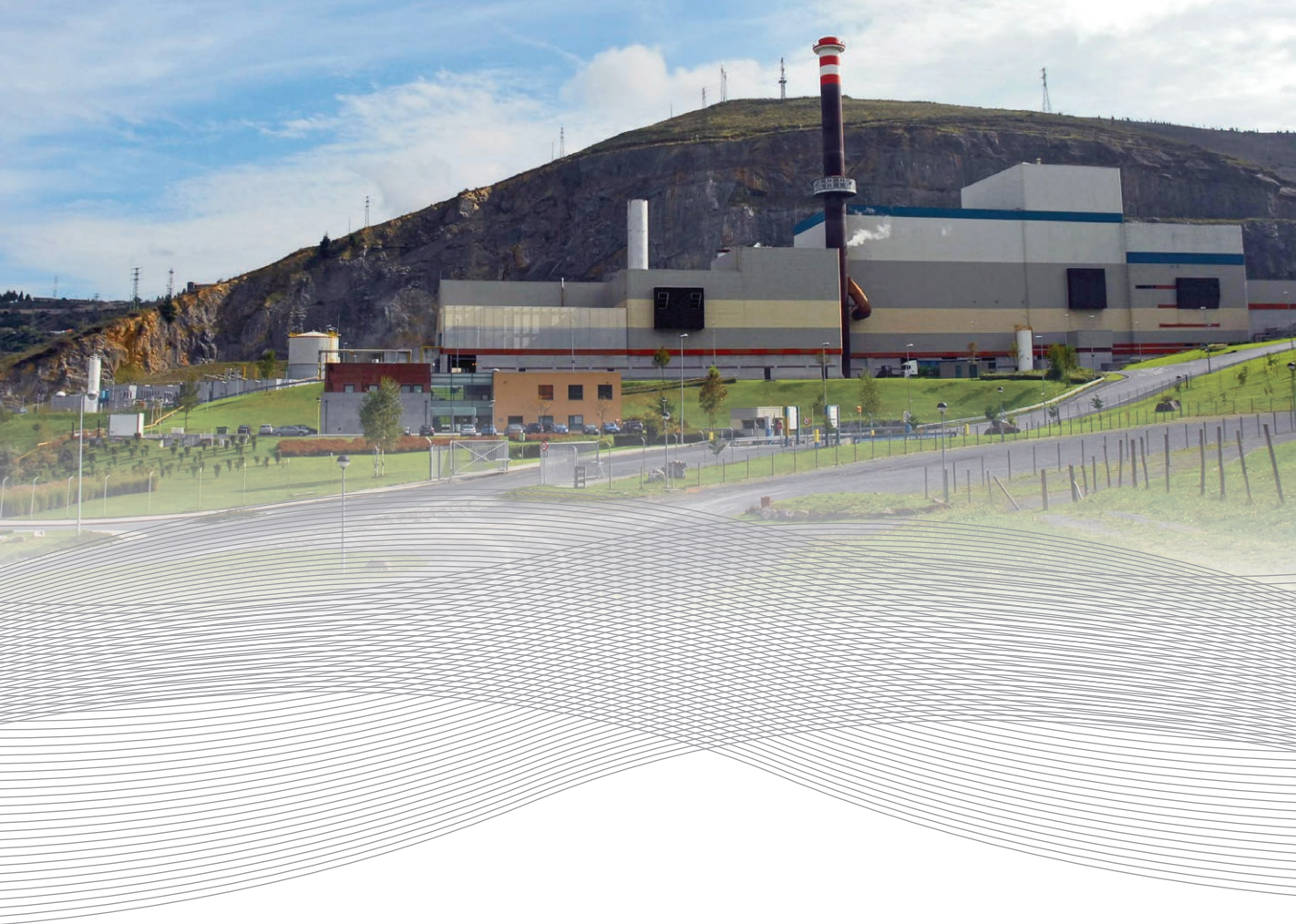




# WASTE MANAGEMENT CONSULTANCY

# WASTE MANAGEMENT

Waste Management Engineering (WME) covers the conception and realisation of solid waste and biomass management related projects, including recycling and valorization as matter and/or energy, within the scope of sustainable development.

Realizing these projects implies a preparatory study on the nature of solid waste and the biomass to be treated, the development of management strategies, the preparation of feasibility studies and the study of contractual modes for the installations construction and exploitation (public assignment, private assignment or public/private partnerships).

Through the years, our engineers have gathered significant references in Belgium as well as abroad, with regard to sorting/recycling installations, biological treatment and energetic valorization of household and analogous waste, of medical waste, of water treatment plant sludge, of organic waste and biomass.

More specifically, our experts have gathered a profound knowhow in the conception, control of construction and start-up, follow-up of operation and improvement of maintenance of "Waste to Energy and Biomass Plants".



## IBH

### 30+ YEARS OF EXPERIENCE IN WASTE MANAGEMENT

- Solid waste and biomass management related projects
- Recycling and valorization as matter and/or energy
- Within the scope of sustainable development
- Significant references
- Profound knowhow in conception, control of construction and start-up, follow-up of operation and improvement of maintenance

## SERVICES

### FEASABILITY, PROJECT MANAGEMENT & OPERATION ASSISTANCE

Our engineers offer various services, from feasibility studies, the entire project management, contractual and technical advice, general engineering, to the organisation of tendering, tender analysis, the placing of orders, technical and contractual follow-up of construction, follow-up of operation and optimisation of maintenance.



HOUSEHOLD AND ANALOGOUS WASTE  
ORGANIC WASTE & BIOMASS  
MEDICAL WASTE  
WATER TREATMENT PLANT SLUDGE  
SORTING & RECYCLING INSTALLATIONS  
BIOLOGICAL TREATMENT  
ENERGETIC VALORIZATION

## PROJECT CYCLE

### FEASIBILITY STUDY



### TECHNICAL AND CONTRACTUAL PROJECT MANAGEMENT



### FOLLOW-UP AND ASSISTANCE OF OPERATION AND MAINTENANCE

We determine the basics of a project, both with regard to general dimensioning, as regards technical choices, possible locations, required investments and exploitation costs.

Project management, general engineering, contractual advice, technical supervision of construction, ... We ensure the entire follow-up of a project, from drawing up the tender documents to the final acceptance of the installations.

We verify whether the installations are used in optimum circumstances, reducing the risks of wear and tear.

# REFERENCES

## WASTE TO ENERGY

|              |                                     |                                |                                    |                              |
|--------------|-------------------------------------|--------------------------------|------------------------------------|------------------------------|
| 2012-2020    | District Heating                    | Herstal and Liège, Belgium     | 85 MW <sub>th</sub> - 155 GWh/year | Valorical                    |
| 2011-2017    | Incineration plant of Charleroi     | Pont-de-loup, Belgium          | 110,000 t/year                     | ICDI                         |
| 2010-2030    | Municipal waste treatment plant     | Manama, Bahrain                | 390,000 t/year                     | HSBC Dubaï                   |
| 2008-2013    | Waste management centre             | San Sebastian, Spain           | 240,000 t/year                     | GHK                          |
| 2000-2004    | Waste to energy plant               | Huddersfield, United Kingdom   | 235,000 t/year                     | Lloyds Bank                  |
| 1999-ongoing | Power plant                         | Bilbao, Spain                  | 240,000 t/year                     | Zabalgarbi                   |
| 1999-ongoing | Waste to energy plant               | Liège, Belgium                 | 320,000 t/year                     | Intradel                     |
| 1996-1999    | Waste to energy plant               | Dudley, United Kingdom         | 90,000 t/year                      | Dudley Waste Services Ltd.   |
| 1996-1999    | Waste to energy plant               | Stoke-On-Trent, United Kingdom | 180,000 t/year                     | Hanford Waste Services Ltd.  |
| 1996-1998    | Waste to energy plant               | Wolverhampton, United Kingdom  | 105,000 t/year                     | Wolverh. Waste Services Ltd. |
| 1994-2011    | Incineration units of the W.Brabant | Virginal, Belgium              | 50,000 t/year                      | IBW                          |
| 1993-1995    | Incineration and composting plant   | Mataro, Spain                  | 140,000 t/year                     | Crédit Lyonnais (F)          |
| 1992-1993    | Municipal waste treatment           | St Germain, France             | 200,000 t/year                     | BCEOM                        |
| 1992-2013    | Waste to energy plant               | Tournai, Belgium               | 400,000 t/year                     | Ipalle                       |
| 1990-1991    | Incineration plant                  | Montreal, Canada               | 200,000 t/year                     | LBCD                         |
| 1989-2004    | Municipal waste treatment           | London, United Kingdom         | 400,000 t/year                     | SELCHP Ltd.                  |
| 1977-1996    | Incineration plant                  | Brussels, Belgium              | 500,000 t/year                     | Agence Bruxelles Propreté    |

## BIOLOGICAL TREATMENT

|           |                             |                                  |               |         |
|-----------|-----------------------------|----------------------------------|---------------|---------|
| 2007-2008 | Biological treatment plants | Varenne-Jarcy and Calais, France | Audit         | URBASER |
| 2004-2007 | Biological treatment plant  | Namur, Belgium                   | 25,000 t/year | BEP     |
| 1997-1998 | Equipments for green waste  | Virginal, Belgium                | 30,000 t/year | IBW     |
| 1996-1998 | Composting plant of Tournai | Thumaide, Belgium                | 12,000 t/year | Ipalle  |

## SORTING AND RECYCLING

|           |                                        |                             |               |          |
|-----------|----------------------------------------|-----------------------------|---------------|----------|
| 2008-2013 | Sorting and shredding plant            | Mont-Saint-Guibert, Belgium | 80,000 t/year | IBW      |
| 1998-2002 | Sorting and shredding plant of Liège   | Liège, Belgium              | 60,000 t/year | Intradel |
| 1995-1999 | Sorting and shredding plant of Tournai | Tournai, Belgium            | 30,000 t/year | Ipalle   |

## FEASIBILITY STUDIES

|           |                                      |                                        |                           |                           |
|-----------|--------------------------------------|----------------------------------------|---------------------------|---------------------------|
| 2008-2008 | Solid waste management solutions     | Charleroi, Belgium                     | -                         | ICDI                      |
| 2005-2007 | Waste to energy plants               | Castellon - Valencia - Alicante, Spain | 150,000 to 300,000 t/year | VAERSA CAAZ               |
| 2000-2000 | Materials recycling facility         | Charleroi, Belgium                     | 30,000 t/year             | ICDI                      |
| 1999-2000 | Sorting and shredding plant          | Walloon Brabant, Belgium               | 30,000 t/year             | IBW                       |
| 1999-2003 | Herstal Plant refurbishment          | Liège, Belgium                         | 320,000 t/year            | Intradel                  |
| 1995-1997 | Common collection service            | Hainaut, Belgium                       | -                         | Ipalle                    |
| 1992-1994 | Transfer station for municipal waste | Brussels, Belgium                      | 120,000 t/year            | Bruxelles-Capitale        |
| 1992-1994 | Municipal waste treatment            | Namur, Belgium                         | -                         | Sonat                     |
| 1989-1990 | Treatment of urban solid waste       | Bangkok, Thailand                      | 50,000 t/year             | CEC, Ministry of Thailand |

## MASTER PLANS, AUDITS AND STUDIES

|           |                                        |                          |                |                                |
|-----------|----------------------------------------|--------------------------|----------------|--------------------------------|
| 2011      | Nantes incineration plant              | Nantes, France           | -              | USBASER                        |
| 2009-2011 | Huddersfield incineration plant        | Kirklees, United Kingdom | -              | DEXIA Public Finance Bank      |
| 2009      | Solid waste management                 | Charleroi, Belgium       | -              | ICDI                           |
| 2007-2008 | River transport of municipal waste     | Liège, Belgium           | 80,000 t/year  | Intradel                       |
| 2006-2007 | Polish Waste Management Market         | Poland                   | -              | URBASER                        |
| 2006-2007 | Waste to energy plants                 | United Kingdom           | -              | CIBC World Markets             |
| 2005-2006 | Incineration plants, feasibility study | Valencia, Spain          | -              | VAERSA                         |
| 2005      | Co-incineration in cementry            | Valencia, Spain          | -              | VAERSA                         |
| 2002-2004 | Waste water sludge, Walloon region     | Walloon Region, Belgium  | 250,000 t/year | SPGE/Office Wallon des Déchets |
| 2000-2006 | Solid Waste Management Plans           | Walloon Region, Belgium  | -              | Office Wallon des Déchets      |
| 1994-1995 | Solid waste management                 | Samut Sakhon, Thailand   | -              | PWD- Ministry of Interior      |
| 1989-1991 | Treatment of hospital waste            | Brussels, Belgium        | -              | Région de Bruxelles-Capitale   |



# WASTE TO ENERGY

## WASTE TO ENERGY PLANT OF HERSTAL

Herstal (Province of Liège), Belgium

Intradel is a syndicate of 72 communes (950,000 habitants) of Liège Province. In response to more stringent legislation, Intradel decided to modify an existing sorting and incineration plant by implementing new incineration streams capable to directly mass burn 320,000 tons per year of municipal and non-dangerous industrial waste. Sorting equipment has been dismantled and the reception hall has been extended. Two stoker grates of 21 tons per hour each are installed with a recovery boiler of 67 MWth delivering superheated steam to a 30 MWe turbo generator. Part of the energy could also be used to power a district heating grid. Wastewater sludge is injected in the combustion chamber. The flue gas cleaning system includes electro filter, selective catalytic reactor for DeNOx reduction, semi-dry lime scrubber, activated carbon injection and bag house filter. For this assignment, a 'Design, Build and Operate' contract was managed.

### Assignment

new incineration streams of municipal and non-hazardous industrial waste

### Client

Intradel

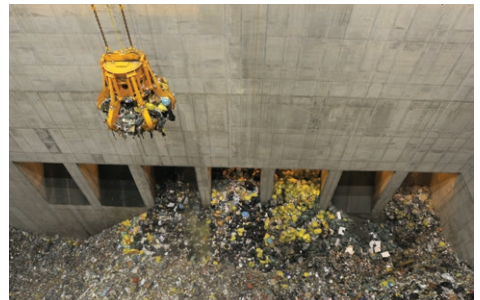
### Services

project management  
technical assistance  
contractual assistance

### Numbers

320,000 tons/year

1989 - ongoing  
(construction of the  
2 plants, operation  
follow up)



## WASTE TO ENERGY PLANT OF THUMAIDE

Thumaide (Province of Hainaut), Belgium

Ipalle has been adapting and expanding its waste disposal plant since the 1990's. From 1992 to 1996, the addition of equipment to the sorting, composting and incineration plant were managed. The project included a flue gas cleaning equipment and an aerobic composting of "green" waste. From 1995 to 2004 were managed the extension of the Solid Waste incineration plant with the addition of 2 incineration units and the refurbishment of existing facilities. A flue gas treatment equipment is installed in accordance with DUE/94 regulation (dangerous waste). The bottom ash treatment facility was extended. From 2002 to 2011, a third incineration stream was added, designed to burn 12 tons of waste per hour. A sludge combustion device with pulverization in the combustion chamber was installed, as well as a SCR Denox flue gas treatment for 3 incineration units. From 2006 to 2012 followed the study and installation of a fourth incineration stream (n°7).

### Assignment

addition of equipment  
and new incineration  
streams

### Client

Ipalle

### Services

technical and  
contractual assistance:  
project and execution  
operational monitoring

### Numbers

400,000 tons/year

1992 - 2012



## CLINICAL WASTE TRANSFER BUILDING

Thumaide (Province of Hainaut), Belgium

The progressive strengthening of legislation on air emissions has forced many hospitals to close their incinerators. To respond to the problems faced by clinics and healthcare facilities, Ipalle provides the management and the treatment by incineration of hospital waste type B2 (cutting, piercing, blunt and/or infectious). The reception area consists of two automatic handling chains responding strictly to legal demands: checking for the absence of radioactivity, prohibition to mix B2 waste with garbage stored in pit, maximum limitation of human contact with this type of waste, limited storage time before treatment (24 hours max), supervising the disinfection of the containers. As the standard containers with waste arrive, they are weighed and identified by a scanning system (barcodes). This ensures a complete traceability of waste (origin, date, time of arrival and treatment). Our engineers provided the general design, preparation of contractual and technical specifications, tendering procedure, evaluation of tenders and construction supervision.

### Assignment

construction of a clinical waste transfer building

### Client

Ipalle

### Services

project management

### Numbers

2,000 tons/year

1995 - 1999



## WASTE TO ENERGY PLANT OF VIRGINAL

Virginal (Province of Walloon Brabant), Belgium

In 1994, tenders were evaluated for additional equipment and replacement of the existing incineration stream of the plant located in Virginal. The project consisted of the treatment of the exhaust gas in accordance with EC regulations (100,000 Nm<sup>3</sup>/h) and the installation of a new incineration stoker grate and boiler (65,000 tons/year). From 2001 to 2008, the client was assisted for the design and construction of a second incineration stream for municipal waste (50,000 tons/year) with a water cooled grate (20 MWth), a recovery boiler and a turbo generator set (4 MWe). From 2005 to 2010, we also provided technical assistance services for the provision of SCR deNOx flue gas treatment of the two incineration units (2 x 50.000 Nm<sup>3</sup>/h). A solid waste sorting and transfer station have been studied to improve municipal and industrial bulky waste reception and storage before treatment in the WTE Plant of Virginal. The construction of the facility was completed in 2012.

### Assignment

addition of new incineration streams, SCR deNOx and transfer station

### Client

IBW

### Services

project management  
technical assistance  
contractual assistance

### Numbers

115,000 tons/year

1994 - 2012



## INCINERATION PLANT OF CHARLEROI

Pont-de-loup (Province of Hainaut), Belgium

The project (in joint venture with IGRETEC) consists of a new incineration stream of municipal and non-hazardous waste (55,000 tons/year). Furthermore, civil works and the refuse silo are extended. The existing incineration unit is replaced. Services provided include basic engineering and architectural improvement, contractual and technical project specification, tender documentation, analysis of tender, preparation of construction contract, construction supervision and operation monitoring.

**Assignment**  
new incineration  
stream of municipal  
and  
non-hazardous waste

**Client**  
ICDI

**Services**  
project management

**Numbers**  
110,000 tons/year  
2011 - 2017



## BRUSSELS INCINERATION PLANT

### Brussels, Belgium

In 1977, on behalf of Brussels Conglomerate, we realized the general design and the tendering for an incineration plant with a capacity of 500,000 tons per year with energy recovery. We then supervised the construction of the plant from 1981 to 1984 and, from 1985 to 1990, monitored the operation. From 1993 to 1996, we assisted the Agency Bruxelles Propreté in the general design, the tender documentation and the evaluation of tenders in relation with the processing of the exhaust gas of the incineration plant, in accordance with the EC regulations.

#### Assignment

construction of an incineration plant processing of the exhaust gas in accordance with the EC regulations

#### Client

Brussels Conglomerate (1977 - 1987)  
Brussels Capital Region (1989 - 1990)  
Agency Bruxelles Propreté (1993 - 1996)

#### Services

project management  
technical assistance

#### Numbers

500,000 tons/year



## WASTE TO ENERGY PLANT OF HUDDERSFIELD

Huddersfield, United Kingdom

Kirklees Waste Services (KWS/SITA) obtained a concession contract to manage the municipal waste disposal of the Kirklees Metropolitan Borough Council in the United Kingdom. A key aspect of the project was the design, finance, construction and operation of a new Waste to Energy Plant. Financing the new facility was assigned to Dexia Bank. The Kirklees Waste Treatment scheme includes 1 Waste To Energy Plant, 1 Material Recycling Facility, 2 Landfill Sites, 2 Transfer Stations ... for a total capacity of 235,000 tons per year. The Waste To Energy Plant is designed to handle 136,000 tons per year and includes 1 stream of 17 tons per hour of waste with a NCV (Net Calorific Value) of 9,800 kJ/kg. The recovery boiler delivers overheated steam to a 15 MW turbo-generator. The combustion chamber is equipped with a non-catalytic DeNOx system. The flue gas cleaning system comprises the following stages: spray absorber, activated lignite coke injection and bag filter.

### Assignment

construction of a waste to energy plant

### Client

Dexia bank

### Services

technical assistance during construction  
reporting on operation

### Numbers

235,000 tons/year

2000 - 2004 (construction)

2008 - 2012 (operation follow-up)



## WASTE TO ENERGY PLANT OF SOUTH-EAST LONDON

London, United Kingdom

The SELCHP Plant has been commissioned in 1994. We have been involved as the Client's technical advisor during the construction stage of the plant and have been assisting the Client on technical matters and operation monitoring until 2004. The SELCHP plant is designed to handle 400,000 tons per year of municipal waste. Two lines have the capacity to burn 29 tons per hour of waste each with a NCV (Net Calorific Value) of 8,500 kJ/kg. The recovery boilers deliver overheated steam to a 32 MW turbo-generator. The combustion chambers are equipped with a non-catalytic DeNO<sub>x</sub> system. Each stream is fitted with two semi-dry lime scrubbers with lime milk injection and activated carbon injection and followed by bag house filters.

### Assignment

construction of a waste to energy plant

### Client

SELCHP Ltd

### Services

project management  
technical assistance  
contractual advice  
technical advice

### Numbers

400,000 tons/year

1989 - 2004



## MECHANICAL BIOLOGICAL TREATMENT (MBT) AND WASTE TO ENERGY (WTE) PLANT OF GIPUZKOA

Gipuzkoa, Spain

GHK is a public company with the objective to treat the solid waste of Gipuzkoa. GHK as a public developer leads the construction of a plant for the treatment of Municipal and analogous Solid Waste, including a pretreatment installation for biodrying (200,000 tons/year) and a waste to energy plant (240,000 tons/year). This MBT plant wants to obtain a reduction of waste of 27%, and more energy from waste heat. The WTE plant will process biodried and non-hazardous industrial waste through 2 lines of 16 tons/hour. A royal decree also demands smoke treatment. Supporting facilities contain the treatment and valorisation of ashes and the recycling of metals.

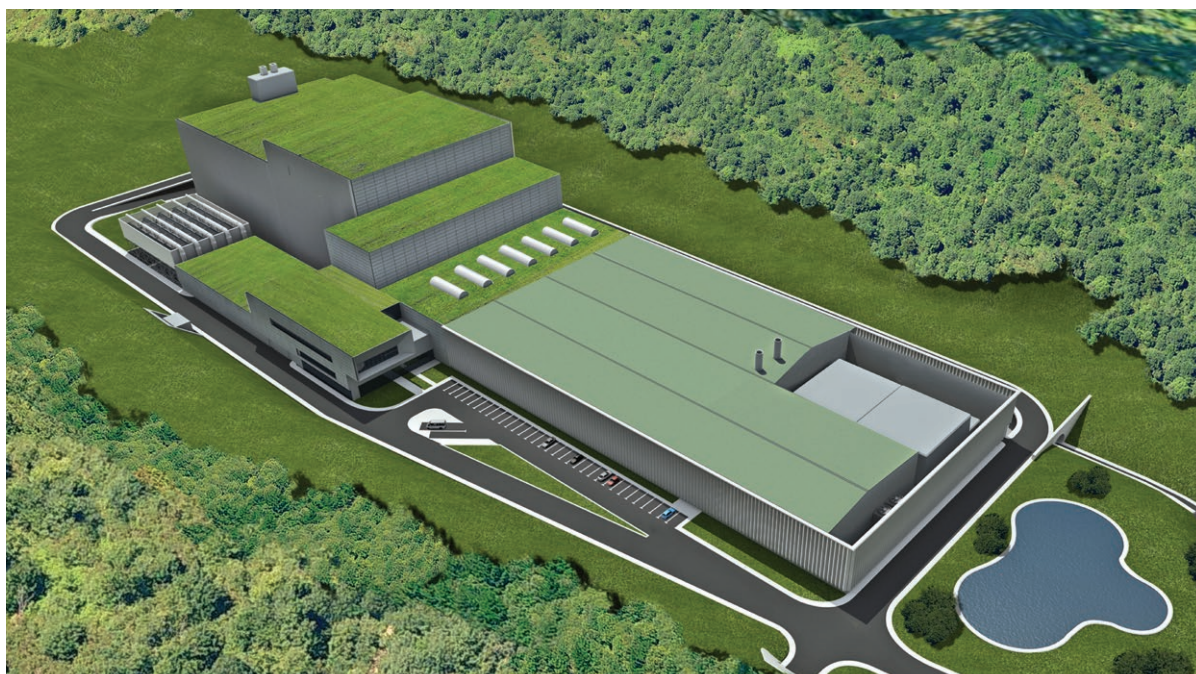
**Assignment**  
construction of a waste to energy plant

**Client**  
GHK

**Services**  
technical assistance  
contractual assistance

**Numbers**  
240,000 tons/year

2008-2013



## POWER PLANT OF BILBAO

Bilbao, Spain

Zabalgarbi is a project company whose purpose is the treatment of Municipal Solid Waste generated in Biskaia (Spain). Zabalgarbi is the developer of a power plant that includes a combined cycle and a Municipal Solid Waste incineration stream. The project includes a combustion train of 30 tons per hour, a combined cycle with a gas turbine, a heat recovery steam generator and a steam turbine for a total power of 100 MW (Line 1). The combustion train is designed to handle 240,000 tons per year of municipal solid waste and includes 1 stream of 30 tons per hour of solid waste with a NCV (Net Calorific Value) of 8,500 kJ/kg. The recovery boiler following the incineration furnace delivers slightly superheated steam to a heat recovery steam generator following the gas turbine. The combustion chamber is equipped with a non-catalytic DeNOx system. The flue gas cleaning system comprises the following stages: spray absorber, activated carbon injection and bag filter.

### Assignment

construction of a power plant

### Client

Zabalgarbi Ltd

### Services

project management  
technical assistance

### Numbers

240,000 tons/year

1999 - 2004 (construction)

2005 - ongoing (operation)



## WASTE TREATMENT PLANT OF MANAMA

### Manama, Bahrain

IBH is the Lender's Technical Advisor for the construction and exploitation of this waste to energy plant for municipal waste with a capacity of 390,000 tons/year. For this assignment, in association with EC Harris (UK), our engineers are responsible for the analysis and certification of the project (Due Diligence Report), follow up construction, and deliver regular reports on performance tests and operation.

#### Assignment

new waste treatment plant for municipal waste

#### Client

HSBC Dubai

#### Services

contractual advice  
technical advice

#### Numbers

390,000 tons/year

2010 - 2030



## COMPOSTING PLANT OF THUMAIDE

Thumaide (Province of Hainaut), Belgium

Each year, approximately 12,000 tons of green waste (grass clippings, leaves, branches) are transported to the composting facility of Thumaide to be transformed into a quality amendment commercialized under the name 'Composal'. The project consisted of adding a facility to an existing composting plant. The facility is composed of preliminary storage and pre-treatment of green waste, magnetic separation, shredding and transfer to an existing composting hall. Green waste is first demetallised and crushed. It is then moistened and stored in a windrow composting hall. Formed windrows are watered and turned periodically. The temperature exceeds 60°C, which allows the elimination of pathogens. The composting process is accelerated thanks to a forced air aspiration system, and takes only 4-8 weeks. After this period, the product is transported to the drying hall where it will continue its maturation phase. It will then be screened and packaged for sale.

### Assignment

addition of a facility to an existing composting plant

### Client

Ipalle

### Services

technical assistance  
contractual assistance

### Numbers

12,000 tons/year

1996 - 1998



## SORTING & RECYCLING PLANT OF THUMAIDE

Thumaide (Province of Hainaut), Belgium

The unit consisted of a sorting and shredding plant for Municipal Solid Waste bulky objects (30.000 tons/year). As it arrives on the site, bulky waste is summarily sorted by an handling machine. After this sorting, a loader transports the waste to the loading area equipped with a buried rotary shear. A horizontal hydraulic tappet ensures proper feeding of the cutter with a capacity of 25 tons per hour. This unique shredding line reduces the size of the bulky waste to 400 mm long and 50 mm wide for their introduction into the ovens. For this project, our engineers provided the general design, preparation of contractual and technical specifications, tendering procedure, evaluation of tenders and construction supervision.

### Assignment

new sorting and shredding plant

### Client

Ipalle

### Services

project management

### Numbers

30,000 tons/year

1995- 1999



## SORTING & SHREDDER PLANT OF MONT-SAINT-GUIBERT

Mont-Saint-Guibert, Belgium

For this project on the Sablière site in Mont-Saint-Guibert, our engineers collaborated with the Atelier d'Architecture Astragale. The project consists of 3 industrial halls (reception, pit and sorting/shredding unit), a workshop, an administrative building and a weighbridge. The pit has two roller bridges that transfer the bulky waste on conveyor belts for being shredded in the hall before falling back into the pit. The shredding line can also be fed from the shredding hall. Scrap is filtered out for separate recycling. The halls are equipped with a sprinkler installation and deodorizing installation (air scrubbers and biofilters). The preliminary study, tender documents and tender analysis occurred in 2009-2010. From June 2010 till 2012, our engineers assisted the client in the administrative and technical supervision of construction.

### Assignment

new sorting and shredding plant

### Client

Intercommunale IBW

### Architect

Atelier d'Architecture Astragale

### Services

project management  
technical assistance  
contractual assistance

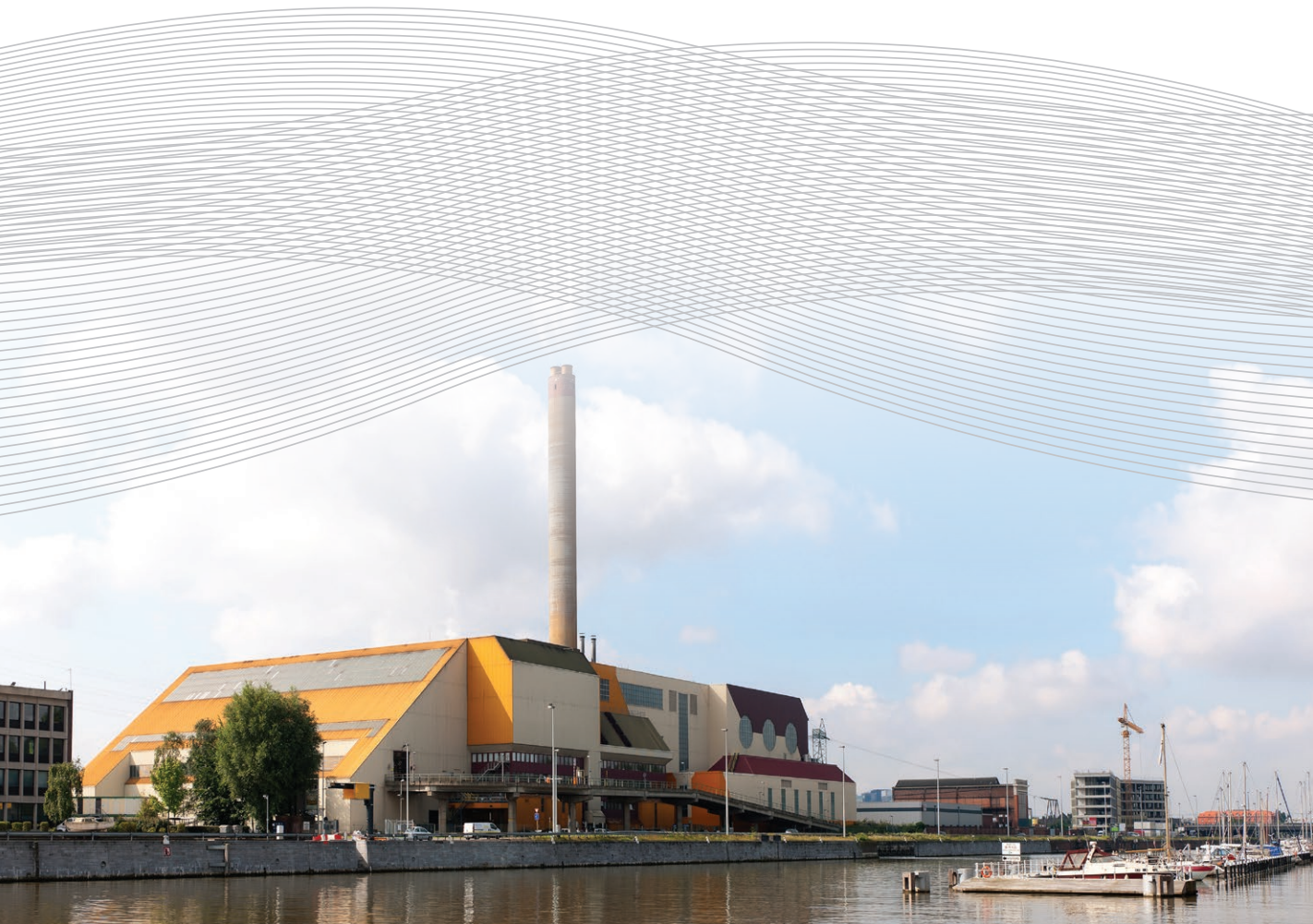
### Numbers

80,000 tons/year

2008 - 2012



Waste is our food for thought



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