

# Incinerators in Disguise

Case Studies of  
Gasification, Pyrolysis, and Plasma in  
Europe, Asia, and the United States

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### **Greenaction for Health and Environmental Justice**

#### **Mission Statement**

Greenaction mobilizes community power to win victories that change government and corporate policies and practices to protect health and to promote environmental justice.

### **Global Alliance for Incinerator Alternatives (GAIA)**

#### **Mission Statement**

GAIA is a worldwide alliance of non-profit organizations and individuals who recognize that our planet's finite resources, fragile biosphere and the health of people and other living beings are endangered by polluting and inefficient production practices and health-threatening disposal methods.

We oppose incinerators, landfills, and other end-of-pipe interventions.

Our ultimate vision is a just, toxic-free world without incineration. Our goal is the implementation of clean production, and the creation of a closed-loop, materials-efficient economy where all products are reused, repaired or recycled back into the marketplace or nature.

## Introduction

# Incinerators in Disguise: Toxic Threat to Health, Environment, Pollution Prevention, and Renewable Energy

From California to Asia and beyond, communities are facing an unprecedented onslaught of proposals from waste treatment companies and entrepreneurs promoting a new generation of incineration technologies. Not since the waste industry tried to site hundreds of hazardous and solid waste incinerators in the United States in the late 1980's and early 1990's has there been such an intense effort to site new waste treatment facilities.

Today, many dozens of companies are promoting technologies such as pyrolysis, gasification, plasma arc, and catalytic cracking as a way to allegedly eliminate and "recycle" all types of waste into energy. Many of these companies falsely and boldly claim their technology is "pollution-free" and has "no emissions." Aware of the public's opposition to incineration, the companies promoting these technologies all claim these are not incinerators but are a "green" alternative to incineration.

Despite the grandiose claims of industry, the facts prove that these technologies are in reality "incinerators in disguise" that heat the waste materials, and then burn the waste gases and emit dioxin and other pollutants into the air.

Across the United States, municipalities, counties, state agencies and hospitals are now considering proposals for so-called "conversion technologies." This trend is now spreading across the world, with these technologies being proposed in countries large and small.

The stakes are high. If implemented, the countless proposals for these new incineration facilities may very well result in a profound impact on society and the environment from air and water pollution, the threat to public health, and the potential to devastate recycling, pollution prevention and renewable energy programs. These new incineration facilities would reverse decades of progress achieved by communities and the environmental health and justice movement to dramatically reduce the number of waste incinerators across the country and promote pollution prevention, safe treatment technologies and clean, renewable energy.

Exploiting legitimate concerns about emissions from traditional incinerators as well as the ongoing landfill crisis, the waste industry has targeted communities, counties and state legislative and regulatory bodies in an attempt to site these incineration technologies.

California has become a key focus of the waste industry promoting these technologies. There are dozens of actual or pending projects being proposed using plasma arc, pyrolysis, gasification, catalytic cracking, or a combination of these technologies for virtually every type of waste, including solid waste, sewage sludge, tires, fireworks, and medical waste. Many of the companies also claim they can treat hazardous and radioactive wastes. Jurisdictions are considering these technologies as a way to address waste disposal or to provide energy.

The industry and its allies are pushing legislation in California to encourage the siting and financing of facilities. The California Integrated Waste Management Board has made at least one large loan for a catalytic cracking facility proposed by Plastic Energy LLC for Hanford in the San Joaquin Valley despite the lack of any data to back up the company's claims of no emissions. The California Pollution Control Finance Authority is now being asked by InEnTec for tax-exempt bonds to help finance their proposed plasma arc medical waste facility in Red Bluff, located in Tehama County in northern California.

Counties such as Los Angeles and Santa Barbara in California are considering these technologies, but are relying heavily on industry studies. For example, URS Technology released a report in September 2005 commissioned by Los Angeles County that ranked Thermoselect gasification technology as the most promising of the companies URS considered, a curious model as Thermoselect's flagship facility in Germany was a failure and closed in 2004. The URS report refers to Interstate Waste Technologies, the U.S. licensee of Thermoselect's gasification technology.

Adding to the concern of community members and public health advocates is the fact that the projects seen to date are getting approved in California without Environmental Impact Reports, and in some cases without real public notice or public hearings. Many government agencies and regulators on local, state, and national levels are failing to scrutinize the claims being made by many companies, and are quick to approve and support these so-called conversion technologies. In many cases, the media has repeated the public relations claims of companies without investigation, only to find out later that certain key industry claims, such as "no emissions," were not true.

## **Public Relations Claims Vs. Reality: Problems with Existing Facilities**

In the United States, there have been only a few companies using these technologies commercially for waste treatment, and the operations at the two facilities where information is available were plagued with problems. These case studies document the problematic nature of these technologies on three continents.

Allied Technology Group operated a plasma arc facility for mixed radioactive and hazardous wastes in Richland, Washington, and the facility closed due to operational problems with the plasma arc equipment as well as financial problems. The Hawaii Medical Vitrification facility run by Asian Pacific Environmental Technologies near Honolulu has also had serious operational problems as well as serious permit violations. For example, the Hawaii Medical Vitrification facility was closed for approximately eight months due to refractory damage in the kiln of the plasma arc equipment.

Both the Allied Technology Group and the Hawaii Medical Vitrification facilities used Integrated Environmental Technologies' (IET) "Plasma Enhanced Melter" equipment. IET and their related company InEnTec claimed on their website that these two facilities were successful commercial operations using their technology, but the facts show that there were severe problems with the plasma arc equipment at both facilities.

A number of facilities have closed due to operational problems, including Thermosteel's large municipal solid waste (MSW) gasification facility in Karlsruhe, Germany and Brightstar Environmental's flagship MSW gasification facility in Australia. Both facilities exceeded emissions limits for various pollutants during emissions tests. The Thermosteel facility's parent company lost over \$500 million due to repeated breakdowns and technical problems and was never capable of operating at expected capacity before it closed in 2004. Brightstar Environmental's facility closed in 2003, and the company no longer exists.

Since 2003 numerous proposals for waste treatment facilities hoping to use plasma arc, pyrolysis, catalytic cracking and gasification technologies failed to receive final approval to operate when the claims of project proponents did not withstand public and governmental scrutiny of key claims.

## The Onslaught of Proposals in the U.S.

### North American Power Company Pyrolysis Proposal, Chowchilla, California<sup>1</sup>

In August 2003, Greenaction for Health and Environmental Justice, a nonprofit organization that works with communities on pollution and health issues, learned from the California Department of Health Services that North American Power Company was about to receive permits for the state's first pyrolysis facility for medical waste, to be located in the diverse, working class community of Chowchilla in the San Joaquin Valley. The company claimed there would be no hazardous emissions, and the city, state, and Air District regulators were days away from approving the project without ever notifying residents or requiring an Environmental Impact Report. Greenaction researched the technology, confirmed there would be emissions resulting from the burning of waste gases created from the heating of the medical waste, and started notifying residents. After Greenaction met with city officials, the city held off on approving the Conditional Use Permit and requested that North American Power Company provide more information to back up their claims. In response to the city's request and increased community awareness of the proposal, North American Power Company withdrew their proposal at the last minute when they could not back up their claim of zero emissions.

### Alameda Power and Telecom Rejects "Conversion Technologies"

In 2003, Alameda Power and Telecom (APT), the public power agency of the City of Alameda, California, began a study to look at technologies that might help generate small amounts of power for future city energy needs. APT spent over \$500,000 hiring consultants, who assured city officials, the media and the public that gasification technologies would have no emissions and could generate electricity cleanly by treating solid waste. One of APT's consultants, Dan Predpall of URS Corporation, shocked residents and recyclers when he told the Alameda Public Utilities Board that they would no longer have to recycle, as that would now be unnecessary as a gasification plant would supposedly be the new recycling technology.<sup>2</sup>

APT had first discussed siting the garbage plant in a low-income community of color in San Leandro, without discussing this with residents or city officials. Residents and environmental justice groups responded by forming a three-city grassroots coalition that challenged the claims of "no emissions" and advocated for clean, renewable energy, and the mayor of San Leandro spoke strongly

against the project.<sup>3</sup> The Alameda Public Utilities Board expressed reservations about the claims of the city's own consultants and voted against proceeding with further study on these "conversion technologies" until a future time when there might be more verifiable data upon which to base a decision.<sup>4</sup> The utility also modified its criteria for new electricity sources to exclude anything considered an emerging technology, including MSW gasification.<sup>5</sup>

### **Romoland Pyrolysis Emissions Higher Than Other Incinerators in Los Angeles Area**

Neoteric Environmental Technologies and International Environmental Solutions have built a plasma arc/pyrolysis facility in Romoland, located in Riverside County, California. Neoteric is interested in a commercial waste operation at this location, and in having a showcase facility to allow them to market this technology elsewhere. Residents were never fully informed about this facility, which was built without an Environmental Impact Report. The company did not pass test burns conducted in 2004 on sewage sludge and fireworks.<sup>6</sup> Tests using municipal solid waste conducted in 2005 were declared a success by the company,<sup>7</sup> but analysis by the South Coast Air Quality Management District determined that the pyrolysis facility emits more dioxins, NOx, volatile organic compounds and particulate matter than the two existing large municipal solid waste incinerators in the Los Angeles area.<sup>8</sup>

### **Plastic Energy LLC Loses Permits for Catalytic Cracking Facility Proposal<sup>9</sup>**

Plastic Energy LLC received permits in 2002 for a proposed catalytic cracking facility in Hanford in the San Joaquin Valley of California. Plastic Energy claimed they would generate electricity and turn plastics into diesel without any emissions. The project was initially approved by the Kings County Planning Department without public notice or an Environmental Impact Report, and was completely exempted from any review under the California Environmental Quality Act. In August 2004, residents and Greenaction challenged the permits and forced the San Joaquin Valley Air Pollution Control District to cancel the permits their agency had previously issued to Plastic Energy due to the lack of data supplied by the company to back up its claims. In November 2004, company officials attended a forum organized by a community coalition, where they admitted their technology would have toxic emissions, admitted they did not have data from similar facilities that they earlier had said they did have, and announced they were temporarily stopping their project. Plastic Energy has not reapplied for permits.

### **Global Energy Resources Drops Proposal in Sierra Vista, Arizona**

Arizona has recently become another battleground in this issue, with a company called Global Energy Resources targeting rural areas for a proposed facility. In late 2004, Global Energy Resources began an attempt to site a facility in Sierra Vista, located in Cochise County in southeast Arizona that the company said would use plasma arc technology to treat solid waste and tires. The company claimed their project would have no emissions, and also claimed on their website that they "owned and operated" similar facilities. When challenged on these claims at a meeting of the Cochise County Board of Supervisors during the spring of 2005, their consultant admitted there would be some emissions. It quickly became clear that the company did not and never had owned or operated any such facilities. Faced with increased concern and skepticism from elected officials and residents, Global Energy Resources dropped its proposal.<sup>10</sup> The company then focused its energy in an attempt to site a facility in Eagar, located in Apache County in rural northeast Arizona. The company has expressed an interest in other waste streams in addition to solid waste and tires. The proposed facility in Eagar is being met with strong community opposition.

### Permit for InEnTec Medical Services Rescinded by Appeal Hearing Board

Authorities to Construct permits issued to InEnTec Medical Services California LLC for a proposed medical waste plasma arc facility in Red Bluff, California were rescinded in December 2005 by the Tehama County Air Pollution Control District Hearing Board after the permits were appealed by residents and Greenaction.<sup>11</sup>

The Hearing Board ruled 3-1 to rescind the permits issued to InEnTec, after ten hearings that spanned over three months. The Hearing Board's ruling was based on findings including the fact that there were substantial changes to the project, significant new information had not been evaluated by the regulatory agencies, and there were concerns about the adequacy of InEnTec's data.<sup>12</sup>

The Tehama County Air Pollution Control District did not have a public comment period or public hearing before issuing permits, and approved the air permits for InEnTec Medical Services (related to Integrated Environmental Technologies) in July 2005. In December 2004, the Tehama County Planning Commission approved InEnTec Medical Services' project as a power generation facility, without an Environmental Impact Report.<sup>13</sup> Some InEnTec documents claimed their technology was "pollution-free" and did not produce dioxins, despite the fact that their own test results from a research project showed emissions of dioxin and other pollutants.<sup>14</sup> InEnTec also boasted that their technology (Integrated Environmental Technologies LLC's "plasma enhanced melter") was being successfully used at commercial facilities including the Hawaii Medical Vitrification plant and the Allied Technology Group facility (Richland, WA), despite the serious problems at both plants. InEnTec hopes to site similar plants around California, across the U.S. and the world, and wants facilities to treat a wide range of waste streams including medical, solid and hazardous wastes.

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#### Endnotes:

- <sup>1</sup> Lisa Aleman-Padilla, "Medical Waste Disposal Criticized," *Fresno Bee*, 26 Aug. 2003; Patty Mandrell, "Meeting Addresses Medical Waste Facility," *Chowchilla News* 8 Oct. 2003.
- <sup>2</sup> Alameda Public Utilities Board meeting, witnessed by report authors, Alameda, CA, 2004.
- <sup>3</sup> John Geluardi, "Alameda 'Gas' Plant Proposal Draws Fire," *Alameda Times-Star*, 30 June 2004.
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- <sup>5</sup> Susan Fuller, "Trash-for-Energy Talks Likely to End Monday," *Contra Costa Times* 15 Oct. 2004.
- <sup>6</sup> Personal communication with South Coast Air Quality Management District, 6 Oct. 2005.
- <sup>7</sup> IES presentation to the California Assembly Natural Resources Committee, 16 Nov. 2005.
- <sup>8</sup> Presentation by South Coast Air Quality Management District to California Integrated Waste Management Board, 20 Sept. 2005, available at <http://www.ciwmb.ca.gov/agendas/mtgdocs/2005/09/00019545.ppt>; Confirmation of this presentation's data being the same as the finalized analysis (with the exception of heavy metal emissions data, which were considered invalid), by personal communication with the SCAQMD, April 7, 2006.
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- <sup>10</sup> Michael Sullivan, "Memorandum on Plasma Arcs 'a Dead Issue'," *Sierra Vista Herald* [Sierra Vista, AZ] 29 June 2005.
- <sup>11</sup> Cheryl Brinkley, "Appeal wins on InEnTec," *Red Bluff Daily News* [Redbluff, CA] 23 Dec. 2005.
- <sup>12</sup> Final findings of the Hearing Board, Tehama County Air Pollution Control District, January 24, 2006.
- <sup>13</sup> Cheryl Brinkley, "InEnTec Appeal Date Set," *Red Bluff Daily News* [Redbluff, CA] 10 Sept. 2005.
- <sup>14</sup> Integrated Environmental Technologies, LLC, <<http://www.inentec.com>>.

## Case Studies

### Thermoselect

<b>Name of facility:</b>	Thermoselect Karlsruhe
<b>Owner:</b>	Switzerland-based Thermoselect ( <a href="http://www.thermoselect.com">www.thermoselect.com</a> ) provided the technology for the Karlsruhe Thermoselect facility. The Karlsruhe facility was owned by a subsidiary of a large German energy corporation called Energie Baden-Württemberg (EnBW, <a href="http://www.enbw.com">www.enbw.com</a> ). Thermoselect's technology is licensed to Interstate Waste Technologies in the United States and Caribbean region, JFE in Japan, and Daewoo in South Korea. <sup>1</sup> The technology has also been marketed under the names of Thermolink in Ireland and GADAT in the Philippines.
<b>Location:</b>	Karlsruhe, Baden-Württemberg, Germany
<b>Technology:</b>	Gasification followed by combustion of gases for municipal solid waste
<b>Status:</b>	Closed in November 2004. Operated in an extended test phase from 1999 to 2002, in commercial operations from 2002 <sup>2</sup> to 2004. <sup>3</sup>

Thermoselect's Karlsruhe facility was once one of the world's largest municipal solid waste (MSW) gasification incinerators, designed to process 225,000 tons of municipal wastes per year.<sup>4</sup> Recurring operational problems that led local press to rename it "Thermodefect" prevented the facility from reaching full operating capacity.<sup>5</sup> During its operations the facility was only able to dispose of one-fifth of the total quantity of contracted waste, forcing cities that had contracted with the facility to find new disposal options.<sup>6</sup> By the time facility-owner EnBW decided to close Thermoselect Karlsruhe in 2004, it had lost at least 400 million Euros (approximately \$500 million) on MSW gasification.<sup>7</sup>

Thermoselect's promotional material, including its website, makes claims about the technology's environmental performance such as "completely destroys dioxins and furans"<sup>8</sup> and "harmful substances contained in the waste are also completely destroyed."<sup>9</sup> Neither of these statements is true, as plainly shown in the company's contradiction of itself on the same webpage in a table listing the technology's emissions, including dioxins/furans, sulfur dioxide, carbon monoxide, hydrogen chloride, hydrogen fluoride, total carbon, mercury, cadmium/thallium, and total heavy metals.<sup>10</sup>

The Karlsruhe facility was forced to close temporarily in 2000 after releases of toxic gas were discovered, and operational problems during the years of test operations included an explosion, cracks of the high temperature chamber's concrete due to corrosion and heat, and a leaking sediment basin that held cyanide-contaminated wastewater.<sup>11</sup> The regional government admitted that the walls of the chamber were so battered that pieces had fallen off and could have caused an explosion.<sup>12</sup> In the first year of operations it was discovered that the facility had been using an emergency gas release vent, the existence and use of which the operators had failed to mention to regulators and the community during the permit process.<sup>13</sup>



The facility set off emissions alarms for both total organic carbon (TOC) and nitrogen oxides (NO<sub>x</sub>) in 2002<sup>14</sup> and exceeded emissions limits for TOC, NO<sub>x</sub> and particulates during tests in 2000.<sup>15</sup> The gas released from the emergency release chamber exceeded regulatory limits for dioxins, heavy metals and other pollutants.<sup>16</sup> Another monitoring sample found dioxins in cleaned gases at above regulated levels, in one case exceeding the limit of 0.1 ng/m<sup>3</sup> by a factor of seven. In two out of three cases within a few days dioxins levels were higher in the “cleaned” gases than in the gases before “cleaning” in pollution control devices.<sup>17</sup> Thermoselect’s Karlsruhe facility at times exceeded limits for hydrogen chloride (HCl) emissions.<sup>18</sup> HCl is a precursor to formation of dioxins.

Thermoselect Karlsruhe’s operating difficulties were reflected in energy inputs and outputs, an indication of the facility’s energy balance. In 2002 the facility used 17 million cubic meters of natural gas to heat the waste, and did not deliver any electricity or heat back to the grid.<sup>19</sup>

EnBW started construction of another Thermoselect MSW gasification incinerator in the German city of Ansbach, but the facility did not receive operating permits and was never completed because of problems at the sister-facility in Karlsruhe.<sup>20</sup> After massive financial losses from the Karlsruhe facility, EnBW is currently suing Thermoselect for the costs of dismantling the facility and the facility’s loan payments.<sup>21</sup>

The operational problems at Thermoselect’s Karlsruhe incinerator followed convictions for environmental violations at the company’s first MSW gasification facility in Fontodoce, Italy. In December 1999, the founder and chief engineer of Thermoselect and two board members were convicted in an Italian court for environmental violations including contamination of a nearby lake with poisonous compounds including cyanide, chlorine and nitrogen compounds.<sup>22</sup> The Thermoselect officers were sentenced to six months probation and fines between 50,000 and 100,000 DM. The same facility had operating problems and was unable to operate at full capacity for longer than one month at a time before shutting down.<sup>23</sup>

The websites of both Thermoselect and the U.S. licensee of the technology, Interstate Waste Technologies, mislead the public by stating that the Karlsruhe facility is still in operation and failing to mention the insurmountable technical problems at the facility. As of November 10, 2005 – a full year after the facility was shuttered – the Thermoselect website inaccurately states: “The Thermoselect facility was started up in January 1999 after a twenty month construction period and is today in unlimited continuous operation.”<sup>24</sup>

The use and discharge of water is a critical issue in most communities. Despite Interstate Waste Technologies’ claim on its website that the Thermoselect technology has no water emissions,<sup>25</sup> the Karlsruhe Thermoselect facility disposed of approximately 120,000 cubic meters of wastewater into the Rhine River in 2003.<sup>26</sup> Further refuting this claim, Thermoselect’s officers in Italy were convicted of contaminating a lake with polluted wastewater.

Thermoselect’s reputation has been damaged not only by operational problems but also by scandals. In 1995, the company gave DM 100,000 (approximately \$85,000 in 2005 U.S. dollars) to the Baden-Württemberg CDU (Christian Democratic Union) political party which led the state at the time.<sup>27</sup> The company has also been linked to attempts to bribe politicians to site facilities in Switzerland and Austria.<sup>28</sup>

The Karlsruhe incinerator inspired opposition from members of the community and local politicians. Repeated setbacks and shut downs in Karlsruhe, along with involvement of Karlsruhe community members, helped stop proposed Thermoselect facilities in the German cities of Herten, Bremen, Berlin and Hanau, as well as in Lebanon, Austria, Poland, and Tessin, Switzerland near Thermoselect's headquarters.<sup>29</sup>

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- <sup>2</sup> Bernhard Baldas, "Permit for Thermoselect [Genehmigung für Thermoselect]," Die Tageszeitung [Germany] 10 Jan. 2002.
- <sup>3</sup> Bernhard Baldas, "The End of the Karlsruhe Garbage Miracle [Das Karlsruhe Müllwunder ist am Ende]," Die Tageszeitung [Germany] 11 Mar. 2004.
- <sup>4</sup> Thermoselect, Facility in Karlsruhe, Germany, <<http://www.thermoselect.com/index.cfm?fuseaction=Anlagen&m=3>> (Viewed 21 July 2005)
- <sup>5</sup> Bernhard Baldas, "Closure Threatens the Karlsruhe Garbage Miracle [Dem Karlsruher Müllwunder droht das Aus.]," Die Tageszeitung [Germany] 28 Oct. 2003.
- <sup>6</sup> Bernhard Baldas, "Closure Threatens the Karlsruhe Garbage Miracle [Dem Karlsruher Müllwunder droht das Aus.]," Die Tageszeitung [Germany] 28 Oct. 2003.
- <sup>7</sup> Süddeutsche Zeitung [Munich, Germany], "The End for Thermoselect [Aus für Thermoselect]," 5 Mar. 2004; Frankfurter Allgemeine Zeitung [Frankfurt, Germany], "No Future for Thermoselect [Keine Zukunft für Thermoselect]," 3 Mar. 2004.
- <sup>8</sup> Thermoselect, Process Characteristics, <<http://www.thermoselect.com/index.cfm?fuseaction=Technologie&m=2>>, (Viewed 2 Aug. 2005).
- <sup>9</sup> Thermoselect, The Environment, <<http://www.thermoselect.com/index.cfm?fuseaction=Umwelt&m=2>> (Viewed 2 Aug. 2005).
- <sup>10</sup> Thermoselect, The Environment, <<http://www.thermoselect.com/index.cfm?fuseaction=Umwelt&m=2>> (Viewed 2 Aug. 2005).
- <sup>11</sup> Bernhard Baldas, "Magic Gone from Miracle Garbage Weapon [Entzauberte Müllwunderwaffe]," Die Tageszeitung [Germany] 28 Aug. 2001.
- <sup>12</sup> Fränkische Landeszeitung, "Natural Gas Use Should Be Halved This Year [Erdgas-Verbrauch soll dieses Jahr halbiert werden]," 29 Jan. 2003.
- <sup>13</sup> Bernhard Baldas, "Magic Gone from Miracle Garbage Weapon [Entzauberte Müllwunderwaffe]," Die Tageszeitung [Germany] 28 Aug. 2001.
- <sup>14</sup> Trade Control Office Karlsruhe, Thermoselect emissions data, 2002.
- <sup>15</sup> Stuttgarter Zeitung, "Lawsuit Against Thermoselect [Anzeige gegen Thermoselect]," 5 July 2000.
- <sup>16</sup> Jürgen Dahlkamp, "Defective Miracle [Defektes Wunder]," Der Spiegel 25 Sept. 2000; TÜV Pfalz (technical control association) measurements of combusted refined synthesis gas, tests during February and March 2000.

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- <sup>17</sup> District Administration of Karlsruhe (Regierungspräsidium Karlsruhe), press release, 5 Nov. 1999.
- <sup>18</sup> District Administration of Karlsruhe (Regierungspräsidium Karlsruhe), press release, 5 Nov. 1999.
- <sup>19</sup> Fränkische Landeszeitung, "Natural Gas Use Should Be Halved This Year [Erdgas-Verbrauch soll dieses Jahr halbiert werden]," 29 Jan. 2003.
- <sup>20</sup> Ulrich Rach, "A Prick in the Flesh [Ein Stachel im Fleisch]," Nürnberger Nachrichten, 13 Sept. 2004.
- <sup>21</sup> Andreas Müller, "The Story of the 'Garbage Miracle' Ends in the Courts" [Die Geschichte des 'Müllwunders' ended vor Gericht], Stuttgarter Zeitung [Stuttgart, Germany] 20 Oct. 2005.
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- <sup>23</sup> Bernhard Baldas, "Magic Gone from Miracle Garbage Weapon [Entzauberte Müllwunderwaffe]," Die Tageszeitung [Germany] 28 Aug. 2001.
- <sup>24</sup> Thermoselect, Facility in Karlsruhe, Germany, <<http://www.thermoselect.com/index.cfm?fuseaction=Anlagen&m=3>> (Viewed 21 July 2005).
- <sup>25</sup> Interstate Waste Technologies, Process Description, <<http://www.interstatewastetechnologies.com/process.htm>> (Viewed 10 Nov. 2005); Interstate Waste Technologies, Benefits, <<http://www.interstatewastetechnologies.com/benefits.htm>> (Viewed 10 Nov. 2005).
- <sup>26</sup> Wolfgang Heining, "Skepticism from Hanau Opponents Proves True: Karlsruhe Thermoselect Garbage Oven on the Verge of Closing Completely [Die Skepsis der Hanauer Gegner bestätigt sich. Karlsruher Thermoselect-Müllofen droht endgültiges Aus]," Frankfurter Rundschau 29 July 2003.
- <sup>27</sup> Meinrad Heck, "Garbage Miracle Thermoselect Brings Trouble [Müllwunder Thermoselect bringt dicke Luft]," Stuttgarter Zeitung February 7, 2005.
- <sup>28</sup> Neue Zürcher Zeitung, "The Garbage Debacle in Tessin [Das Kehrichtdebakel im Tessin]," 19 April 1997.
- <sup>29</sup> Bernhard Baldas, "Magic Gone from Miracle Garbage Weapon [Entzauberte Müllwunderwaffe]," Die Tageszeitung [Germany] 28 Aug. 2001; Jürgen Dahlkamp, "Defective Miracle [Defektes Wunder]," Der Spiegel 25 Sept. 2000.

## Brightstar Environmental / Energy Developments Limited

<b>Name of Facility:</b>	Brightstar Environmental
<b>Owner:</b>	Brightstar Environmental (former website: <a href="http://www.brightstarenvironmental.com">www.brightstarenvironmental.com</a> ) was a subsidiary of Energy Developments Limited ( <a href="http://www.energydevelopments.com">www.energydevelopments.com</a> ). Energy Developments is no longer pursuing SWERF (Solid Waste & Energy Recycling Facility) technology. Brightstar Environmental is no longer in operation. <sup>1</sup>
<b>Location:</b>	Wollongong, New South Wales, Australia
<b>Technology:</b>	Gasification followed by combustion of gases and oils (pre-processing included autoclaving) for municipal solid waste
<b>Status:</b>	Closed in April 2004. Commercial-scale facility operated in test phase from 2000 to 2004.

Brightstar Environmental's gasification technology was called the Solid Waste & Energy Recycling Facility, or SWERF. Although both Brightstar Environmental and its parent company Energy Developments Limited aggressively promoted the SWERF technology in many countries, only one facility was ever constructed. The facility was designed to dispose of 30,000 tons of municipal waste per year, and the company planned to expand in order to dispose of 150,000 tons per year.<sup>2</sup> By the time Energy Developments decided to close the facility, it had lost at least Au\$175 million (US\$134 million) on SWERF.<sup>3</sup>

Brightstar Environmental intended to operate as a commercial facility and had a processing agreement with the city of Wollongong, but repeated technical problems prevented the technology from moving out of test phase. After two years of test operations, an Energy Developments press release stated that "a run of 50 hours [has] been achieved" but that the facility was having problems with "minor material handling issues."<sup>4</sup>

The SWERF technology had additional technical problems with the following components:

- Replacement of second gasification unit for char (solid residues)<sup>5</sup>
- High levels of fine particles in the char gasification unit<sup>6</sup>
- Gasifier feeding system<sup>7</sup>
- Preprocessing drying system<sup>8</sup>

Emissions tests in 2001 observed the following problems: result for sulfuric acid mist and/or sulfur trioxide was found at nearly twice the allowable limit in the facility's permit<sup>9</sup>; arsenic exceeded the limit in the facilities permit<sup>10</sup>; NO<sub>x</sub> emissions were high (tests showed 190-300 mg/m<sup>3</sup>; as a comparison, the German NO<sub>x</sub> limit is 200 mg/Nm<sup>3</sup>),<sup>11</sup> and carbon monoxide emissions were very high (tests showed 681 mg/m<sup>3</sup>; as a comparison the German CO limit is 50 mg/Nm<sup>3</sup>).<sup>12</sup> The same tests found emissions of dioxin, hydrogen chloride, hydrogen fluoride, polyaromatic hydrocarbons,

hexachlorobenzene, heavy metals, and other chemicals of concern. Brightstar's website admitted to emissions of dioxins, heavy metals, NOx and other chemicals of concern.<sup>13</sup>

Energy Developments unsuccessfully tried to sell Brightstar Environmental in 2003 and in mid-2003 Energy Developments announced it would stop funding SWERF development activities.<sup>14</sup> In April 2004, Energy Developments abruptly announced the closure of the Wollongong facility. The city of Wollongong had invested over US\$1 million in the facility, however it inherited the buildings on the site once Brightstar Environmental left. The site will become a green waste facility and transfer station.<sup>15,16</sup>

Before closing its Wollongong facility, Brightstar had entered negotiations with the Australian cities of Gosnell and Salisbury, as well as the cities of Kent and Derby in the United Kingdom. The company also tried to site facilities in a number of cities in India and the U.S.. All of these contracts have now been cancelled.<sup>17</sup>

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#### Endnotes:

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<sup>2</sup> Energy Developments Limited, "SWERF: Amendment of Agreement with the City of Wollongong," press release, 13 June 2002.

<sup>3</sup> Rod Myer, "EDL Prepared to Give Up on Recycling Project," *The Age* [Australia] 23 July 2003.

<sup>4</sup> Energy Developments Limited, "Whytes Gully SWERF Technical Performance Update – Progress Encouraging," press release, 13 Dec. 2002.

<sup>5</sup> Energy Developments Limited, "EDL Board Approves New SWERF Char Gasifier," press release, 7 June 2002.

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<sup>7</sup> Energy Developments Limited, "Half Yearly Report of EDL's SWERF Business," press release, 25 June 2001.

<sup>8</sup> Energy Developments Limited, "Half Yearly Report of EDL's SWERF Business," press release, 25 June 2001.

<sup>9</sup> Brightstar Environmental. "Emissions Data from Solid Waste and Energy Recycling Facility (SWERF)," 1-2 Mar. 2001.

<sup>10</sup> Brightstar Environmental, Emissions Testing from July 3 and 18, 2001, presented at the Whytes Gully SWERF Community Consultation Committee Meeting, 15 Nov. 2001.

<sup>11</sup> Brightstar Environmental, Emissions Testing from July 3 and 18, 2001, presented at the Whytes Gully SWERF Community Consultation Committee Meeting, 15 Nov. 2001.

<sup>12</sup> Brightstar Environmental, Emissions Testing from July 3 and 18, 2001, presented at the Whytes Gully SWERF Community Consultation Committee Meeting, 15 Nov. 2001.

<sup>13</sup> Brightstar Environmental, <<http://www.brightstarenvironmental.com>> (Website is now closed. A cached version from 24 Jan. 2005 from Google is available at [http://www.google.com/search?q=cache:yO\\_JYblgJVUJ:www.brightstarenvironmental.com/html/env%2520frame%2520set/envtext.htm+site:brightstarenvironmental.com&hl=en](http://www.google.com/search?q=cache:yO_JYblgJVUJ:www.brightstarenvironmental.com/html/env%2520frame%2520set/envtext.htm+site:brightstarenvironmental.com&hl=en)).

<sup>14</sup> Energy Developments Limited, "ENE to cease SWERF development expenditure and focus on traditional energy business," press release, 21 July 2003.

<sup>15</sup> City Council, "Disappointment at End of SWERF Project," press release, 31 Mar. 2004.

<sup>16</sup> Minutes of the meeting of the Wollongong Neighbourhood Committee No. 7, 17 Feb. 2005, <<http://www.wollongong.nsw.gov.au>> (Viewed 4 Aug. 2005).

<sup>17</sup> Brightstar Environmental, <<http://www.brightstarenvironmental.com>> (website is now closed. Cashed versions of the website pages are available from Google at <http://www.google.com/search?q=site:brightstarenvironmental.com&hl=en&lr=&start=50&sa=N> ; Viewed 4 Aug. 2005).

## Hawaii Medical Vitrification Facility/Asia Pacific Environmental Technology

<b>Name of Facility:</b>	Hawaii Medical Vitrification
<b>Owner:</b>	Asian Pacific Environmental Technology
<b>Location:</b>	Honolulu, Hawaii
<b>Technology:</b>	Plasma Arc (“Plasma Enhanced Melter”) from Integrated Environmental Technologies (IET) for medical waste
<b>Status:</b>	Commercial medical waste facility

Asian Pacific Environmental Technology (APET) operates the Hawaii Medical Vitrification (HMV) facility. The facility was built in 2003 in response to the closure of a large medical waste incinerator and a demand for new waste disposal options. APET uses the “Plasma Enhanced Melter” plasma arc technology of Integrated Environmental Technologies LLC (IET). APET told the Honolulu Advertiser newspaper in March 2002 that the plasma arc technology was an electrical energy process that “breaks items down to their basic components, hydrogen and inert material”.<sup>1</sup> The article failed to mention the issue of emissions of hazardous pollutants.

Despite several years of commercial operations, as of October 2005 there had never been air emissions testing or monitoring of air emissions at the facility. The State of Hawaii and the United States Environmental Protection Agency did not require testing or monitoring of emissions due to the small amounts of waste being treated at the plant,<sup>2</sup> despite the fact that tests done by the manufacturer of the plasma arc equipment, IET, documented emissions of dioxin and other pollutants.<sup>3</sup> HMV has submitted a new permit application requesting permission to increase the amount of medical waste they treat.

In May of 2004, the State of Hawaii Department of Health (DOH) filed a complaint against Asia Pacific Environmental Technology/Hawaii Medical Vitrification for serious violations, including the storage of excessive amounts of untreated infectious medical waste which violated the state’s solid waste rules. The Department of Health imposed a penalty of \$60,270 for these violations.<sup>4</sup> According to the DOH complaint, between April and October of 2003 APET’s HMV facility illegally stored between 9,724 and 90,239 pounds of untreated infectious medical waste at their facility. The facility had continued to accept waste even though its permitted storage capacity was exceeded when the plasma arc system was out of service and could not process the waste. Information submitted by HMV to the Department of Health indicated that the PEM system was out of service from May 27 to August 8, 2003. Daily reports submitted by the company to the State DOH show that the company continued to exceed its permitted infectious waste storage capacity from October 29, 2003 through March 12, 2004.<sup>5</sup>

The company also violated permit conditions by failing to test their end products quarterly, and instead had tested only once for microbial cultures and heavy metals. APET/HMV failed to allow

the Hawaii Department of Health (DOH) to conduct a complete inspection of the facility in 2003. Sam Liu, President of HMT, told regulators that they could not take pictures of a pile of sharp containers because it was a problem and would look bad.<sup>6</sup>

From August 2004 to April 2005 (a period of approximately eight months), HMT was shut down for “refractory damage” to the plasma arc equipment, according to Nolan Hirai at the Hawaii Department of Health.<sup>7</sup> Columbia University’s Earth Institute also cited electrode issues that prompted the closure.<sup>8</sup>

Despite the serious problems at the facility, including the refractory damage in the plasma arc equipment that caused the facility to close for eight months, Integrated Environmental Technologies and InEnTec claimed on their website that this facility is a successful commercial operation when in fact it has not been a success.

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**Endnotes:**

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- <sup>2</sup>R.W. Beck, Inc. City of Honolulu Review of Plasma Arc Gasification and Vitrification Technology for Waste Disposal: Final Report 2003, pp. 5,21; phone discussions between Greenaction and Nolan Hirai, Hawaii Department of Health.
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- <sup>4</sup>Laura M. Lott and Janice Okubo, “Hawaii Medical Vitrification Subject to Enforcement Action” Hawaii Department of Health, press release, 28 May 2004.
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- <sup>6</sup> Department of Health, State of Hawaii, “Department of Health, State of Hawaii, Complaint, vs. Mr. Samuel Y.K. Liu Asia Pacific Environmental Technology, dba Hawaii Medical Vitrification, Respondents. Notice and Finding of Violation; Exhibit ‘A’ ”, Complaint, pp. 6-8, 19 May 2004.
- <sup>7</sup>Nolan Hirai, Hawaii State Department of Health, email to Bradley Angel, Executive Director, Greenaction for Health and Environmental Justice, 18 May 2005.
- <sup>8</sup>Environmental Science & Policy Research Team, School of International and Public Affairs, Columbia University, and the Earth Institute Master of Public Administration Program in Environmental Science and Policy, Columbia University, “Solid Waste Management Alternatives for the City of New York”, workshop in Applied Earth System Policy Analysis, p. 53, 2005.

## Allied Technology Group

<b>Name of Facility:</b>	Allied Technology Group
<b>Owner:</b>	Allied Technology Group
<b>Location:</b>	Richland, Washington
<b>Technology:</b>	Plasma Arc Gasification from Integrated Environmental Technologies (IET) for treatment of radioactive and hazardous wastes
<b>Status:</b>	Plasma Arc equipment Closed (2001)

Allied Technology Group Limited (ATG) owned and operated a commercial waste treatment facility using plasma arc gasification, but the facility was closed in 2001 due to operational and financial problems.

ATG started treating low-level radioactive and hazardous wastes in the late 1980s, a decade before adding the Plasma Enhanced Melter (PEM) to its Richland facility. Designed by Integrated Environmental Technologies (IET), the plasma arc technology was supposed to “take low-level radioactive wastes laced with dangerous chemicals and turn them into a benign glass.”<sup>1</sup> The technology was supposedly able to reduce any type of mixed waste to a vitrified state, including PCBs, while a final cleansing stage would supposedly break down emissions and reconstitute them into “harmless carbon dioxide and steam.”<sup>2</sup>

In reality, tests from the technology provider parent company IET revealed that in fact the PEM technology does have emissions of toxic pollutants including dioxins.<sup>3</sup>

With anticipated contracts from both commercial customers as well as the Department of Energy (DOE), ATG began construction of the IET plasma gasification system within the Richland plant in 1999. The system, which ATG called GASVIT, had problems from the start. According to a Tri-City Herald news report, the “system routinely shuts down because of problems with the emissions equipment”.<sup>4</sup> The plasma gasification system was not able to operate nonstop as expected.

ATG continued to delay state and federal agencies’ observations of tests of the plasma arc technology, postponing a scheduled test run from November 2000 to early 2002.<sup>5</sup> Problems with the system resulted in a buildup of untreated waste while the processing system was not operating properly. “The bottleneck is the size of a medium house. The radioactive wastes clogged behind it could fill a small lake...The problem is the sophisticated equipment keeps shutting itself off. That means Allied Technology Group cannot conduct a demonstration for state and federal regulators, whose approval is needed before the so-called GASVIT system can operate at full speed. Its official test run is now 10 months behind schedule.”<sup>6</sup>

Due in large part to problems with the plasma arc equipment, ATG filed for bankruptcy and laid off most of its workers. According to an ATG filing with the Security and Exchange Commission, “ATG's operations will not generate sufficient cash flow to allow the company to



meet its past due obligations under the bank loan. If it cannot immediately modify or refinance this debt, it may be required to seek bankruptcy relief or to otherwise reorganize or sell substantially all of its assets.”<sup>7</sup>

ATG went on to file bankruptcy on December 3, 2001 before ever obtaining the needed permits to operate at full capacity. “ATG terminated most of its 120 Richland workers last November and declared bankruptcy Dec. 3 because of massive debts and an expensive waste glassification facility that doesn’t work... ATG sunk at least \$40 million into building it, and the emissions purification equipment kept shutting down on its own.” While the facility tried reopening in 2002, the plasma arc equipment did not start up again.<sup>8</sup>

Despite the fact that the ATG facility using IET’s technology closed due to operational and financial problems, the website of IET’s wholly –owned subsidiary InEnTec claimed this was a “successfully operating” commercial system.<sup>9</sup> IET continues to heavily market its plasma arc gasification technology for medical and other waste streams.

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**Endnotes:**

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<sup>2</sup> John Stang, “Radioactive Red Ink – Glitches Stall Progress at Allied Technology Group Melter, But Officials Still Optimistic,” Tri-City Herald 23 Sept. 2001.

<sup>3</sup> William J. Quapp and David Lamar, Integrated Environmental Technologies, LLC and Nick Soelberg, Idaho National Engineering and Environmental Laboratory, “Waste Gasification – Test Results From Plasma Destruction of Hazardous, Electronic, and Medical Wastes,” May 12, 2003; Environmental Technology Evaluation Center (EvTEC), CERF/IIEC, “Environmental Technology Verification Report for the Plasma Enhanced Melter,” May 2002.

<sup>4</sup> John Stang, “ATG Lays Off 55 Workers, Delays Testing of Glassification System” Tri-City Herald 27 Sept. 2001.

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<sup>8</sup> John Stang, “ATG getting back to business,” Tri-City Herald 6 May, 2002.

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## Ebara

<b>Name of facility:</b>	Ebara
<b>Owner:</b>	Ownership of this facility is unclear. The technology provider is Ebara Corporation, a Japanese engineering company that has constructed at least six municipal solid waste gasification facilities in Japan as well as traditional municipal solid waste incinerators.
<b>Facility location:</b>	Broga, Malaysia
<b>Technology:</b>	Fluidized-bed gasification followed by combustion of gases and ash for municipal solid waste
<b>Status:</b>	The Broga facility is still in the planning stage. An appeal of the project's Environmental Impact Assessment and strong local opposition have stalled the project.

In 2002, the Malaysian government proposed the construction of a municipal solid waste (MSW) gasification incinerator to treat an average of 5,000 tons per day. The plant was originally planned for construction in Kampung Bohol near the Malaysian capital of Kuala Lumpur. Because of wide-spread public protest, the project was cancelled and relocated to the city of Broga in the state of Selangor.<sup>1</sup>

In February 2003, Tokyo-based Ebara Corporation was awarded a contract through an internal bidding process to build a gasification facility in Broga, which would be the world's largest municipal waste incinerator.<sup>2</sup> Ebara Corporation is an environmental engineering company that claims to have a zero emissions concept with a commitment to sustainable development, clean air and clean water.<sup>3</sup>

Ebara proposes to install a fluidized-bed gasification furnace technology that the company claims has "zero emissions".<sup>4</sup> Despite this claim, Ebara's website admits that its gasification technology does release dioxins.<sup>5</sup> Indeed, an Environmental Impact Assessment (EIA) for the proposed Broga facility noted concern for public health and safety, and raised the possibility that dioxin emissions and accidents could cause cancer.<sup>6</sup>

Ebara's track record of contaminating water with dioxins in Japan conflicts with its proclaimed corporate philosophy of "zero emissions." A traditional mass-burn incinerator run by Ebara Corporation in Fujisawa, Japan was closed in 1999 after regional environmental regulators discovered that wastewater containing 8,100 times the regulatory limit of dioxin was being pumped into a stream leading to the Hikichi River.<sup>7</sup> Because of Ebara's negligence, contaminated wastewater from the Ebara incinerator was discharged into the Hikichi River for at least seven years and portions of the river contained at least 16 times more dioxins than Japan's national standard.<sup>8</sup> Shortly after discovery of the contamination was announced, Japan's Environment Agency stated "it has become clear that the inappropriate release of wastewater [from incinerators] may not only pollute public waterways, but also have a large impact on the health of surrounding residents."<sup>9</sup>

Details about the contract between Ebara and the Malaysian government have been withheld from the community. When questioned about the government contract, an Ebara spokesperson stated, "We have agreed to abide by the secrecy requirement in the contract and are unable to describe these terms."<sup>10</sup> Community members have expressed frustration with the lack of transparency regarding the project and 85% of the local community opposes the incinerator project.<sup>11</sup> Local residents have formed groups such as the Broga No Incinerator Action Committee to appeal to the Malaysian government and the Japanese government to end the project.

The question of financing and what financial burden will be carried by Malaysian taxpayers and the local community is of special concern. Due to the failure of several gasification incinerators in Japan, the Ebara Corporation lost 27 billion yen (US\$247 million) in 2002 alone.<sup>12</sup> In the same year, Ebara spent 6.8 billion yen (US\$62 million) to repair similar plants in Japan, an amount far exceeding projected expenses.<sup>13</sup>

Financial backing for the project has not been disclosed. In 2003, the Malaysian government claimed that the project would be financed through a soft loan from the Japanese government, however the Japanese government denied the claim. The capital costs of the facility are estimated to be RM 1.5 billion (US\$395 million). Annual operations are expected to cost nearly RM 200 million (US\$53 million), which could pass on substantial financial burdens to ratepayers.<sup>14</sup>

Rising costs for the Broga proposal have similarities with a recent Ebara scandal in Japan. Kick backs from the construction of a gasification incinerator and other scandals led to fines for Ebara from the Tokyo Regional Taxation Bureau in April 2004 for failing to declare a total of 1.3 billion yen (US\$9 million) in income. Of this amount, Ebara received 300 million yen (US\$2.7 million) from a subcontractor during construction of a gasification facility in Nagareyama, Japan.<sup>15</sup>

Ebara is already suspected of breaching other portions of its contract with the Malaysian government, including failure to transfer technology to local vendors and failure to maximize use of local materials for the project.<sup>16</sup>

Other blemishes on Ebara's record include a bid rigging investigation by Japan's Fair Trade Commission, announced in August 2005. Ebara and other engineering firms have been accused of selecting bid winners at predetermined prices to win sewage and water treatment facility contracts from local governments.<sup>17</sup>

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