Solutions for your environment

EuRec® Waste Treatment Technology

Proposal for Environmentally and Economically Sound Municipal Waste Disposal in Asia

EuRec®- Concept for Municipal Solid Waste (MSW) Disposal

T E R M S O F R E F E R E N C E

Many big Asian cities create in excess of 10,000 tons per day municipal solid household waste (MSW) incurring severe ecological and economic problems:

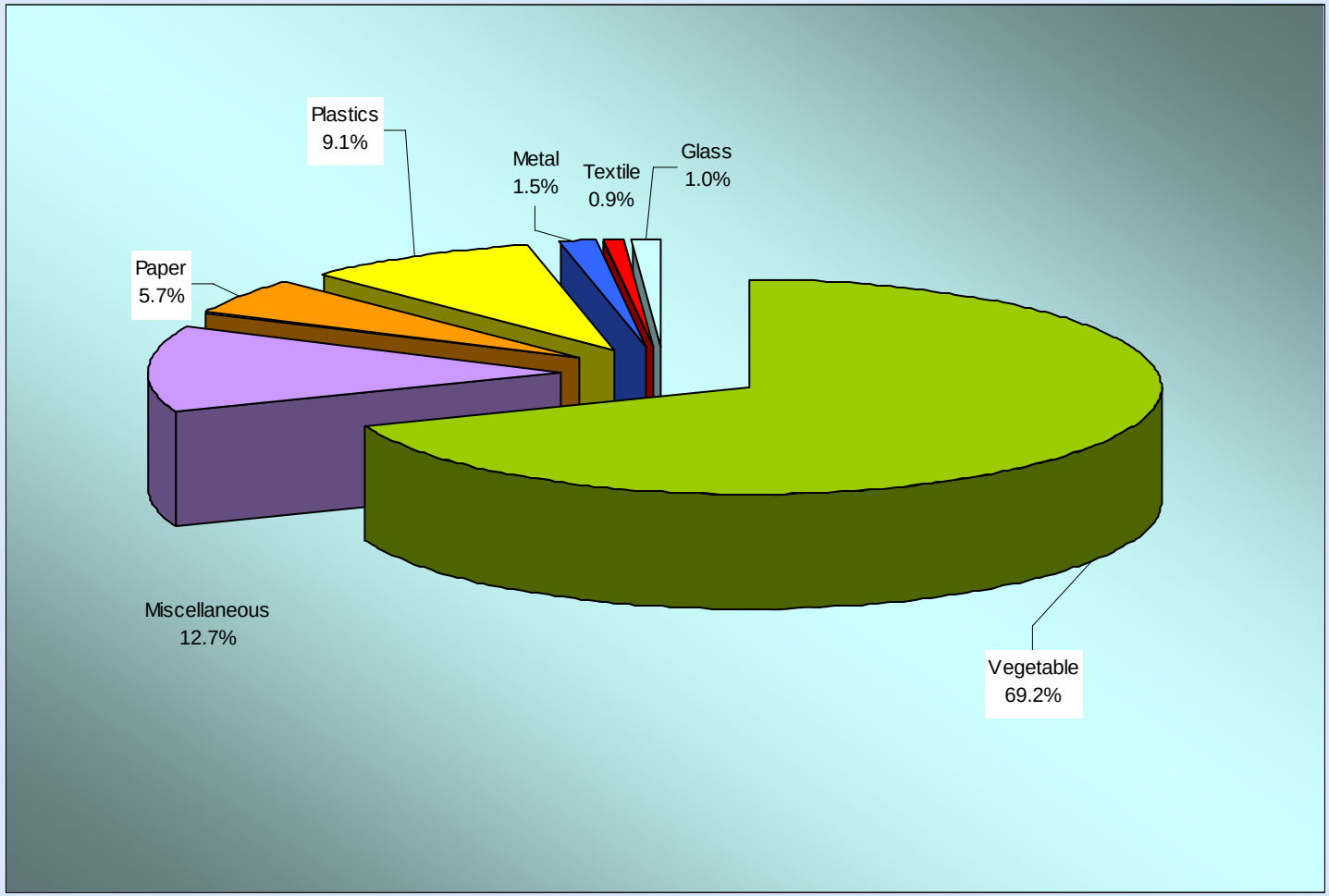
- **A high tonnage of untreated MSW has to be collected and disposed daily.**
- **Incineration of unsorted MSW is very expensive and causes high air pollution levels.**
- **Unsafe dump sites are threatening to poison and contaminate the environment.**
- **Generally these dump sites are not adequately sealed and the landfilling occurs in an uncontrolled fashion. Often the groundwater is contaminated by leakage.**
- **Self-ignition is almost common, poisoning the air.**
- **Uncontrolled gas emissions impair the local area and the atmosphere, pose health risks.**
- **Cavities in the dump site body, caused by smouldering fires, are a further source of danger for the static stability of the site and the people who work at it.**

EuRec®- Municipal Solid Waste (MSW)

MSW AT A GLANCE

EuRec®- Municipal Solid Waste (MSW)

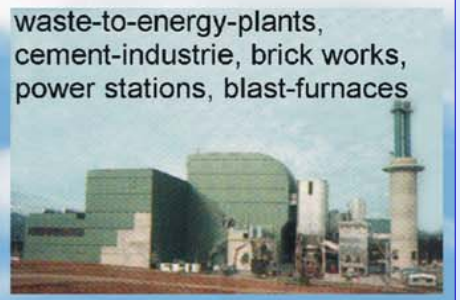
COMPOSITION OF MUNICIPAL WASTE



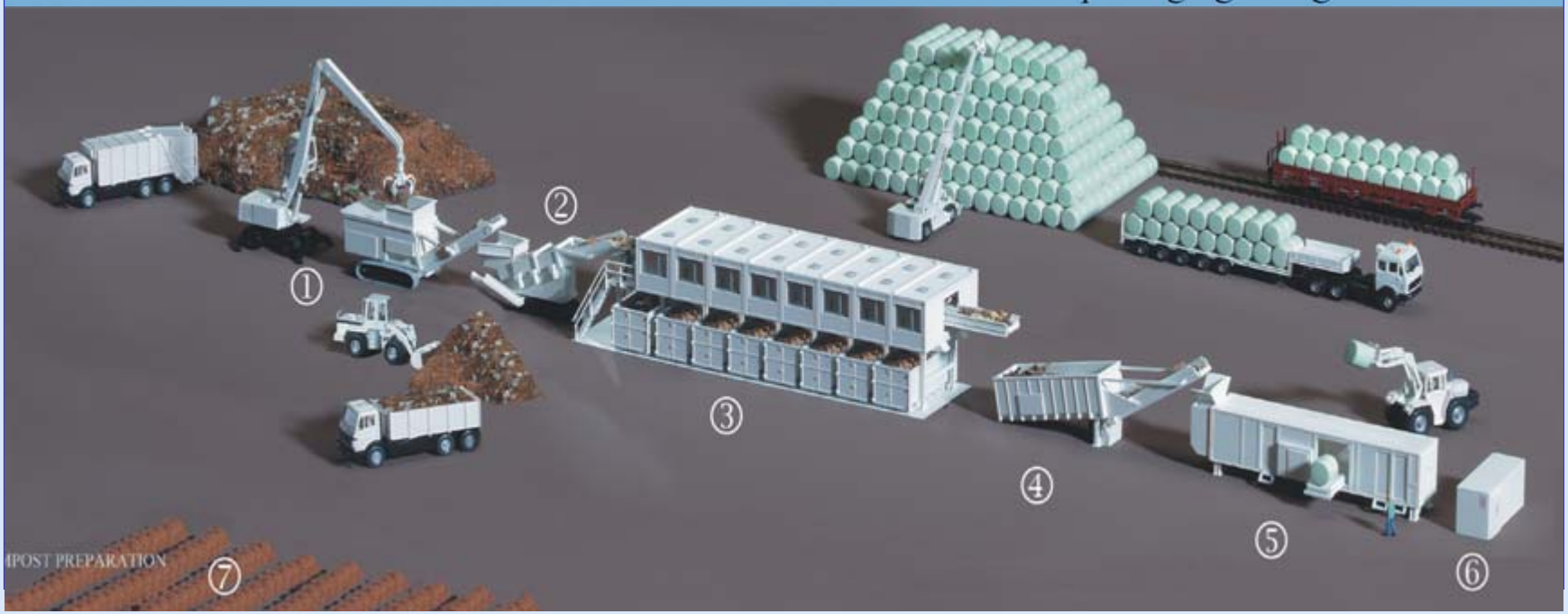
The EuRec®- Waste Treatment Program for Asia

- **Integrated Concepts**
- **Sustainable Solutions**
- **Advanced Technology**

... for Disposal of Different Types of Waste

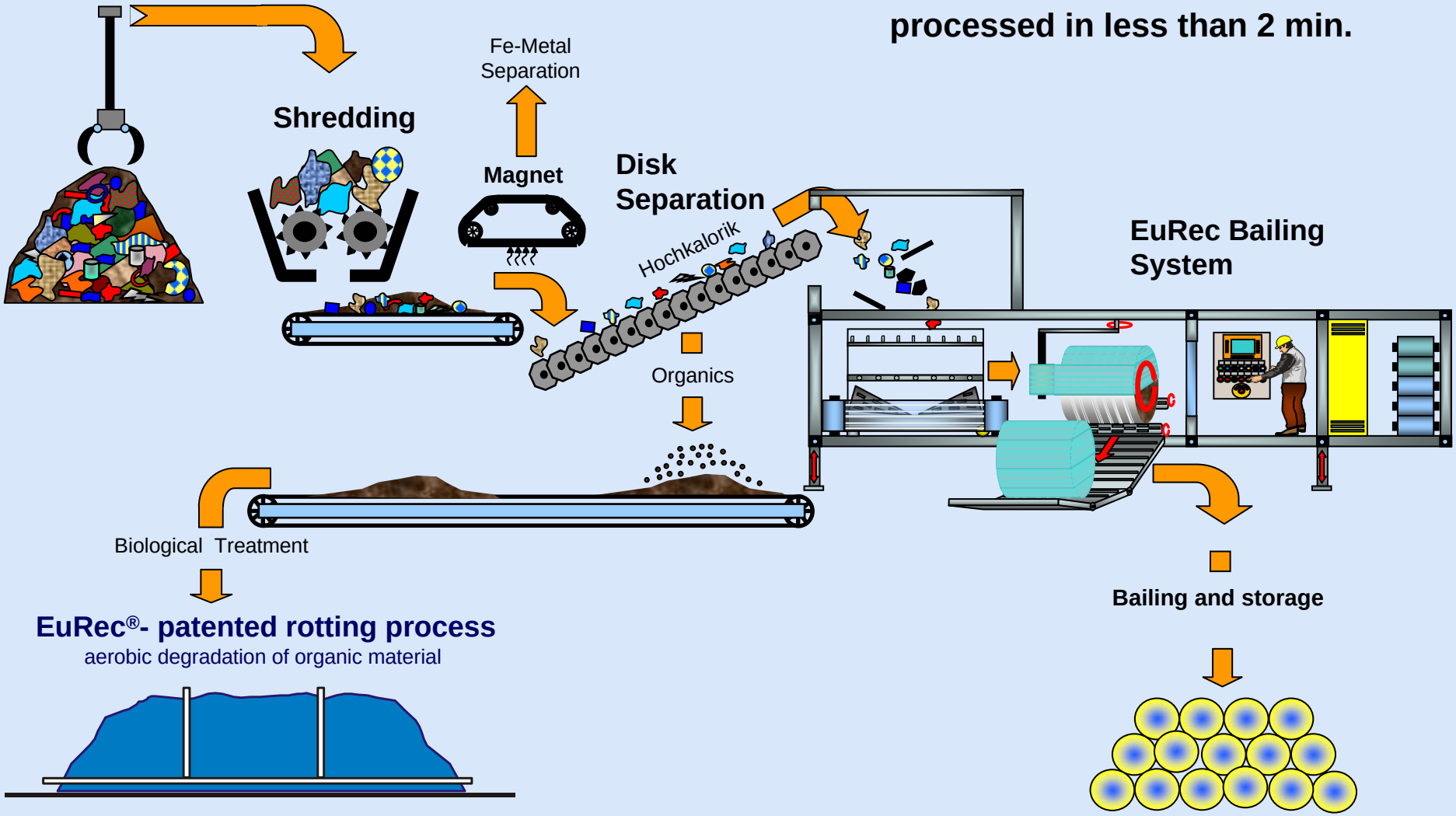


crushing of waste,
separation and composting of organic,
packaging of high caloric waste



Stage I: Mechanical Treatment

Every Metric Ton of Municipal Household Waste will be processed in less than 2 min.



EuRec®- patented rotting process

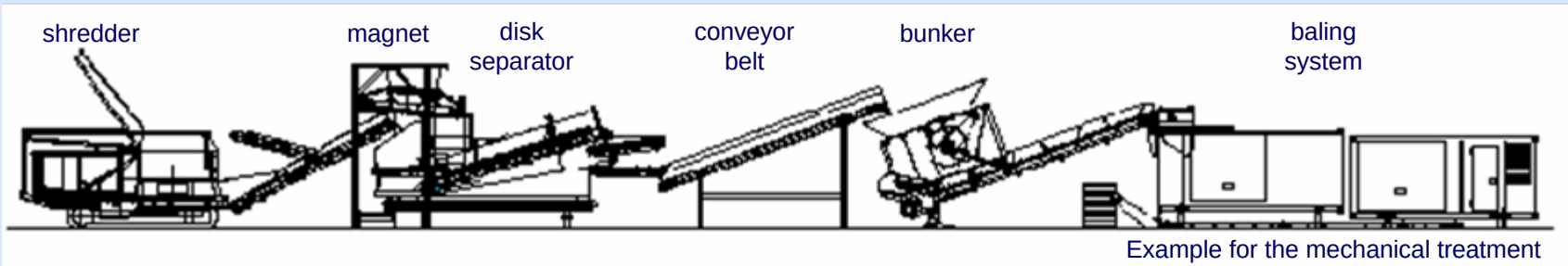
aerobic degradation of organic material

EuRec®- Treatment Concept for Every Waste Disposal Site

S O L U T I O N A N D B E N E F I T S

To improve the environmental situation in an economical manner, EuRec® Technology has developed a sustainable waste treatment concept which satisfies the following ultimate goals:

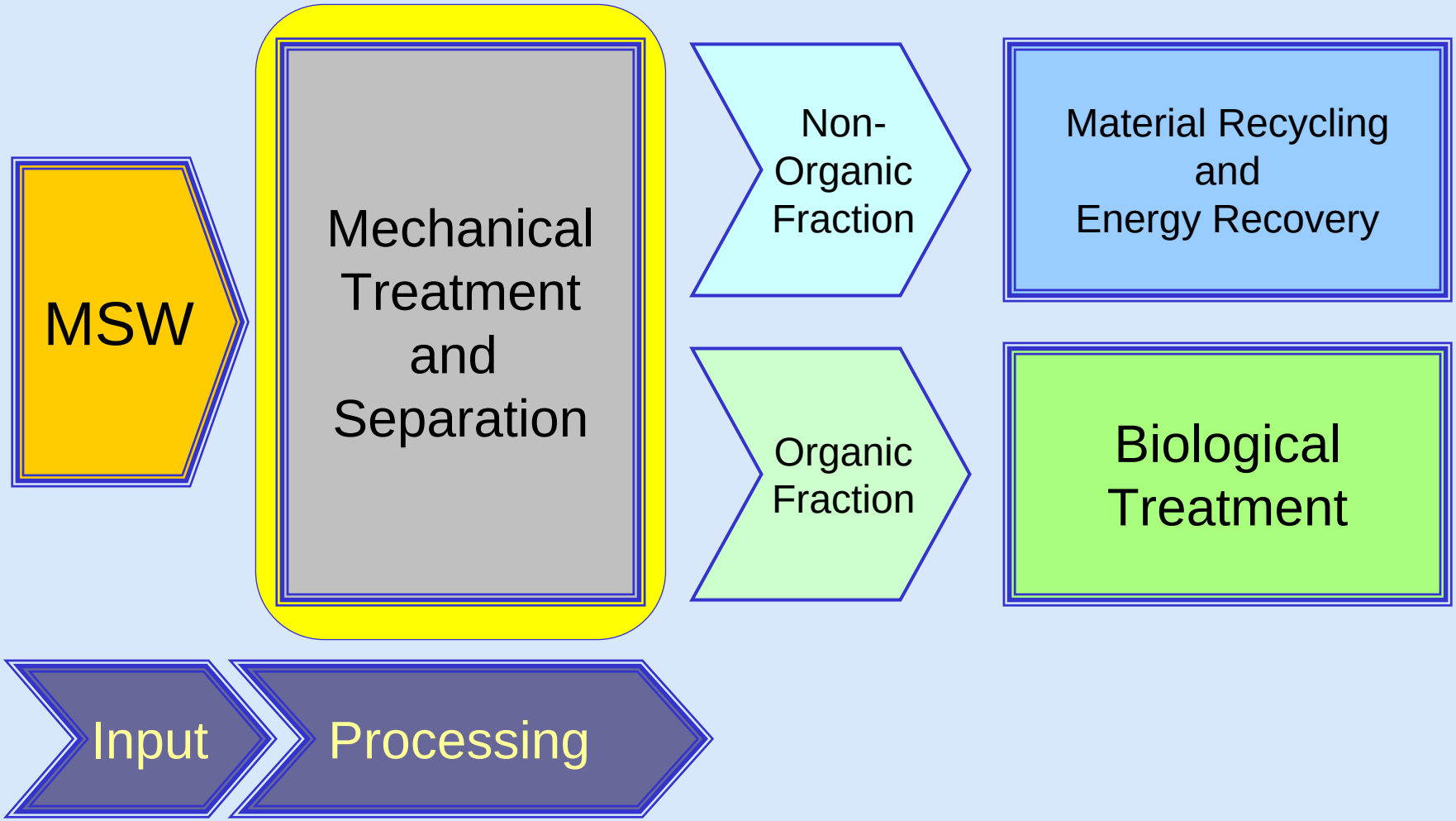
- **Improvement of the environmental status quo;**
- **Reduction of the volume of municipal solid waste which has to be landfilled;**
- **Reduction of gas emissions;**
- **Prevention of poisoning leakage water, draining of the landfill;**
- **Making waste a raw material by separation and packing of high caloric and recyclable fractions for clean incineration, composting and separation of reusable materials (plastics, glass, metal, paper).**



Example for the mechanical treatment

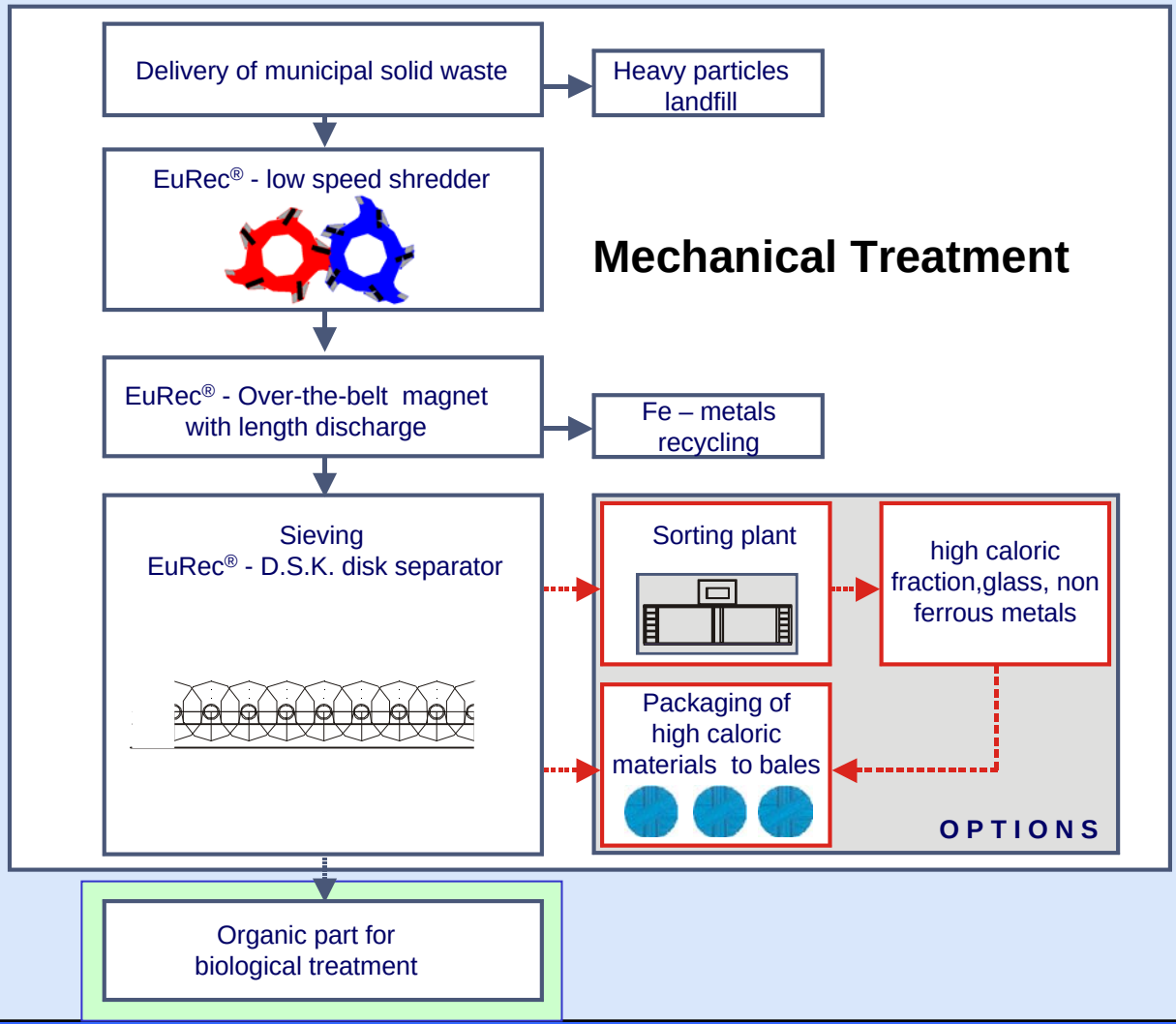
EuRec MSW Treatment System

Total Solution for Every Waste Disposal Site



EuRec®- Treatment Concept for the Disposal Site

PROCESS DESCRIPTION



EuRec®- Mechanical Treatment Device

EuRec®-Shredder

Mechanical conditioning of the municipal solid waste for the following treatment stages through the EuRec®-Shredder:

2 shafts, which rotates against each other.

Manual and automatically reversing system.

Different treatment of organic and high caloric fraction.

High endurance through specially hardened steel. Can be changed quick and easy.

Fe-metal recycling through an integrated magnetic device.

EuRec® Shredder S25.00

EuRec®- Mechanical Treatment Device

EuRec®-D.S.K. Disk Separator

For the separation of the organic material a disk separator is necessary. The separator has the following characteristic:

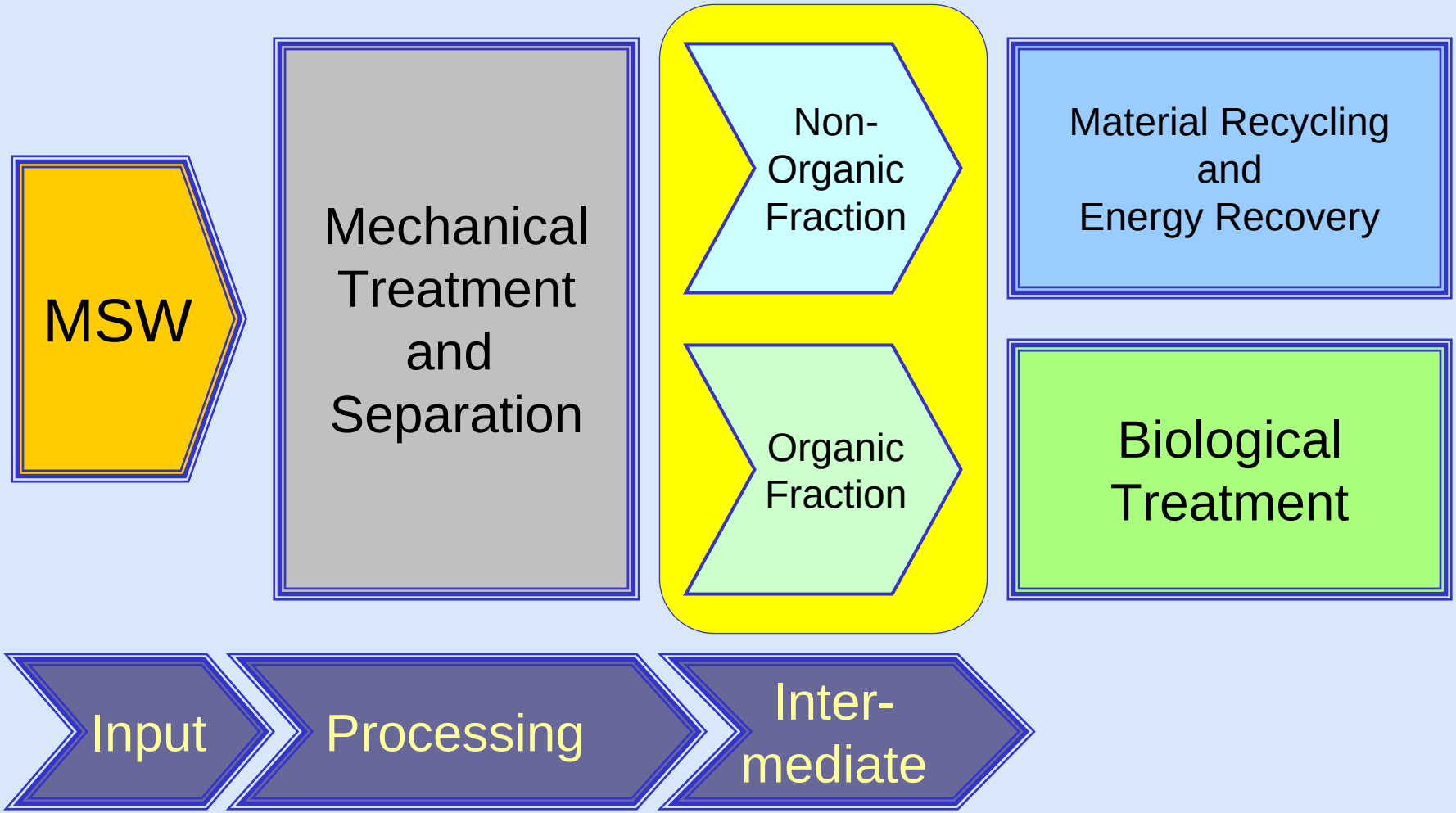
- **Separation of more than 90 % of the organic material**
- **Residual waste with a high caloric value and low water content**
- **Shredder and disk separator are operating synchronously**
- **Each screen shaft has a hydraulic single drive**
- **Screen disks with a trapeze design for better flow of the materials**
- **No cleaning stops during operation through a special design of the gab avoiding entanglement of plastics, bands and textiles.**

Example EuRec®-D.S.K. Disk Separator

Example separator desk

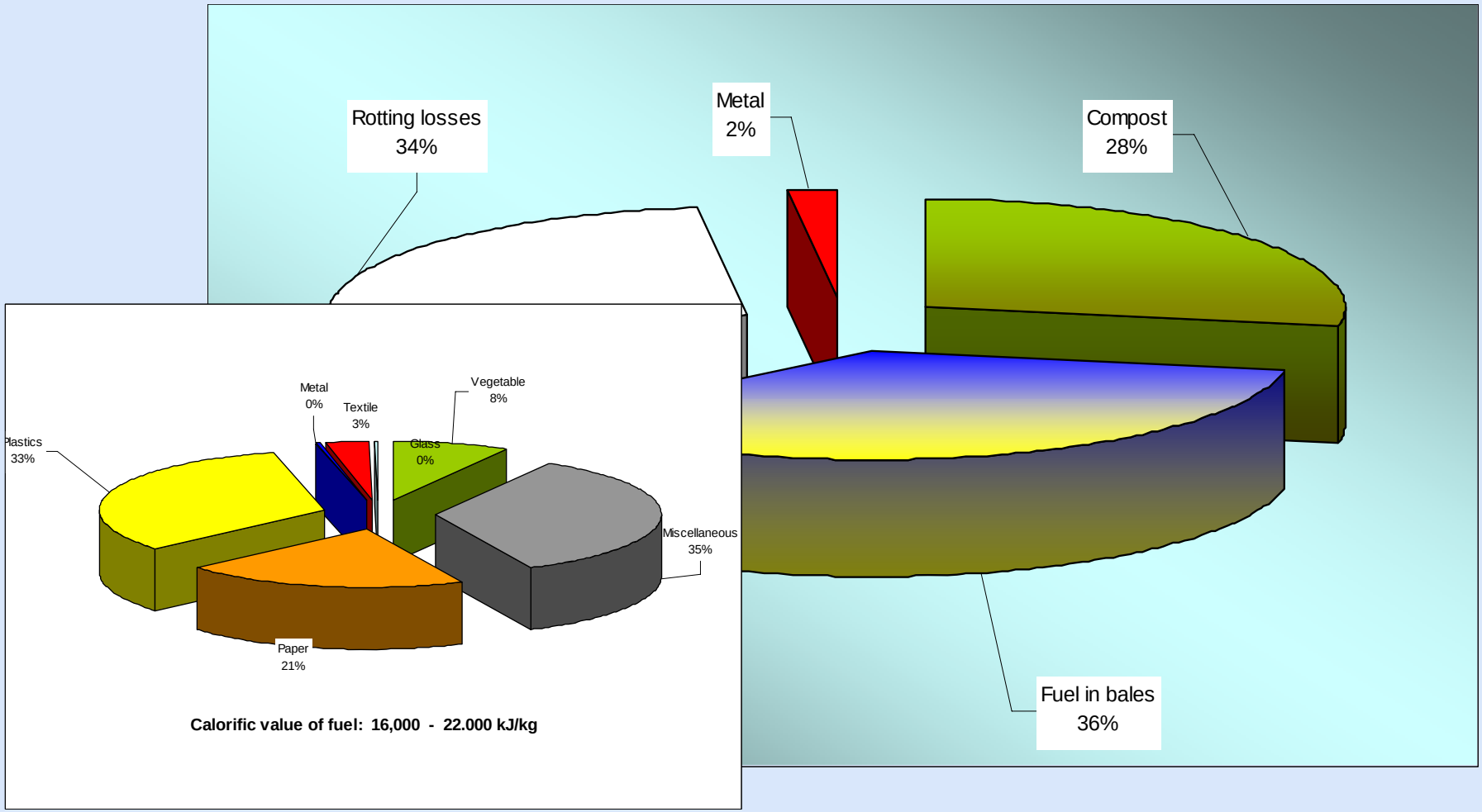
EuRec MSW Treatment System

Total Solution for Every Waste Disposal Site



EuRec MSW Treatment System

COMPOSITION OF RECYCLING OUTPUT



EuRec®- Intermediate Output

Additional Fuel from Waste

The output of the disk separator can be adjusted to the required fuel specifications*:

Fuel specification*

Water content	24,61	mass-%
Ash	10,73	mass-%
C	38,68	mass-%
H	4,84	mass-%
N	1,58	mass-%
S	0,40	mass-%
H_0	**17.785,00**	**kJ/kg**
H_U	**16.127,00**	**kJ/kg**
Density	91,00	kg/m³

*) Tested by Fraunhofer Institute and der University of Magdeburg/Deutschland

EuRec®- Intermediate Output

Organic Material

The organic output of the disk separator will be conditioned as follows:

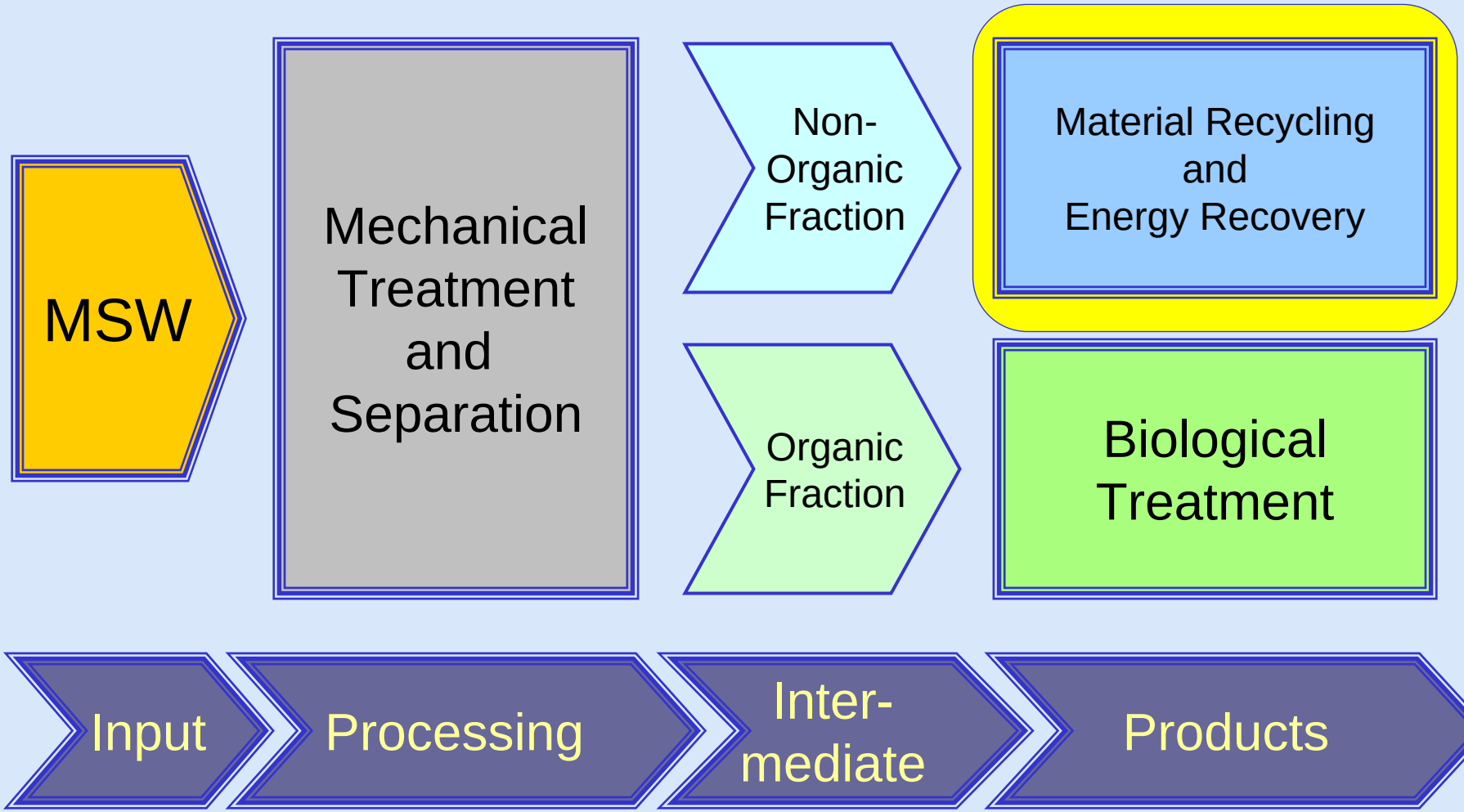
- No leakage water losses during shredding and separating processes.

- Starting the biodegradation process:

⇨ Enrichment with aerobic, thermophile bacteria,
⇨ Integration of organic material in a windrow for initiating aerobic rotting process:
a) dry, naturally closed base;
b) storage layer of dry, biologically stabilised waste > # 40 mm,
c) fresh domestic waste WG > 70 %;
d) upper layer of biologically stabilised waste > # 40 mm, effective as biological filter and as insulating and condensing layer.

EuRec MSW Treatment System

Total Solution for Every Waste Disposal Site



EuRec®- Raw Material Recycling

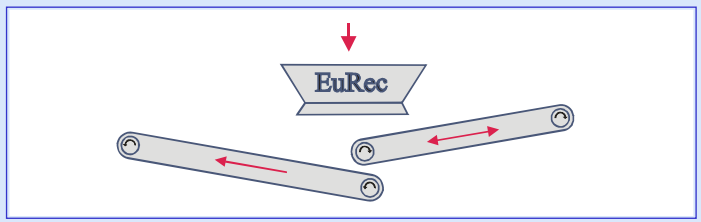
EuRec®-Sorting Station

As an option, all recyclable materials can be sorted out manually and subsequently be sold to wholesalers.

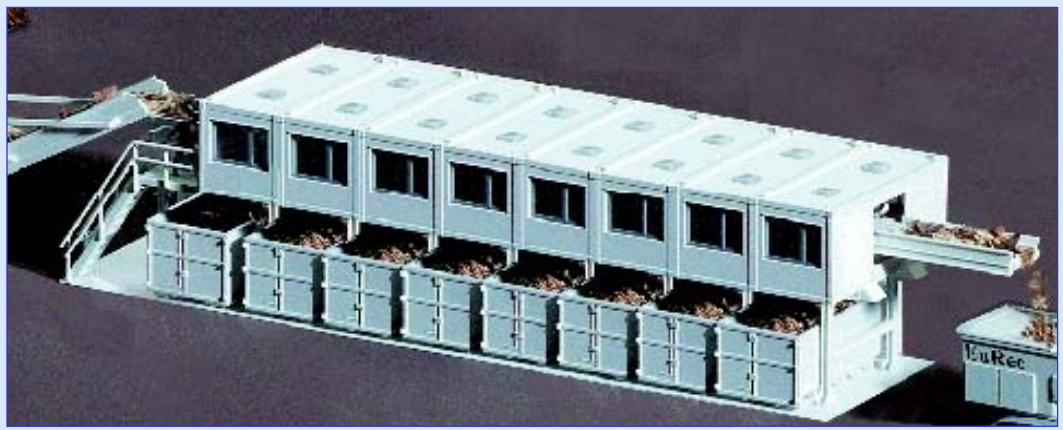
With the sorting station, **glass**, **stones**, **plastic materials**, **paper** and **non ferrous metals** can be sorted out manually.

If there is a high total input (>1.000 tons/d) a **buffer bunker** is necessary to distribute the material to two sorting lines.

In this way the proposed option with two parallel **sorting lines** ensures that the recyclable fractions can be sorted out optimally with **high efficiency**.



Principle of the EuRec®-dosage Bunker



Example EuRec®-Sorting Station

EuRec®- Recycling for Energy Recovery

EuRec®- Round Bailing System

The screen output from the disk separator will be sealed into bales. The baling system works after the following principles:

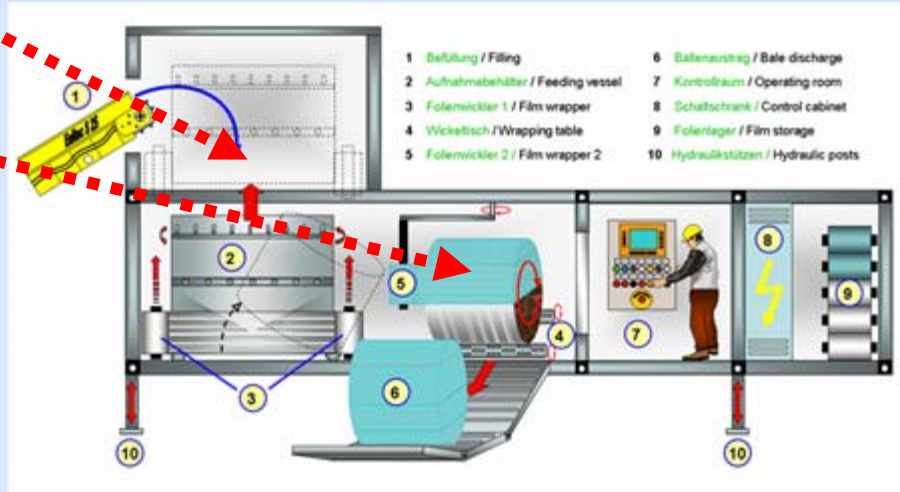
BUNKER: For the steady baling process the material has to be transported to a bunker system, working as a buffer.

PRESS: Packs solid waste and minimises air content which decreases internal chemical reactions.

WRAPPING SYSTEM wraps bales in waterproof plastic film to allow long term waste storage without foul smelling leakage, gas formation or fermentation.

BALES: Compact bales are easy to transport and maximise storage space.

Example baling process EuRec®-Shredder > EuRec®-Bunker > EuRec®-RBS System



Example Principles of the EuRec®-RBS-2 Round Baling System

EuRec®- Clean MSW Disposal Site

BENEFITS OF MECHANICAL TREATMENT

Decomposition of the municipal solid waste.

Separation of the organic substances for the biological treatment.

Reduction of the absolute quantity of waste which has to be land filled through recycling and biological rotting processes.

Separation and **packing** of recyclable materials and high caloric substances (bales).

After baling there are **alternative possibilities** to commercially **use the bales**.

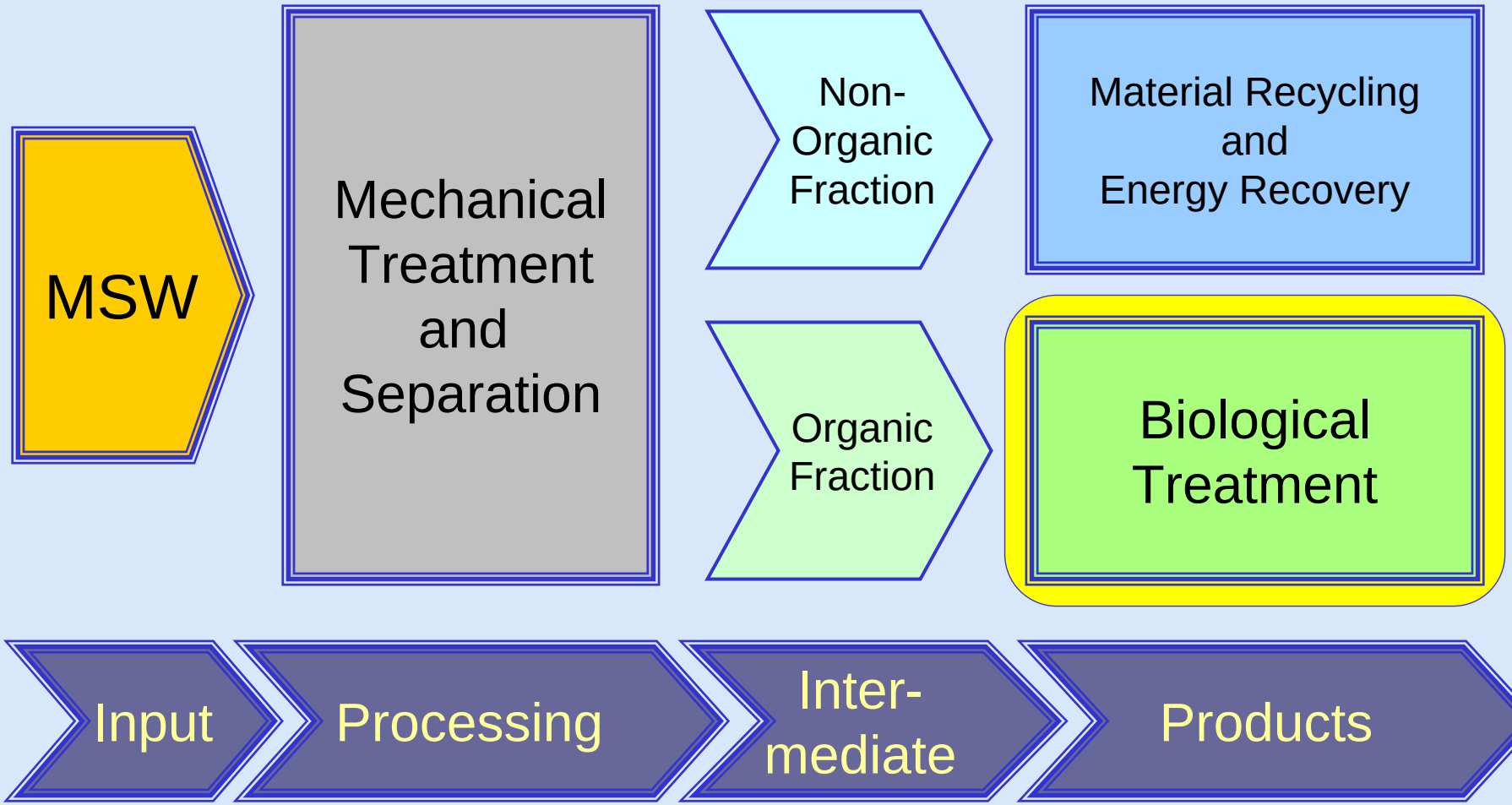
Delivery as **fuel** to **waste-to-energy-plants, cement-industry, brick works, power stations, steel mills and blast-furnaces** .

Use for landfill and as **replacement of soil** at **road construction** and landscaping.

Example bale storage in Italy

EuRec MSW Treatment System

Biological Treatment



EuRec®- Treatment Concept for the Disposal Site

B I O L O G I C A L T R E A T M E N T

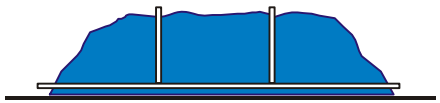
Option
Mixing with up to
50 % sewage sludge

OUTPUT OF DISK SEPARATOR

Homogenised and conditioned
organic fraction

Option
Mixing with biological
untreated
sewage sludge

EuRec®- patented rotting process
aerobic degradation of organic material

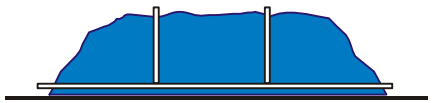


Stage 1: intensive rotting process

Rot output compost
deposition
at landfill or greenery

Rot loss > 50%
water loss >80%

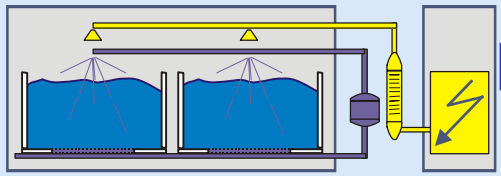
EuRec®- patented rotting process
aerobic degradation of organic material



Stage 2: post rotting process

Dry fermentation

Anaerobic degradation

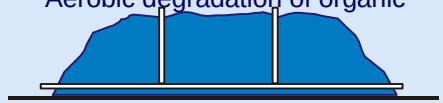


optional

Production of biogas

Curing

Aerobic degradation of organic



Rot loss > 50%
water loss >80%

substrate improvement
for re-cultivation and high-quality fertiliser

EuRec®- Patented Rotting Process

B I O L O G I C A L T R E A T M E N T

Objectives of the EuRec®- rotting process:

High operating safety and **operational simplicity** with proven aeration system.

The system is **adaptable to variations** of input composition**.**

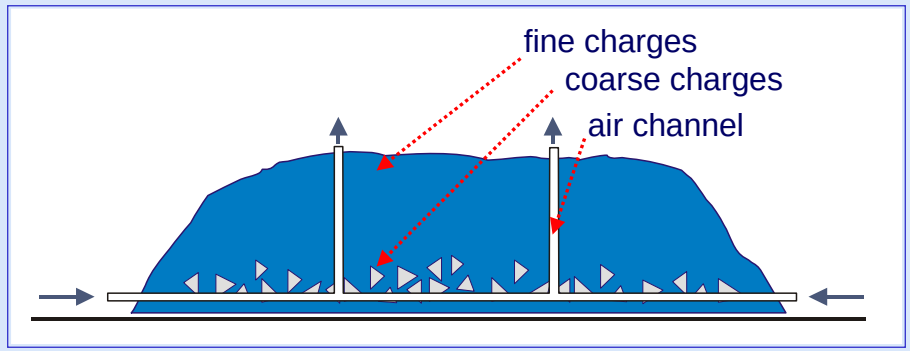
There are **no specific requirements** for the **location** of the biological treatment unit**.**

Once deposited, the material does not require turning over, due to active air ventilation.

Because of the systems design, **odour emissions** are very limited.

Low capex invest and **operational costs**.

Example EuRec®-aerobe rotting process for 1.000 tons/d Tehran (Iran)

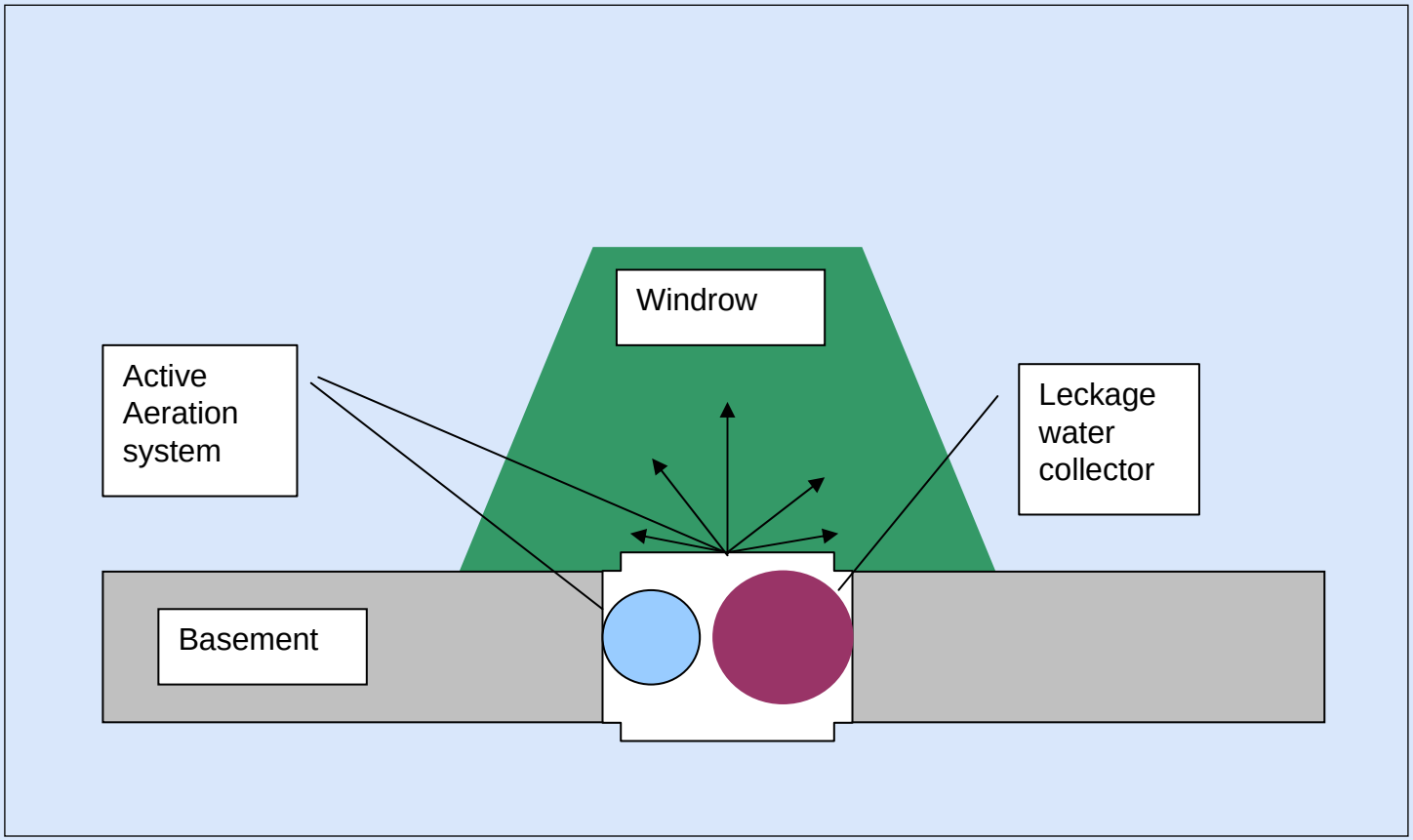


Layout of an EuRec®-aerobe rotting process

EuRec®- Treatment Concept for Organic Waste

B I O L O G I C A L T R E A T M E N T

The new design of an active aeration system



EuRec®- Treatment Concept for Organic Waste

B I O L O G I C A L T R E A T M E N T

Typical Air Supply System for Aerobic Rotting Process

EuRec®- Treatment Concept for Organic Waste

B I O L O G I C A L T R E A T M E N T

The biological aspects of an aerobic rotting process are:

Reduction of the **reactive potential** of **organic substances**.

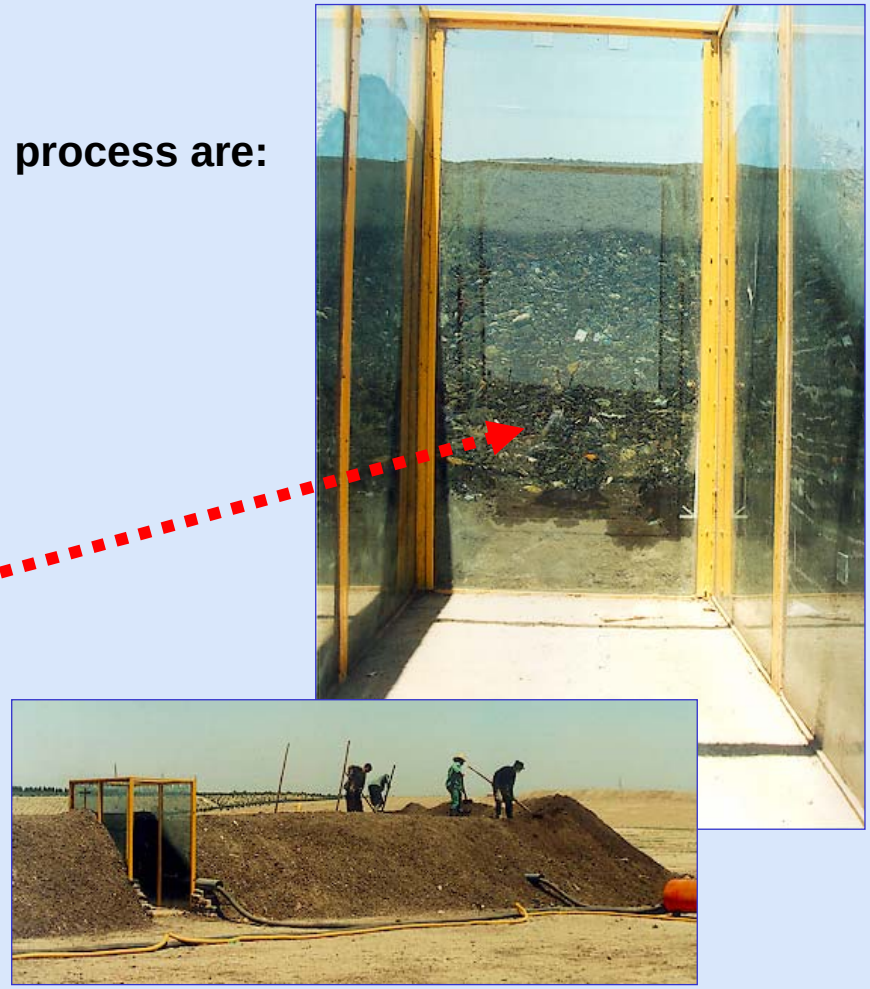
Reduction of the **volume and quantity** of **material** which has to be **deposited**.

Reduction of **leakage water** and **leakage concentrations**.

Benefits of the **biological treatment** are:

- Reduction of toxic gas emissions and pollution at landfills;
- Reduction of methane gas emissions are kept to a bare minimum;

Almost **no odour emissions** by **smell**.

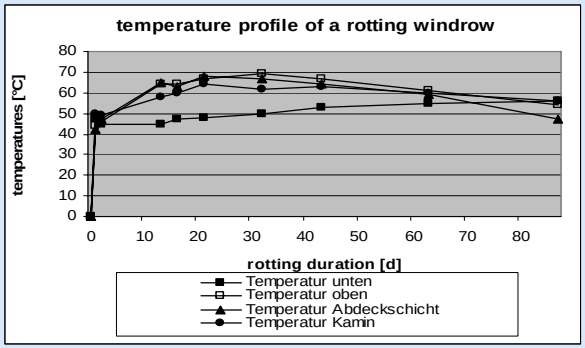


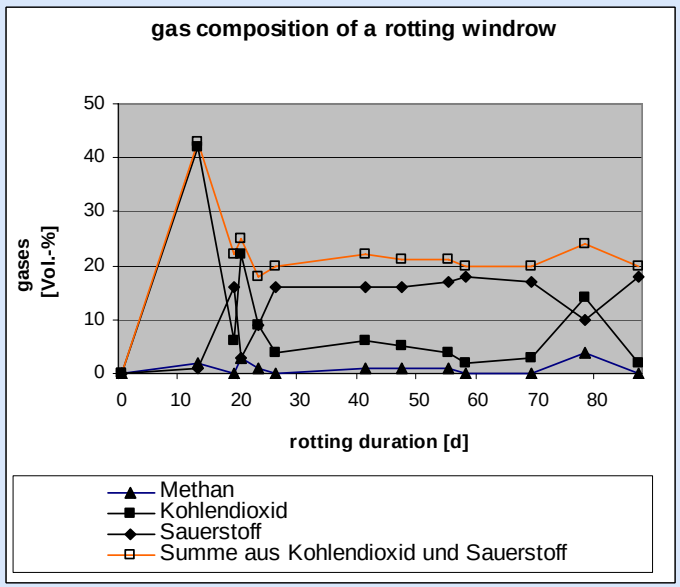
Example EuRec®-aerobe rotting process for 1.000 tons/d Tehran (Iran)

EuRec®- Treatment Concept for Organic Material

B I O L O G I C A L T R E A T M E N T

Fast setting-in of the **aerobic rotting process**





EuRec®- Treatment Concept for Organic Material

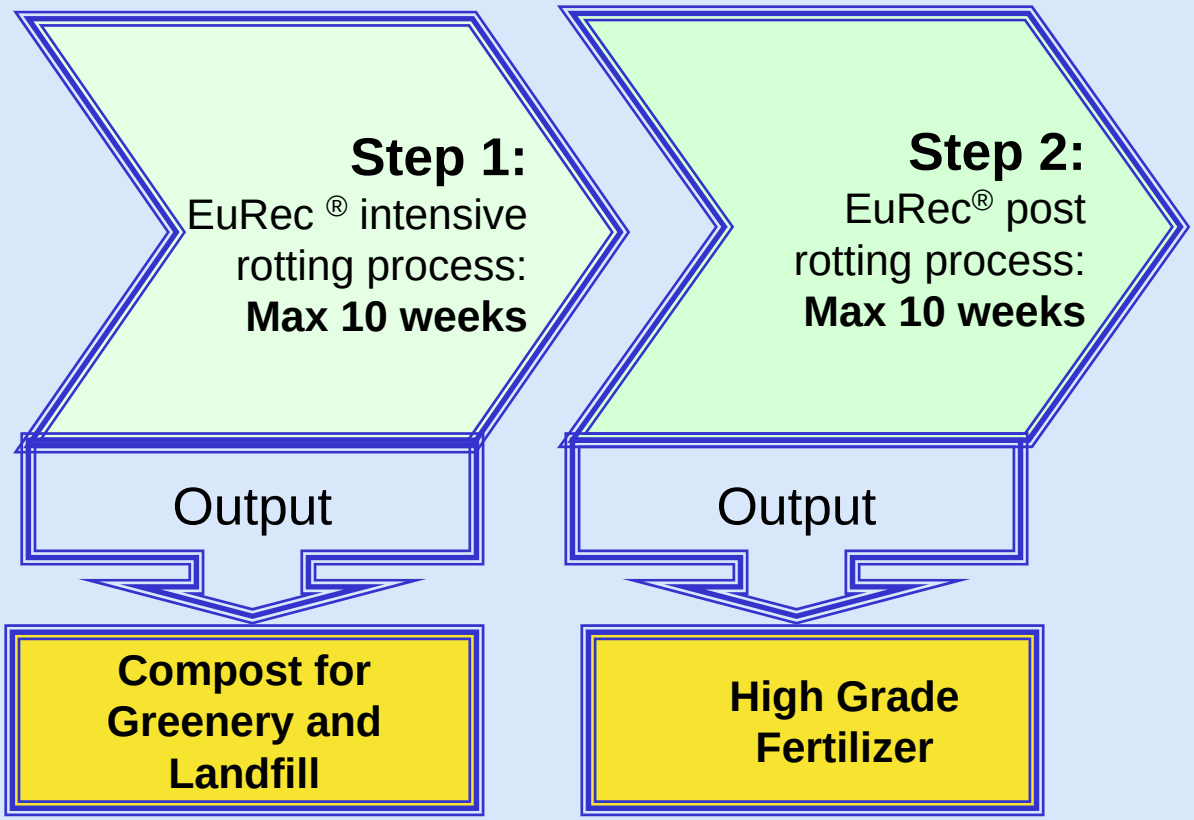
B I O L O G I C A L T R E A T M E N T

Rotting Windrop in Factory

EuRec®- Treatment Concept for Compost and Fertilizer

B I O L O G I C A L T R E A T M E N T

Depending on time and process steps different products come out.



EuRec®- Treatment Concept for Organic Material

B I O L O G I C A L T R E A T M E N T

Step 1: Compost Before Sieving & Screening

EuRec®- Treatment Concept for Organic Material

B I O L O G I C A L T R E A T M E N T

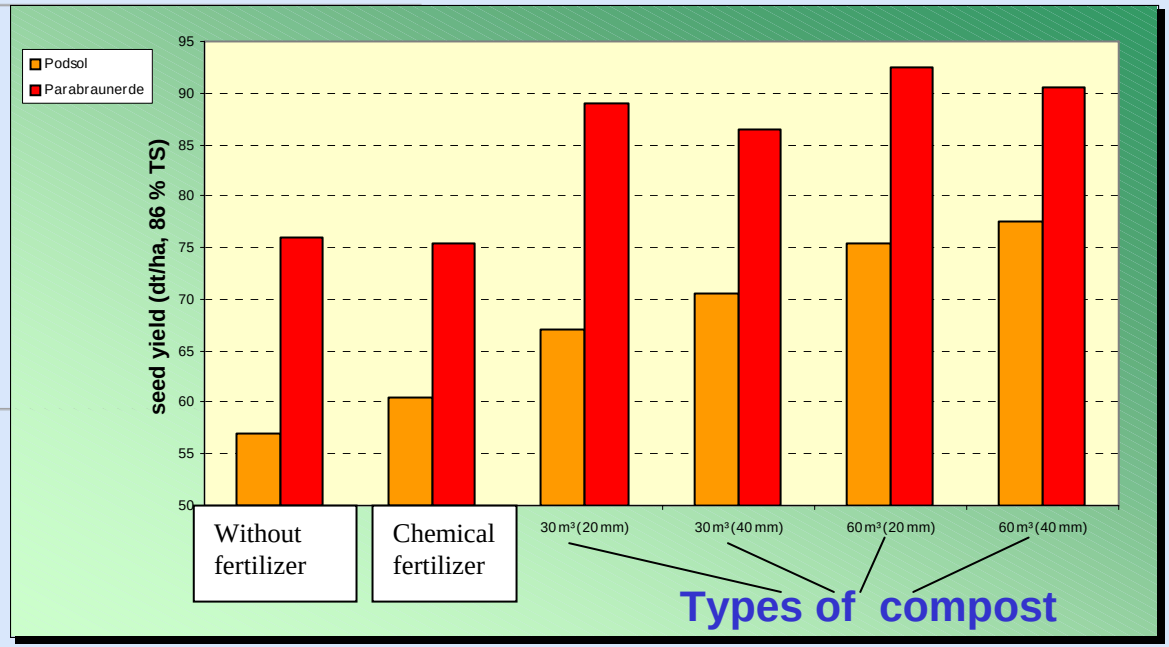
Step 2: High Grade Fertilizer After Sieving & Screening

EuRec®- Fertilizer

Production of High-grade Fertilizer

Compost is the better alternative compared to the general mineral fertilization. (University of Bremen, 1998 – 2000 Germany)

Chemical Analysis:	
N total Nitrogen in %	0,69 %
P_2O_5 total Phosphat in %	0,51 %
K_2O Gesamtkalium in %	0,81 %
Organic substance in %	17,1 %
Zn total zinc in %	0,01 %



Yields of grain maize due to fertilising with compost from1998 till 2000

EuRec®- Fertilizer

A GLANCE OF HIGH GRADE FERTILIZER

EuRec®- Composting Plant Schwaebisch Hall

Results of test plantations of vegetable on fully mineralized compost.

Concentration of heavy metals were substantially below the the limits regulated by law.

Tests have been run by Umweltschutz Institut Stuttgart GmbH

Test no.	**983576-1**	**Tested windrow**	**On top**
Description of test	Tomatoes		
Specification of test	Fresh-picked vegetable		
Sampling	Aug 20, 1998		
Testing period	Aug 21, 98 – Sep 4, 98		
Parameter	**Unit**	**Result**	**Method of investigation**
Aqua regia dissolving	0		DIN ISO 11466
Lead	mg/kg	< 0,01	EN ISO 11885
Cadmium	mg/kg	0,007	EN ISO 11885
Chrome	mg/kg	< 0,01	EN ISO 11885
Copper	mg/kg	0,11	EN ISO 11885
Nickel	mg/kg	< 0,01	EN ISO 11885
Mercury	mg/kg	< 0,002	DIN EN 1483 (amalgam eng'ring)
Zinc	mg/kg	0,86	EN ISO 11885

Test no.	**983576-2**	**Tested windrow**	**bottom**
Description of test	Tomatoes		
Specification of test	Fresh-picked vegetable		
Sampling	Aug 20, 1998		
Testing period	Aug 21, 98 – Sep 4, 98		
Parameter	**Unit**	**Results**	**Method of investigation**
Aqua regia dissolving			DIN ISO 11466
Lead	mg/kg	< 0,01	EN ISO 11885
Cadmium	mg/kg	0,020	EN ISO 11885
Chrome	mg/kg	< 0,01	EN ISO 11885
Copper	mg/kg	0,08	EN ISO 11885

EuRec®- Treatment References

T E S T R E P O R T

Vegetable grown on fully mineralized compost

Parameter		Grenzwert BGA	Netzmelonen	Wassermelonen	Honigmelonen	Zucchini	Kürbis	Tomaten
Trockensubstanz	%		9,1	9,8	11,1	5,9	26,1	8,6
Quecksilber	mg/kg OP	0,05	0,014	< 0,0001	0,0024	0,0006	0,0052	0,0032
Cadmium	mg/kg OP	0,10	0,0027	0,0019	0,0055	0,0024	0,0078	0,0051
Blei	mg/kg OP	0,25	0,018	0,019	0,011	0,012	0,052	0,017
Summe PCB								
28	mg/kg TS		nn	nn	nn	nn	nn	nn
52	mg/kg TS		nn	nn	nn	nn	nn	nn
101	mg/kg TS		nn	nn	nn	nn	nn	nn
138	mg/kg TS		nn	nn	nn	nn	nn	nn
153	mg/kg TS		nn	nn	nn	nn	nn	nn
180	mg/kg TS		nn	nn	nn	nn	nn	nn
OP = Originalprobe								

EuRec®- Treatment Concept References

SELECTED REFERENCE PROJECTS

Germany: Schwäbisch Hall

Italy: Belluno - Trento

Iran: Teheran

USA: NN

EuRec®- Treatment Concept for Schwäbisch Hall

B I O L O G I C A L T R E A T M E N T

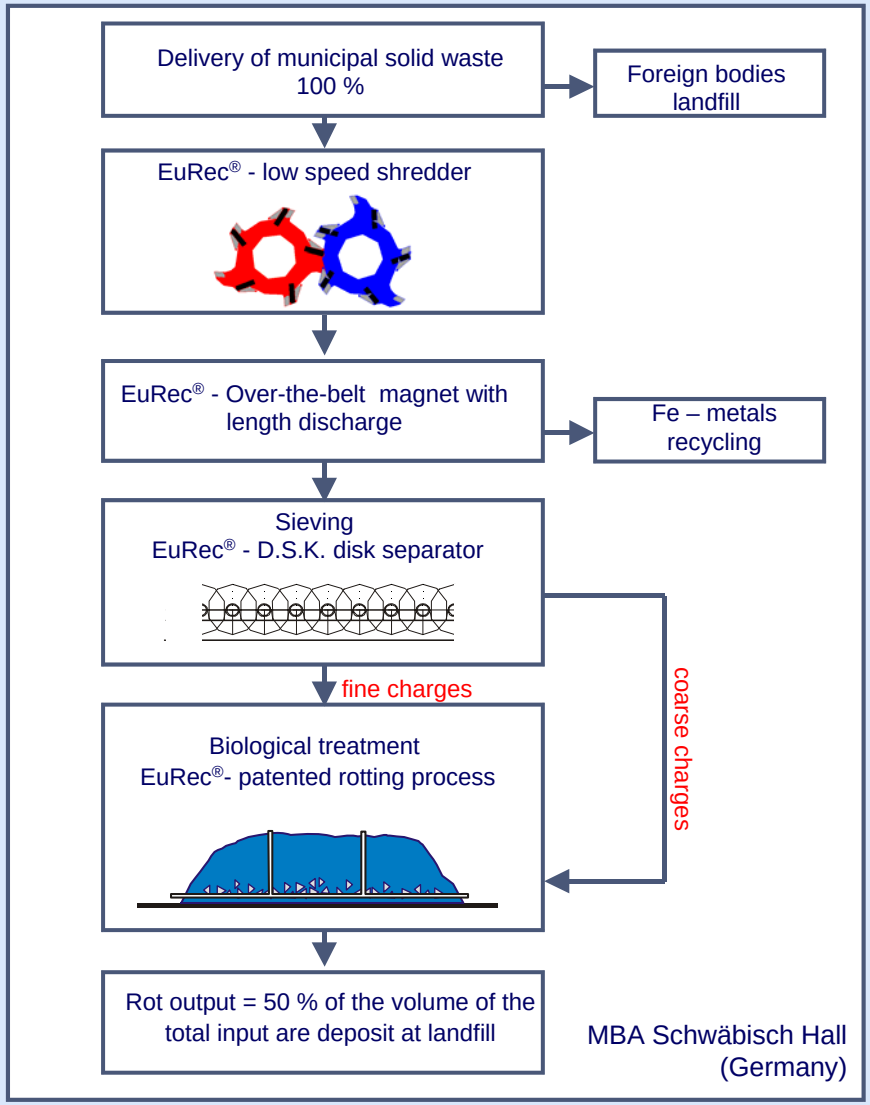
Exemplary reduction of waste material at the example of Schwäbisch Hall (Germany)

In Schwäbisch Hall the municipal solid waste contains about **30 % organic material**.

After the **treatment** all of the material is **deposited on low cost / low security landfill**.

Because of the treatment there is a **reduction** of the **space volume** of **about 50 %**.

If the **content** of organic material is **higher** than 30 % than **the reduction** can increase even further.



EuRec®- Treatment Concept for Schwäbisch Hall

B I O L O G I C A L T R E A T M E N T

The realisation of the treatment concept provides a long-term secure and economic solution.

Recyclable fractions can be sold to **wholesalers, generating income**.

The produced bales can be **stored** at the **landfill without** any **influences for the environment** until there is the possibility to use this material for thermal recycling. Will lead to additional commercial income.

After the treatment the degraded **organic** substances can be deposited on simple **landfills without elaborate environmental provisions**.

If the **treatment method** is adequately **adapted** to the situation on site it is also possible to produce **substrate for re-cultivation** and **high-quality fertiliser** in a second step.

Example Bale storage in Italy

Example MBA Schwäbisch Hall (Germany)

PROCESSING OF MUNICIPAL SOLID WASTE IN TEHRAN / IRAN

Pre- and Fine Sorting and Mechanical Separation of the Organic Fraction out of the Municipal Solid Waste

PROCESSING OF MUNICIPAL SOLID WASTE IN TEHRAN / IRAN

Set Up of the Graduated Windrows

RPP-MEGA BALER AND EuRec SHREDDER S 45.10 E LOCATED IN THE USA

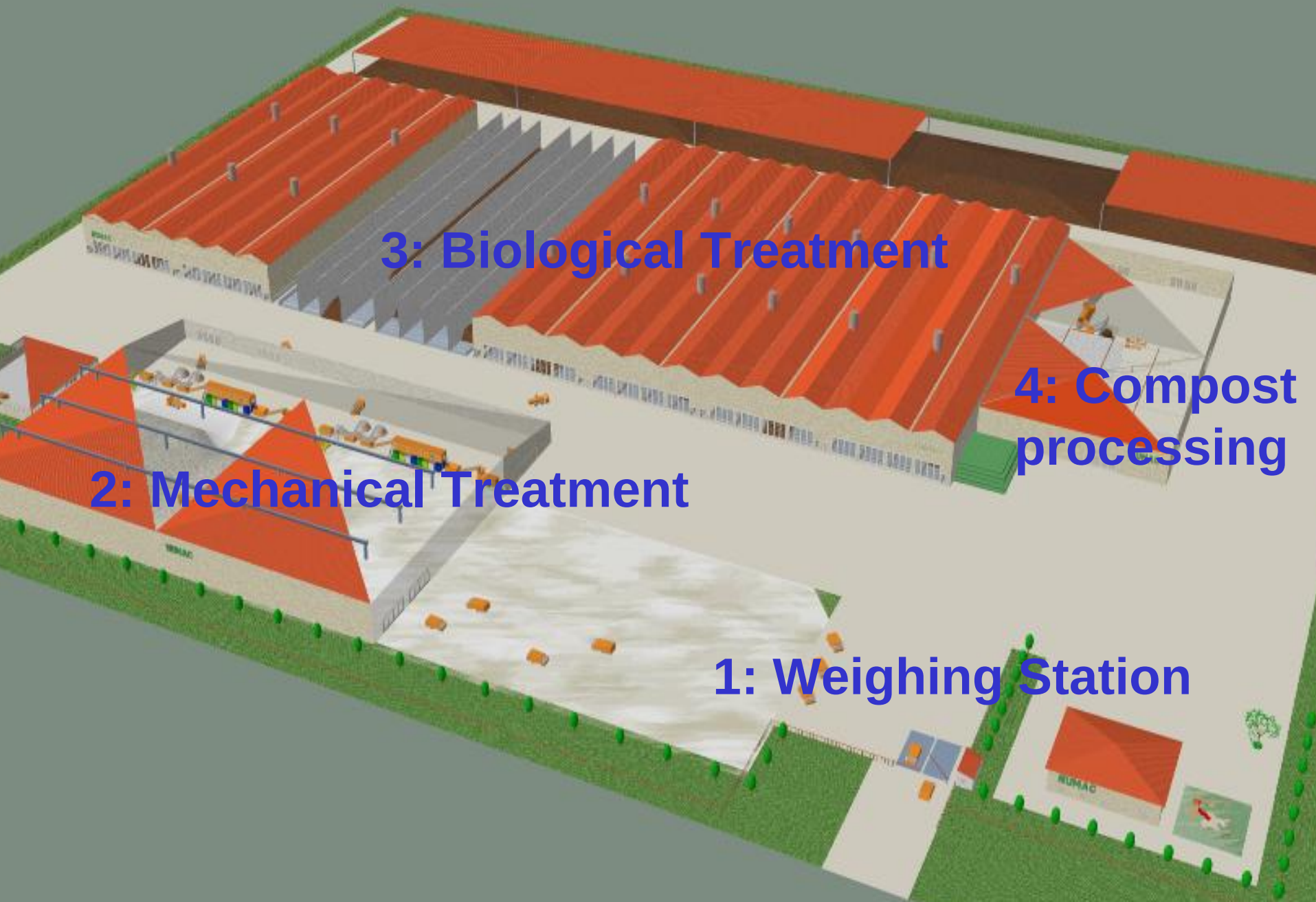
RPP – Mega Baler Made in USA

EuRec- Shredder S 45.10

RPP-MEGA BALER LOCATED IN THE USA

With the Mega Baler Pressed and Packed Municipal Solid Waste

Layout of a 2,000 tons / day plant



EuRec®- Treatment Concept Layout

WEIGHTING OF INCOMING MSW

EuRec®- Treatment Concept Layout

TYPICAL MSW TREATMENT PLANT:
MSW INLET, AUTO DOORS

EuRec®- Treatment Concept Layout

DISCHARGE OF MSW TO EUREC MSW TREATMENT PLANT

PLASTIC RECYCLING

EuRec®- TLT Separation of Plastic Material Mixtures

S P E C I A L Q U A L I F I C A T I O N S

99,9 % separation efficiency for plastic materials which have a density difference of **> 0,032 g/cm³**.

Pure separation independent from size and form of the material.

High processing and **separation speed.**

Economic superiority through **low capex investment** and **low electrical energy consumption**.

Operational safety through usage of a solid technology with lasting aggregates and few rotating parts, minimizing shutdowns.

Easy to operate due to **PLC-control system**.

Low ground-noise level.

An **integration into existing treatment plants** is possible without any problems.

The Pilot Plant in Merkers

EuRec®- TLT Separation of Plastic Material Mixtures

THE INPUT MATERIALS

Thin plastic films and sheets with a particle size of up to **40 mm** can be processed.

Throughput: > 1,5 tons/h

Plastic Material Film

If **rigid plastic materials** are separated, particle sizes up to **20 mm** can be treated with this system.

Throughput : > 4,0 tons/h

Rigid Plastic Materials

Waste Is A Serious Business !

MSW TREATMENT PLANT
RETURN–ON–INVESTMENT (ROI) STUDY

Plant Data

Capacity	**100 mt / h**
Capex	
- Production Equipment	RM 84,650,000
- Facilities & Infrastructure	RM 34,582,000
- Professional Fees (5%)	RM 5,961,600
- EIA and SIA	RM 1,000,000
Total Capex	**RM 126,193,600**

Financial Data

Discounted Interest Rate	6 %
Depreciation	10 years
Equity	20 %
Loan	RM 100,954,880
Loan repayment	10 years
Interest Loan	6 %
Tax Rate	0 %

Production Data

Waste Composition	
- Organics	60 %
- Ferrous Metal	2.1 %
- Glass	1.5 %
Yield - High Caloric Fraction	0.359
- Organics	0.2439
- Operating cost	RM 41

Marketing Data

Tipping Fee	RM 42 / mt
Sales Price	
- High Caloric Fraction	RM 60 / mt
- Organic Fertilizer	RM 110 / mt
- Ferrous Metal	RM 800 / mt
- Glass	RM 200 / mt

F I N A N C I A L S T A T E M E N T

Internal rate of return = 21.67%; Payback = 4.39 yrs

Year		0	1	2	3	4	5	6	7	8	9	10
Capacity	**[mt / year]**		**468,000**	**468,000**	**491,400**	**515,970**	**541,769**	**568,857**	**597,300**	**627,165**	**658,523**	**691,449**
Products												
High caloric Fraction	[mt / year]		168,012	168,012	176,413	185,233	194,495	204,220	214,431	225,152	236,410	248,230
Organic Fertilizer	[mt / year]		114,145	114,145	119,852	125,845	132,137	138,744	145,681	152,965	160,614	168,644
Ferrous Metal	[mt / year]		9,828	9,828	10,319	10,835	11,377	11,946	12,543	13,170	13,829	14,520
Glass	[mt / year]		7,020	7,020	7,371	7,740	8,127	8,533	8,959	9,407	9,878	10,372
Revenue												
Tipping Fee	[RM / year]		19,656,000	19,656,000	20,638,800	21,670,740	22,754,277	23,891,991	25,086,590	26,340,920	27,657,966	29,040,864
High caloric Fraction	[RM / year]		10,080,720	10,080,720	10,584,756	11,113,994	11,669,693	12,253,178	12,865,837	13,509,129	14,184,585	14,893,815
Organic Fertilizer	[RM / year]		12,555,972	12,555,972	13,183,771	13,842,959	14,535,107	15,261,862	16,024,956	16,826,203	17,667,514	18,550,889
Ferrous Metal	[RM / year]		7,862,400	7,862,400	8,255,520	8,668,296	9,101,711	9,556,796	10,034,636	10,536,368	11,063,186	11,616,346
Glass	[RM / year]		1,404,000	1,404,000	1,474,200	1,547,910	1,625,306	1,706,571	1,791,899	1,881,494	1,975,569	2,074,347
Net Revenue			**51,559,092**	**51,559,092**	**54,137,047**	**56,843,899**	**59,686,094**	**62,670,399**	**65,803,918**	**69,094,114**	**72,548,820**	**76,176,261**
Variable Cost												
Operating Cost	[RM / year]		-19,188,000	-19,188,000	-20,147,400	-21,154,770	-22,212,509	-23,323,134	-24,489,291	-25,713,755	-26,999,443	-28,349,415
Total Variable Cost	**[RM]**		**-19,188,000**	**-19,188,000**	**-20,147,400**	**-21,154,770**	**-22,212,509**	**-23,323,134**	**-24,489,291**	**-25,713,755**	**-26,999,443**	**-28,349,415**
Fix Cost												
Miscellaneous	[RM / year]		-200,000	-200,000	-200,000	-200,000	-200,000	-200,000	-200,000	-200,000	-200,000	-200,000
Total Fix Cost	**[RM / year]**		**-200,000**	**-200,000**	**-200,000**	**-200,000**	**-200,000**	**-200,000**	**-200,000**	**-200,000**	**-200,000**	**-200,000**
Operating Expenses	**[RM / year]**		**-19,388,000**	**-19,388,000**	**-20,347,400**	**-21,354,770**	**-22,412,509**	**-23,523,134**	**-24,689,291**	**-25,913,755**	**-27,199,443**	**-28,549,415**
EBITDA	**[RM / year]**		**32,171,092**	**32,171,092**	**33,789,647**	**35,489,129**	**37,273,585**	**39,147,265**	**41,114,628**	**43,180,359**	**45,349,377**	**47,626,846**
Depreciation	[RM / year]		-12,619,360	-12,619,360	-12,619,360	-12,619,360	-12,619,360	-12,619,360	-12,619,360	-12,619,360	-12,619,360	-12,619,360
Amortisation	[RM / year]		-10,095,488	-10,095,488	-10,095,488	-10,095,488	-10,095,488	-10,095,488	-10,095,488	-10,095,488	-10,095,488	-10,095,488
EBIT	**[RM / year]**		**19,551,732**	**19,551,732**	**21,170,287**	**22,869,769**	**24,654,225**	**26,527,905**	**28,495,268**	**30,560,999**	**32,730,017**	**35,007,486**
Interest	[RM / year]		-6,057,293	-5,451,564	-4,845,834	-4,240,105	-3,634,376	-3,028,646	-2,422,917	-1,817,188	-1,211,459	-605,729
EBT	**[RM / year]**		**13,494,439**	**14,100,168**	**16,324,452**	**18,629,664**	**21,019,850**	**23,499,258**	**26,072,351**	**28,743,811**	**31,518,559**	**34,401,757**
Tax	[RM / year]		0	0	0	0	0	0	0	0	0	0
Net Profit	**[RM / year]**		**13,494,439**	**14,100,168**	**16,324,452**	**18,629,664**	**21,019,850**	**23,499,258**	**26,072,351**	**28,743,811**	**31,518,559**	**34,401,757**
Net Cash Flow	**[RM / year]**	**-126,193,600**	**26,113,799**	**26,719,528**	**28,943,812**	**31,249,024**	**33,639,210**	**36,118,618**	**38,691,711**	**41,363,171**	**44,137,919**	**47,021,117**
Cum Net Cash Flow	**[RM]**		**-100,079,801**	**-73,360,272**	**-44,416,460**	**-13,167,436**	**20,471,774**	**56,590,392**	**95,282,103**	**136,645,274**	**180,783,193**	**227,804,310**
Disc Cash Flow	**[RM / year]**	**-126,193,600**	**26,098,140**	**26,687,494**	**28,891,776**	**31,174,139**	**33,538,473**	**35,988,864**	**38,529,595**	**41,165,163**	**43,900,287**	**46,739,919**
Cum Disc Cash Flow	**[RM / year]**		**-100,095,460**	**-73,407,966**	**-44,516,190**	**-13,342,051**	**20,196,422**	**56,185,286**	**94,714,881**	**135,880,044**	**179,780,332**	**226,520,250**
Loan	**[RM]**	**100,954,880**	**90,859,392**	**80,763,904**	**70,668,416**	**60,572,928**	**50,477,440**	**40,381,952**	**30,286,464**	**20,190,976**	**10,095,488**	**0**
			1	2	3	4	5	6	7	8	9	10

The EuRec®- Program

C O N T A C T

For further information please contact:

Numac Machinery Sdn Bhd

40 & 42 Jalan Petaling Utama 3

Jalan Klang Lama

46000 Petaling Jaya

Selangor

Tel: 03-77838188

Email: mail@numac.com.my

www.numac.com.my

T h a n k y o u f o r y o u r a t t e n t i o n ! ! !