, which is largely present and stabilized in RSD and MSW, gives rise to the formation of chlorinated or brominated dioxins/furans, which are emitted in chimney gases or are concentrated on cement, which may be a determining factor in exposing surrounding residents to these harmful agents (LEGATOR et.al, 1998), as well as construction workers and users in general, when using cement manufactured under these conditions.

In addition to dioxins, other dangerous persistent organochlorines can evaporate from raw material or unburned products at lower temperatures in the preheater of cement kilns. They are also formed from the incomplete destruction of these toxic compounds present in the fuel due to temperature fluctuations, or from the recombination from precursor compounds, in the cooling zone of the exhaust gases, normally in the dedusting area (FORMOSINHO *et al*.., 2000).

In order to offer equipment for waste treatment in Brazil, companies are presenting thermal processes that they call the Energy Recovery Unit (URE or in English: *Waste-to-energy*). However, when analyzing the process, it is observed that these projects are based on a unit dedicated to the incineration of MSW by direct mass burning (*Mass Burning*) with energy recovery, which requires that the recyclable material be burned.

The thermal energy released from this process feeds boilers that generate steam, which in turn will drive turbo generators to generate electricity. The process generates slag, bottom ash and fly ash from the boilers and fly ash from the filtration process, all of which are considered hazardous.

Incineration dates back to 1874 in England and 1885 in the United States, when burning the garbage seemed to be a solution to reduce the volume of waste to a third of the original volume, giving a longer life to landfills. At that time, the processes did not have filters, there were no control instruments, nor monitoring, nor did they generate electricity.

Gradually, the incineration process added these controls, and several of these processes incorporated the *Quench system,* which cools the combustion gases from 1,200º C to 70º C in 3 seconds, for better control of the generation of dioxins in the system. They have recently started to reincorporate, before the combustion gas coolers, boilers that generate steam and drive turbines to generate electricity. However, by taking advantage of the heat of combustion, there is a slower cooling, which increases the generation of dioxins in the system. To reduce and try to control the emissions of this excess, it is necessary to inject other chemical products, such as lime, soda and active carbon, which, therefore, increases the dangerous chemical load produced in the process.

Both in incineration processes in URE (*waste-to-energy*) furnaces and in cement factories (cement plants) there is a deficiency in terms of filtration, which is more serious for particles smaller than 2.5 microns. And not requiring a process of continuous monitoring of emissions, especially complex pollutants, is practically a permission to pollute. In addition, in cement kilns in the new Conama Resolution nº 499/2020, only the continuous monitoring of the parameters MP, NO_X, SO_X, O_2 and THC is required, being optional for the environmental agency to require or not the online transmission, and omits in terms of transparency, that is, the public and continuous online transmission of measurements of these parameters.

Fundamental parameters to ensure environmental protection and animal and human health, such as: MP, CO, $CO_{2,}$ $O_{2,}$ SOx, NOx, PAHs, HCT, HCL, $Cl_{2,}$ TOC, Dioxins, Furans, polychlorinated biphenyls, other POPs, mercury, lead, cadmium, chromium, aluminum and other heavy metals are not monitored on an ongoing basis. Therefore, they do not have and will not have public analyzes transmitted online so that society can protect itself from these processes of high polluting potential.

Many of these more complex toxic substances such as dioxins, furans, hexachlorobenzene, polychlorinated biphenyls, among others, are not subject to continuous monitoring in the legislation. They are also biopersistent, bioaccumulative, biomagnifying, genotoxic, mutagenic, teratogenic for fetuses; cause malformations or high latency diseases that can be triggered at birth, puberty or adulthood, and can also cause negative effects on Organs reproductive and cognitive organs, negatively affecting intelligence, attention, learning and behavior. In addition to being carcinogenic and disrupting the hormonal system, negatively impacting flora, fauna, domestic animals and human beings that are in the area of influence of incinerators (ASSUNÇÃO & PESQUERO, 1999).

Cultivated foods (vegetables), poultry and eggs, as well as other meat animals (hunting or breeding) present in the area of influence of these processes, can be severe sources of dangerous chemical exposure for humans who are in these areas and come to consume these foods., reaching even those outside the area of influence. The paradigmatic example of dioxins and their integration into the food chain means that their deleterious action on health can be reflected, in fact, in individuals who live hundreds of kilometers from the places where such foods were produced (FORMOSINHO *et al.,* 2000). Several studies indicate that gestational exposure to dioxins affects androgen levels, secondary sex organs, spermatogenesis, fertility, and the sexual behavior of offspring (US-DHHSPHS-ATSDR, 2017).

Heavy metals and dioxins, as well as other contaminants, are present in emissions from incinerators and currently there is no legislation in Brazil whose effectiveness can prevent harmful action, especially in the category of persistent and bioaccumulative. "The distinction between hazardous and non- hazardous waste is a definition based on the properties of waste for incineration, not a classification based on differences in emissions" (FORMOSINHO *et al.*, 2000, p. 21). That is, residues classified as inert in the incineration ovens can, according to their composition, generate dangerous emissions.

The evaluation of emissions of unintentional persistent organic pollutants (UPOPs) in a chimney of a kiln dedicated to burning waste with energy recovery in the Netherlands showed that there is a "correlation between high dioxin emissions and sampling interruptions", as well as a series of incidents resulting in uncontrolled shutdowns (ARKENBOUT & PETRLIK, 2019, p. 917).

By following the maximum limits for dioxins and furans of 1,000 nanograms, adopted by countries in Europe, for soils in residential areas and private properties and if hens were kept foraging in areas with these levels, their eggs would be contaminated with about 800 picograms. In this case, any child weighing 16 kg who ingests a single egg with this level of contamination would have exceeded by 1,000 times their tolerable daily intake adopted by the European Food Safety Authority (WEBER, *et al.* 2019).

Levels of persistent organic pollutants in the soil, well below the maximum limits used, have resulted in serious contamination for human consumption. Foods such as eggs, fish, birds, among other meat animals, can be deeply contaminated even in areas with low concentrations of persistent organic pollutants (PETRLIK & DIGANGI, 2005).

Dioxins unequivocally still represent a serious problem, especially when monitoring programs, whether of emissions from the incineration process or through biomonitoring and risk assessment to human health, have limitations. This way, it is understood that the health of the population is still under threat due to existing emissions and inefficient and ineffective control measures to protect the environment and life there. There is a long way to go to effectively regulate and eliminate emissions of persistent organic pollutants (ARKENBOUT & PETRLIK, 2019).

The stoichiometric balances of the combustion reactions reveal the unsustainability of incineration, which, in addition to consuming excessive oxygen from the air basin, returns in exchange emissions of thousands of tons of harmful and greenhouse gas (GHG). For every 1 ton of fuel inserted into the incineration process, 4 tons of oxygen are removed from the atmosphere to obtain the combustion reaction and 2.75 tons of GHG and another 2.25 tons of contaminated acid water are released back to the same atmosphere.

Santos *et al.* (2020 b) took as an example the data from the EIA-RIMA of the URE (w*aste-to-energy*) project that is intended to be implemented on the coast of São Paulo, where a conservative balance was considered, such as the addition of inputs, fuel (LPG) and residues, in addition to estimating the emission of gases, vapors, slag and ash. The result was a chemical load 295% higher than that of the waste introduced in the process, putting to rest the proposal to comply with the PNRS objectives in terms of reducing the volume and hazardousness of waste. It is important to point out the positive correlation between the spatial distribution of emissions from the incinerator located in an urban area and mutagenic events (FERREIRA *et al*, 2000).

ANALYSIS OF RESULTS

The incineration process through an Energy Recovery Unit is presented as a solution for generating energy using solid waste, called CDR. However, to achieve some energy recovery, you will have to deliberately ignore the National Solid Waste Policy. To comply with the PNRS, it will be necessary to remove the most commonly recyclable materials, that is, paper, cardboard, foams and plastics. By doing this, the PCI of leftover waste drops to 1,349.7 kcal/kg, which makes the much-vaunted power generation unfeasible. If you delve even further into the possibilities of recycling, such as treating organic material through more sustainable and economically viable routes, the PCI of the leftover material drops to 963 kcal/kg, requiring the complementary use of fossil fuel in load. which makes incineration in URE (*Waste-to-energy*) or even in cement kilns (cement plants) impractical from an economic point of view.

In addition to the toxicity of emissions from processes that use the direct burning of the mass of waste (*Mass Burning*), the analysis of the stoichiometric balance of combustion reactions demonstrates the unsustainability of UREs (*Waste-to-energy*). This process, in addition to consuming excessively oxygen from the local air basin, returns in exchange emissions of thousands of tons of harmful and greenhouse gas (GHG). In the burning of used fossil fuel alone, for each ton introduced into the system, 4 tons of oxygen are removed from the atmosphere and 5 tons of greenhouse gas are produced, in addition to contaminated acidic water and toxic gases. The studies showed that the burning of waste in incineration systems with energy recovery (URE) results in the production of a final chemical load that is 295% higher than the waste introduced in the furnace feed.

CONSIDERATIONS AND RECOMMENDATIONS

Persistent organic pollutants have resulted in high food contamination, even in areas with exposure concentrations considered low, especially dioxins and furans, which represent a serious problem, especially when there are limitations in the processes of control and continuous monitoring of pollutant emissions. complex and assessment in human and animal health. Thus, there is a long way to go for integrated environmental and social care, involving different knowledge.

The PNRS does not and could not indicate the technology to be used in the treatment of urban solid waste, under penalty of favoring certain business sectors. However, as the study indicates, the technology for treating solid waste with energy generation by direct burning of the mass (*Mass Burning*) offers a high potential for danger to the environment, primarily to fauna, flora and human beings, the which refers to the search for new technological routes that meet the tripod of sustainable development, demanding the involvement of all sectors of society with social control, as recommended by the National Solid Waste Policy.

Searching for solutions, such as prevention and reduction of solid waste generation, strengthening selective collection systems, reverse logistics and recycling, in addition to adopting practices such as composting and anaerobic biodigestion, articulating the whole society with efficiency and effectiveness, will be the best response against the waste of burning recyclable materials and the pollution generated by these processes, considered as the "sustainability Anti -Culture".

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