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Concerns regarding the project content of the proposed waste-to-energy incinerator in Zagreb, Croatia¹

Green Action considers plans for a 385 000 tonnes per year waste-to-energy plant in Zagreb to be premature and dangerous, on environmental, economic and legal grounds. Our concerns include the lack of disposal facilities for the disposal of hazardous ash and residues from the plant; air pollution increases; failure to promote waste prevention and recycling and adequately follow the waste hierarchy; the unlikelihood of sufficient monitoring and enforcement; the inefficiency of burning resources; and the excessive cost of incineration.

We are concerned that incineration is being pursued as a quick-fix solution for the city's waste problem rather than as a last resort.

The second Environmental Impact Assessment (EIA)² stipulated a number of important tasks needing to be undertaken before construction of the incinerator begins. Most of these are tasks which need several years to be successfully implemented, for example ensuring that Croatia has facilities to safely process and dispose of hazardous waste, and ensuring that re-use, recycling and composting in Zagreb is adequately increased.

The long-overdue work on improvement of waste management in Zagreb must not be carried out hastily and the City Council must not be tempted by ready-made end-of-pipe solutions, but must adhere to the waste hierarchy and utilise the most effective solutions rather than the easiest.

1) Producing hazardous waste from municipal waste

According to the 2nd EIA, burning an estimated 385 000 tonnes of waste and sludge per year would result in 95 603 - 105 471 tonnes of ash, depending on which incinerator variant is used. This represents between 24.8% and 27.4% of the original weight of the

¹ These comments do not include our concerns about the project development process, which has been secretive and appears to have violated Croatian law on several occasions through withholding of information and failure to implement public participation provisions. Further information on this aspect of the project can be obtained from Green Action - za (at) zelena-akcija.hr

² The 2nd EIA was rejected by the Ministry of the Environment, only for the third version to be approved without a public consultation or public disclosure, in violation of Croatian law and EBRD environmental policy.

waste/sludge. It is likely that even greater quantities of ash would be left as these calculations are based on optimum operating conditions, which are unlikely to prevail because of the lack diversion of organic waste from the municipal waste.

Three solid substances would result from incineration: bottom ash, fly ash, and filter residues. The EIA stated that the bottom ash would be put on the Zagreb municipal landfill, along with the fly ash, until 2011 when the site is due to close.

An agreement has been signed between Zagreb City Council and the Zagreb County administration, obliging the county to take charge of disposal of the ash after the closure of the Zagreb landfill. However it is not enough to have a theoretical landfill somewhere in Zagreb County: The two sites proposed are both facing heavy opposition from local people and it is extremely questionable whether either site would be able to construct and operate a landfill before 2011.

The fly ash, being hazardous, would also be put in this landfill, but solidified in cement, according to the EIA. However, this is not a satisfactory solution as cement dissolves after some years and the heavy metals and dioxins encased within would once again be available in the environment in a highly absorbable form. **Fly ash requires special treatment as hazardous waste and designated hazardous waste facilities need to be carefully planned, in full consultation with the local population, and need to be fully operational before the construction of any incinerator** – problems can occur at any point in the process of opening hazardous waste facilities, and if the incinerator begins operation without proper facilities, tens of thousands of tonnes of toxic waste will pose an even greater threat to the local population through groundwater and dust pollution.

Only the filter residues are designated for special treatment in the EIA. These will make up between 8 361 and 16 487 tonnes per year, depending on the incinerator variant used. The variation in these figures is in itself troubling. If there is less toxic filter residue, as in variant B, it suggests that the remainder of the toxins that would have been caught in the filters are present somewhere else, presumably in the air, or in the fly and bottom ash. These figures are also too inexact to make proper plans for dealing with the waste.

Hazardous waste is a huge and largely unaddressed problem in Croatia, and the current policy involves exporting it. However, this is relatively expensive, at 0.35-.05 euro/kg, and as a result some businesses seek alternative solutions. This has led to the current situation in which **half of the country's hazardous waste is unaccounted for**, and has most likely ended up on municipal landfills, of which only a few are properly constructed. Some may have been simply dumped whilst some may have been illegally incorporated into construction projects.

It is highly irresponsible to construct new sources of hazardous waste while this state of affairs continues. It is not only a violation of the proximity principle to create hazardous waste that is exported to others, but it is also extremely expensive. Even with the lowest projected quantity of filter residues (8361 tonnes) and the lowest named fee for export (0.3 €/kg), it will still cost €2 926 350 per year. Taking the highest projected quantity of filter residues (16 487 tonnes) and the highest fee (0.5 €/kg) it will cost €8 243 500 per year. The EIA was correct in stating that Croatia must construct facilities for dealing with hazardous waste, but this should not mean that Croatia then produces more waste. The construction of hazardous waste facilities is also not a task to be taken lightly, particularly when **half of the country's hazardous waste is unaccounted for**, which makes it difficult to correctly assess needs - this is not something that can be done as a quick

measure before building an incinerator. Since improper supervision of incinerator ashes could lead to human exposure to dioxins and heavy metals in highly available forms, this issue requires much more careful planning and supervision than has been the case so far.

2) Increasing air pollution in Zagreb

Zagreb already suffers from air pollution problems in some areas, which would be made worse by an incinerator, no matter how modern. The 2nd EIA stated that:

*“...the construction of PTOO will lead to an increase of total emissions of SO_x compounds by 0.8%, NO_x compounds by 4.2% and suspended particles by 2.3% compared to 1998. **With regard to the fact that the City of Zagreb air quality is categorised in category II (...), and that a legal obligation already exists for the city to take measures for environmental protection that would not lead to the further excessive burdening of the atmosphere with harmful compounds, the addition of increased emissions of the order of magnitude of around 4% to the level of total emissions may present a problem.**”*

This problem cannot be solved satisfactorily in a short time period and will require several years to be properly addressed. The quality of air in the city needs to be improved, not worsened. Although the EIA stated that the incinerator emissions would be well below the legal limits, this depends on maintaining optimum burning conditions and is not likely to be the case in reality. For example, **in 1999 and 2000, every municipal waste incinerator in the UK for which meaningful data existed breached emissions limits several times.**³

3) Stifling the expansion of waste prevention and recycling and failing to follow the waste hierarchy

The plan for a 385 000 tonnes/year incinerator was developed before waste statistics and predictions for Zagreb had been made, and the figures to support the idea were produced later. These predictions should have been carried out as the **first** step in developing a waste reduction and management strategy, not as an afterthought.

In the Waste Management Strategy of the Republic of Croatia, (Section 4.2.1), the Zagreb incinerator is already planned, whilst other waste-to-energy plants will not be located until expert analysis on the quantity, category and methods of waste management have been done. There is no justification for the Zagreb incinerator to be hurried along without such an analysis. This is not only a matter of procedure but the analysis should dictate the possibilities for dealing with the waste and the efficiency of an incinerator.

In 2006 Zagreb City Council passed a Waste Management Plan without any public consultation, in spite of repeated requests from Green Action to be involved in the process. This document, the extreme inadequacy of which has been analysed in a separate document, predicted the future quantity of waste and the amount that would be prevented, recycled, and disposed of, but was already out of date by the time it was approved. It did not take into account the results of the new Waste Packaging Regulation, which entered force at the beginning of 2006 and greatly increased the amount of glass, PET and aluminium packaging being recycled, rendering the City's predictions inaccurate.

³ Greenpeace: Criminal Damage: A review of the performance of municipal waste incinerators in the UK, 2001, p.7 <http://www.greenpeace.org.uk/MultimediaFiles/Live/FullReport/3766.PDF>

With incorrect figures on the type and volume of waste, the lower calorific value may not be guaranteed, with serious consequences for the efficiency of the combustion process and therefore emissions levels and amount of ash created. The new Waste Packaging Regulation is likely to have reduced the calorific value of Zagreb's municipal waste by removing most PET packaging, so the average calorific value must be recalculated.

The 2nd EIA stated that **before the beginning of construction** of an incinerator the City of Zagreb must ensure that recycling and composting deals with a minimum of 20 - 25% of the total waste, with a tendency towards a further rapid rise in the recycled quantity. In particular, it recommended that the City should increase the number of recycling bins and centres, implement a fee system rewarding recycling and penalising disposal, educate citizens, and consistently apply the relevant national regulations. This is in sharp contrast with the current situation in Zagreb, in which there is almost no incentive for citizens to reduce waste - there is no house-to-house recycling or composting collection, and citizens are charged by the size of their house, not the weight of waste that they produce. **The Zagreb Waste Management plan mentions changing to a weight-based payment system but does not allocate any financial resources for doing so. It stubbornly refuses to examine a house-to-house recycling and compost collection scheme.**

We welcome the increase in recycling resulting from the Waste Packaging Regulation, but insist that **much more must be done to prevent and recycle waste before reliable calculations on new disposal capacity can be made.** Some kinds of waste, for example paper, textiles, and organic waste can be recycled but can also be burnt in an incinerator with less effort on the part of the authorities. Due to the lack of recycling and composting of these wastes it is likely that the 'easiest option' will be taken and that the waste hierarchy will be ignored, particularly as **Zagreb's Waste Management Plan has barely devoted any resources to recycling (EUR 4.5 million vs. EUR 161.4 for incineration)**

Although 20-25% recycling and composting would be a good starting point for further increases, it should be possible to realise those increases quicker than projected, with a door-to-door collection of recyclable and biodegradable materials, together with publicity, and fees and other incentives to increase participation. According to Peter Jones of waste management company Biffa, 'Most in the industry agree that at least 60% is a realistic target for diversion from landfill into biodegradation and recycling.'⁴ An increasing number of places are achieving even higher diversion rates, for example:

- **Canberra, Australia** (pop. around 320 000) has set itself a target of zero waste by 2010, and went from 22% to 69% recovery of waste between 1993/4 – and 2002/3)⁵, with no incineration.
- **San José, California**, (pop. 954 000) recycles⁶ more than 64% of its solid waste⁶
- **Edmonton in Canada** (pop. 697 657) has reached 60% diversion of residential waste from landfill without any incineration,⁷ and is aiming to increase this.
- **Seattle, US**, has a 60% target for diversion from landfill by 2008 and in 2002 recycled 40%. From 1995-2002 there was no increase in the volume of waste despite an increase in population and employment.⁸

⁴ Biffa: PFI Update 2001

⁵ Canberra Australian Capital Territory Government: No waste by 2010, Turning Waste Into Resources, 2003 progress report <http://www.nowaste.act.gov.au/styles/progressreport2003.pdf>

⁶ <http://www.recycleplus.org/achievements.htm>

⁷ Edmonton City Government Official Website: <http://www.edmonton.ca/portal/server.pt> > Environment > Waste management, viewed on 17th August 2005

- The province of **Nova Scotia in Canada** (pop. 936 921) raised its waste recovery (without incineration) rates to 46% by 2002.⁹
- **Austria** recycles and composts 56% of its municipal waste¹⁰, and it is widely recognised that there is scope for more waste diversion.

Although the composition of waste varies, and the diversion measurements are not carried out in a standardised way, the above examples give an indication of the high diversion rates which are not only being achieved, but have been reached in only a few years. **It is important that recycling and composting is given a chance to flourish well before any new disposal projects are implemented**, otherwise it will be tempting for the city authorities to stop increasing recycling services once the incinerator is in operation.

The 2nd EIA did not mention the possibility that incineration may have an adverse effect on waste reduction and recycling. This is particularly relevant given the uncertainty that the projected incinerator is based on an appropriate capacity. The possibility of the incinerator providing a disincentive to waste reduction, recycling and composting was raised at a public meeting on 21.04.2005.¹¹ Dr. Zlatko Milanović, technical director of waste management company ZGOS, replied that it is better to have an incinerator that is too big rather than too small. Green Action does not agree with this assessment, as it believes that waste minimisation should be the central aim of any waste strategy, rather than incinerating precious resources that could be re-used, recycled or composted. The EIA pointed out that it is better to compost than burn organic material, but in other cases, such as paper and textiles, there could be competition between reduction, recycling and incineration. Given the as yet un-quantified removal of **packaging waste from the waste stream and the fact that Zagreb County does not have accurate waste figures at all, it is possible that waste would have to be brought from other parts of the country or even imported in order to fill the incinerator to capacity, thus violating the proximity principle.**

In their analysis of alternative methods, the Zagreb Waste Management plan and 2nd EIA compared recycling, composting, landfill, mechanical-biological treatment (MBT) and incineration in an inadequate and simplistic way, and hardly explored the possible interaction between different methods of waste treatment. Neither did they explore the alternatives for the treatment of sewage sludge. The sludge will be anaerobically digested at the Wastewater Treatment Plant so it is not clear why it has to be incinerated as well. Although it is not surprising that the EIA and Waste Management Plan were aimed at justifying the construction of an incinerator, their consideration of the alternatives should have been of a higher quality.

Landfill was dismissed as ecologically unacceptable, and it was correctly argued that the EU Landfill Directive requires a reduction in the amount of waste being taken to landfill.

⁸ Seattle City Council: Solid Waste Plan 2004 amendment http://www.seattle.gov/util/About_SPU/Garbage_System/Plans/Solid_Waste_Plan/index.asp, viewed on 17th August 2005

⁹ Nova Scotia Department of Environment and Labour: Status Report 2004 in Solid Waste-Resource Management in Nova Scotia <http://www.gov.ns.ca/enla/waste/docs/WasteResourceStatus2004.pdf>, viewed on 17th August 2005

¹⁰ Final report on the framework national strategy for waste management, with emphasis on municipal waste, Carl Bro Consortium as part of the EU Cards Programme, 2003, cited in Draft Strategy of the Waste Management Strategy of the Republic of Croatia, Zagreb, March 2005

¹¹ Local agenda Jakuševac, Mičevac, Kosnica, and Novi Ščitarjevski meeting on waste management, 21.04.2005, Kosnica Youth Centre

However, the important point is that the EU Landfill Directive (1999/31/EC) requires a **decrease in the amount but also in the toxicity** of the waste being landfilled (Preamble, Para. 8). **Incineration decreases the amount of waste going to the landfill but in doing so concentrates the toxicity**, and should therefore be regarded as a highly suspect means for fulfilling ecological ends. It is also misleading to consider the three choices alone, as if choosing one removes the need for the other options, since **incineration also requires a landfill**. The EIA criticized MBT since it only reduces the amount of waste and does not eliminate it altogether, but this can also be said of incineration, and MBT results in a stabilised material that is less harmful in a landfill than incinerator ash.

4) Lack of regulatory oversight in Croatia

Zagreb's experience with the PUTO toxic waste incinerator and waste management in general does not inspire confidence that official monitoring will be sufficient to ensure that any new incinerator operates within legal pollution limits. The PUTO hazardous waste incinerator started operating in 1998. Local people began to complain of health problems which they attributed to the incinerator, including hormonal disorders, indigestion and breathing difficulties, and they claim that life expectancy in the area decreased, while cases of cancer increased.¹² In addition they claim that fruit trees stopped bearing fruit and that birds vacated the area.¹³ There were several incidents at the plant, when chemical reactions caused fires to break out. In October 2001, thick purple smoke billowed from the plant for days, which irritated the eyes and caused breathing difficulties. Local people pressed charges against the owners of PUTO.¹⁴

It was widely alleged that the incinerator was used to burn illegally-imported hazardous waste in order to increase its income.¹⁵ This appears to have been ignored by the authorities, but the Environmental Inspectorate did take a number of legal proceedings against PUTO during 2000 and 2001, related to emissions and hazardous waste storage.¹⁶ In March 2002 the Inspectorate threatened to prohibit the further admission of waste if the storage area was not upgraded to comply with regulations.¹⁷

In August 2002, a major fire broke out in a storage site, and about 100 tonnes of hazardous waste burned. The fire seems to have been caused by explosions of gases, probably resulting from leaks from containers stored outside of the covered storage area.¹⁸ After this incident the incinerator was finally banned from operating until regulatory requirements were met. The ban is still in place and PUTO was declared bankrupt on 8th July 2004.¹⁹ Although some legal action was taken against PUTO, it was extremely limited given the obviousness of the problems there. Local people still have no real information about the chemicals they were exposed to and about the likely effects of this. There is no

¹² Tesić, Mladenka, Interview with Members of UZOJ - Jakuševac Association for Environmental Protection, Zagreb, 2004

¹³ Tesić, Mladenka, Interview with Members of UZOJ - Jakuševac Association for Environmental Protection, Zagreb, 2004

¹⁴ Tesić, Mladenka, Interview with Members of UZOJ - Jakuševac Association for Environmental Protection, Zagreb, 2004. The main investor in PUTO was the City of Zagreb, together with the companies Hafner (Bolzano) and IRS (Meinheim) (UNECE, Environmental Performance Review: Croatia, UN, 1999).

¹⁵ Tesić, Mladenka, Interview with Members of UZOJ - Jakuševac Association for Environmental Protection, Zagreb, 2004

¹⁶ Buksa, Z.: 'Ekoinspekcija upozoravala i tuzila ali bez koristi', Vjesnik, 02.08.2002

¹⁷ Buksa, Z.: 'Ekoinspekcija upozoravala i tuzila ali bez koristi', Vjesnik, 02.08.2002

¹⁸ Klobucar, D: 'Pozar i eksplozije u spalionici opasnog otpada' Večernji List, 02.08.2002

¹⁹ Večernji List: 'Poglavarstvo grada Zagreba za stečaj spalionice PUTO', 10.007.2004

reason to believe that if a new incinerator caused environmental and/or health problems, the concerns of local people would be taken into account any more than with PUTO.

This lack of monitoring and enforcement is also shown in the country's hazardous waste problem, in which approximately half of Croatia's hazardous waste is unaccounted for and is suspected to either end up on municipal landfills, be dumped in the countryside, or end up in construction materials. **There is no evidence that monitoring and enforcement capacities have improved to the extent that the hazardous waste generated by the incinerator will be handled responsibly**, as the monitoring foreseen in EIA is not very frequent, and will be carried out by the incinerator operator, which leaves plenty of room for abuse if it is not backed up by state monitoring. Until this situation substantially improves and more resources are devoted to monitoring, it is highly irresponsible to build new sources of pollution and hazardous waste.

5) Waste of Energy

Energy recovery from waste is a very inefficient method of utilising the energy embodied in waste products, as the products do not only represent the calories which can be burnt, but also the energy which is needed to make more of the same material from raw materials. For example, **it has been estimated that manufacturing newsprint takes over two and a half times the amount of energy generated by burning it, manufacturing glass takes 30 times the energy generated by burning it, and making aluminium 350 times the amount of energy generated when it is burnt.**²⁰ A report by the Sound Resource Management Group Inc. found that **"on average, recycling saves three to five times as much energy as is produced by incinerating municipal solid waste"**²¹ These figures may vary by location and different technologies, but the message is still very clear. The advantage of recycling is recognised in the waste hierarchy but it is hard to see how the incinerator proposed for Zagreb will not end up burning useful materials considering that re-use and recycling is at a low level in the city.

6) Cost

The total cost of municipal solid waste incineration is significantly higher than for recycling, composting and landfills established according to strict environmental standards, taking into account the wide variation in the costs of different schemes.²² One estimate for the cost of construction of the Zagreb incinerator is as high as €290 000 000²³. These high costs are of great concern and could seriously impact on the functioning of the waste management system in and around Zagreb. In order to cover the high costs, it will be necessary to charge high tipping costs, and it is far from clear that the citizens and businesses of Zagreb are willing to pay, as there have been no public discussions of the likely costs to citizens and businesses. A World Bank report points out that "An incineration plant involves heavy investments and high operating costs and requires both local and

²⁰ Sound Resource Management Group Inc: Recycling Versus Incineration. Canada, Pollution Probe Ontario, 1992; and Morris, J: Recycling v incineration: an energy conservation analysis. Journal of Hazardous Materials 47, 1996, p. 277-293.

²¹ Sound Resource Management Group Inc: Recycling Versus Incineration. Canada, Pollution Probe Ontario, 1992

²² T Rand, J. Haukohl, LU .Atarxen: Municipal Solid Waste Incineration: a decision-makers' guide, World Bank, June 2000, p.9,

<http://www.ramboll.dk/docs/dan/Pressecenter/Publikationer/Faglige/Affald/MSWIncineration-ADecisionMakersGuide.pdf>

Friends of the Earth Fact Sheet: "Recycling, can local authorities afford it?", February 2002, p.2 http://www.foe.co.uk/resource/factsheets/recycling_local_authority.pdf

²³ Ministry of Environmental Protection, Physical Planning and Construction: Draft Proposal of the Waste Management Strategy of the Republic of Croatia, Zagreb, March 2005

foreign currency throughout its operation. The resulting increase in waste treatment costs will motivate the waste generators to seek alternatives.”²⁴ Without sufficient incentives to reduce and re-use and recycle waste, this means that in reality landfilling, or worse, illegal dumping, would still be a more economical way to dispose of waste. **This causes concern that a contract to supply a certain amount of waste to the incinerator may be signed, thus creating a severe disincentive to reduce and recycle waste.**

Fears about the high cost of the incinerator have been heightened by Zagreb’s experience with its new Wastewater Treatment Plant, being constructed by a consortium including WTE Wassertechnik, part of the EVN group which has carried out the EIA studies for the incinerator. Information about the total costs of the project are not officially available, which is highly unsatisfactory in itself, but it is estimated that costs have risen by just over EUR 50 million from the original EUR 180 million, and the project is running two years late²⁵. Water prices have risen for households and businesses and several businesses refused to pay on the grounds that they have already invested in their own water treatment systems. Finally the Mayor of Zagreb agreed to use taxpayers’ money to cover their share of the bill, thus imposing a further burden on Zagreb residents. This gives rise to concern about the quality of project preparation of infrastructure projects in Zagreb and raises questions about the final costs of an incinerator and its cost for citizens.

Concluding recommendations:

We recommend that no further preparations for an incinerator should be made in Zagreb at the present time and that in the future no incineration capacity should be considered at least until the following conditions apply:

- 1) That a new updated waste inventory and predictions for Zagreb have been drawn up and analysed by independent experts, and that a new waste strategy for the city has been drawn up *in consultation with interested parties from civil society*.
- 2) That non-incineration options such as anaerobic digestion have been explored for treating sewage sludge.
- 3) That waste prevention targets have been set by the Ministry of the Environment of the Republic of Croatia and that measures for meeting them have been implemented, for example legal stipulations for the availability of re-usable packaging, which are missing from the Packaging Regulation.
- 4) That the City of Zagreb changes the waste collection pricing system from the floor area of the dwelling to the quantity of waste collected.
- 5) That recycling and composting targets for the City of Zagreb are reviewed according to the outcome of the waste inventory, forecasts, and independent expert analysis.
- 6) That regular door-to-door recycling and composting collections serve at least 70% of Zagreb residents
- 7) That door-to-door collections are backed up with financial or penalty incentives to reduce, re-use and recycle waste.
- 8) That a concerted education programme for the citizens of Zagreb has been implemented, giving advice on the need and means to reduce, re-use and recycle.
- 9) That the Croatian Ministry of the Environment has an effective inventory of all new hazardous waste in Croatia and that hazardous waste is able to be effectively tracked and monitored.

²⁴ T Rand, J. Haukohl, LU. Atarxen: Municipal Solid Waste Incineration: a decision-makers’ guide, World Bank, June 2000, p.1,
<http://www.ramboll.dk/docs/dan/Pressecenter/Publikationer/Faglige/Affald/MSWIncineration-ADecisionMakersGuide.pdf>

²⁵ Poslovni Dnevnik 15.01.2007

- 10) That monitoring and enforcement for environmental offences has been significantly improved.
- 11) That a specially designed site or sites have been set up to receive the hazardous ashes from the incinerator, in which they will not be mixed with municipal waste.
- 12) That a full public discussion has taken place including predictions of costs for citizens resulting from the incinerator. The public has a full right to know what they will be expected to pay for new service infrastructure.

Even under these conditions, there would be many aspects of incineration which would remain a concern, such as its extremely high costs, the waste of materials it entails, and its contribution to emissions levels of NO_x, dioxins and heavy metals, but it would be more appropriate to discuss incineration as a last resort after the above measures have been taken than it is to plan a waste-to-energy plant in Zagreb today.