

**ORGANIC WASTE SYSTEMS:
TRUE ALL-ROUNDER IN ANAEROBIC
DIGESTION OF SOLID
AND SEMI-SOLID ORGANICS**

**LUC DE BAERE
MANAGING DIRECTOR**

**IMPLEMENTING ANAEROBIC DIGESTION IN WALES,
CARDIFF, 11 NOVEMBER 2008**

THE COMPANY

FIGURES

- **DRANCO TECHNOLOGY DEVELOPED IN 1983**
- **OVS CREATED IN 1988**
- **ANNUAL SALES : 20 TO 30 MILLION EUROS**
- **65 PEOPLE**
- **OVS NV BELGIUM WITH SUBSIDIARIES:
DRANCO NV (BELGIUM), OVS INC (OHIO),
BIOGAS ENERGY SYSTEMS (GERMANY)**

THE COMPANY

ACTIVITIES

- **DESIGN AND CONSTRUCTION OF ANAEROBIC DIGESTION PLANTS FOR MUNICIPAL SOLID WASTE AND ENERGY CROPS:**
- **20 FULL-SCALE DRANCO PLANTS ON:
FOOD/BIOWASTE: 12 PLANTS (SINCE 1992)
RESIDUAL/MIXED WASTE: 7 PLANTS (SINCE 1997)
ENERGY CROPS: 1 PLANT (SINCE 2006)**

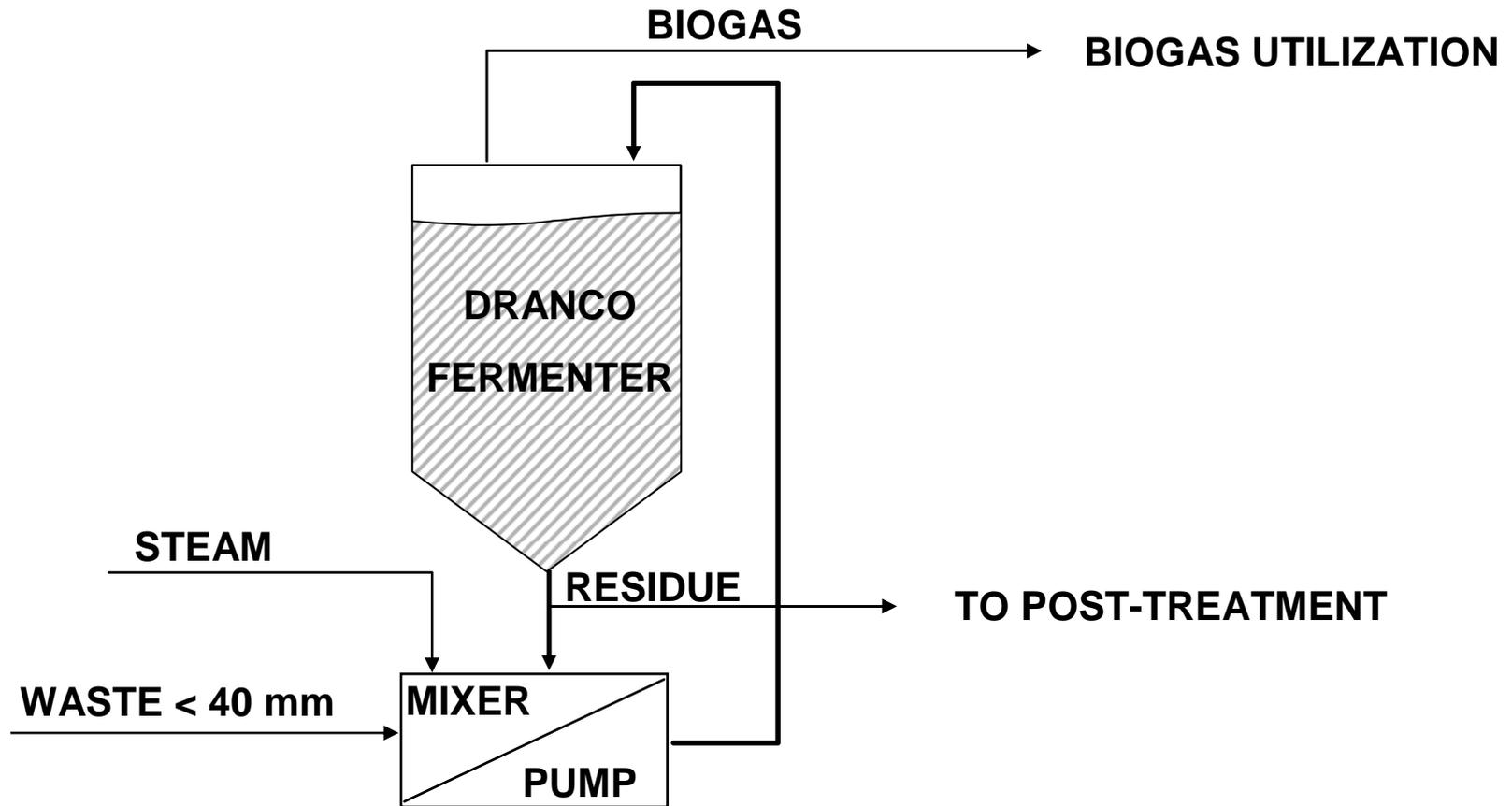
THE COMPANY

ACTIVITIES

- **OPERATION, BIOLOGICAL FOLLOW-UP AND REVAMPING OF ANAEROBIC DIGESTION PLANTS**
- **BIOLOGICAL AND TECHNICAL FOLLOW-UP IN 20 PLANTS IN EUROPE, ASIA AND USA**

THE DRANCO TECHNOLOGY

THE DRANCO PROCESS



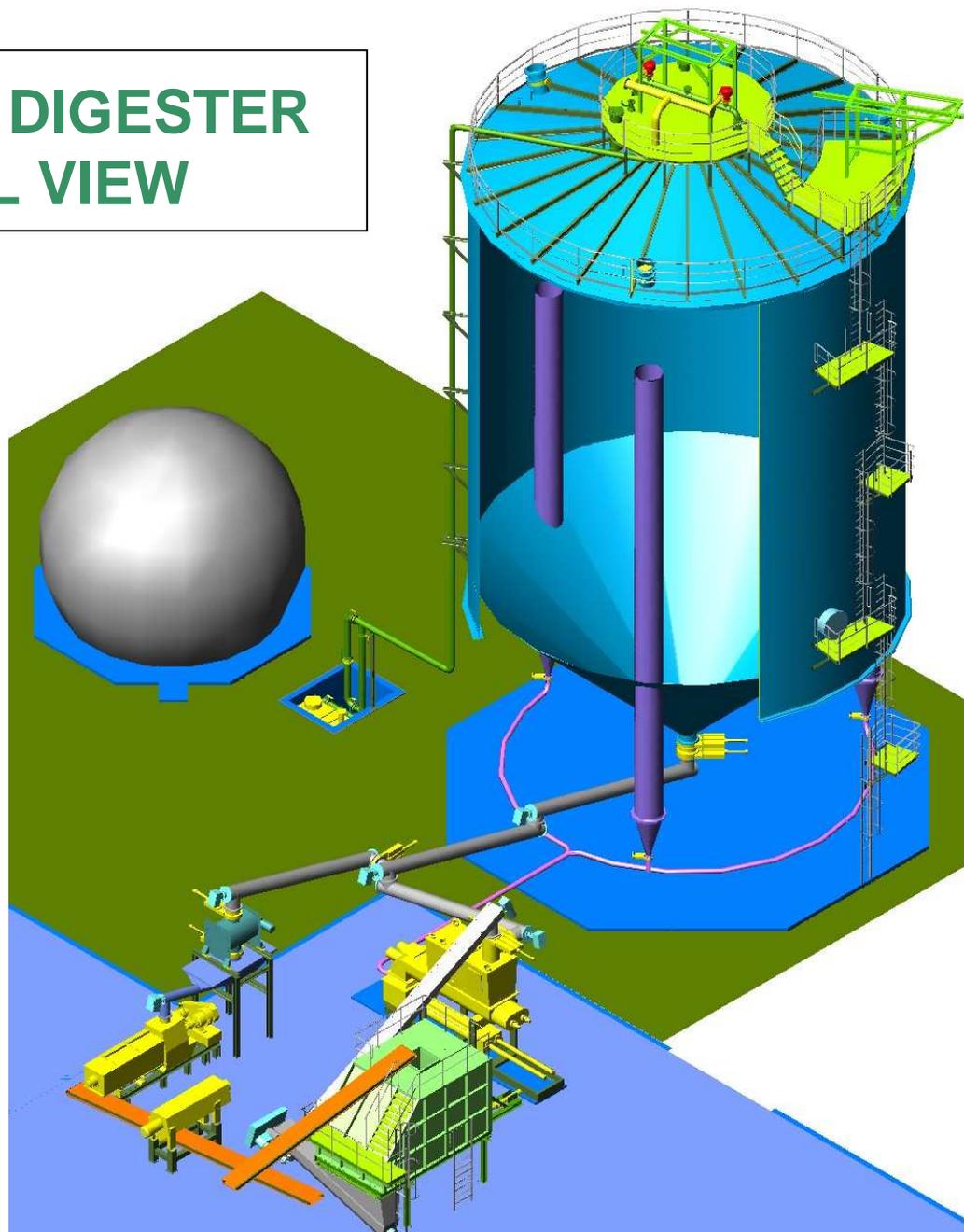
THE DRANCO DIGESTER



CONICAL OUTLET WITH EXTRACTION SCREW



DRANCO DIGESTER GENERAL VIEW



ADVANTAGES OF THE DRANCO SYSTEM

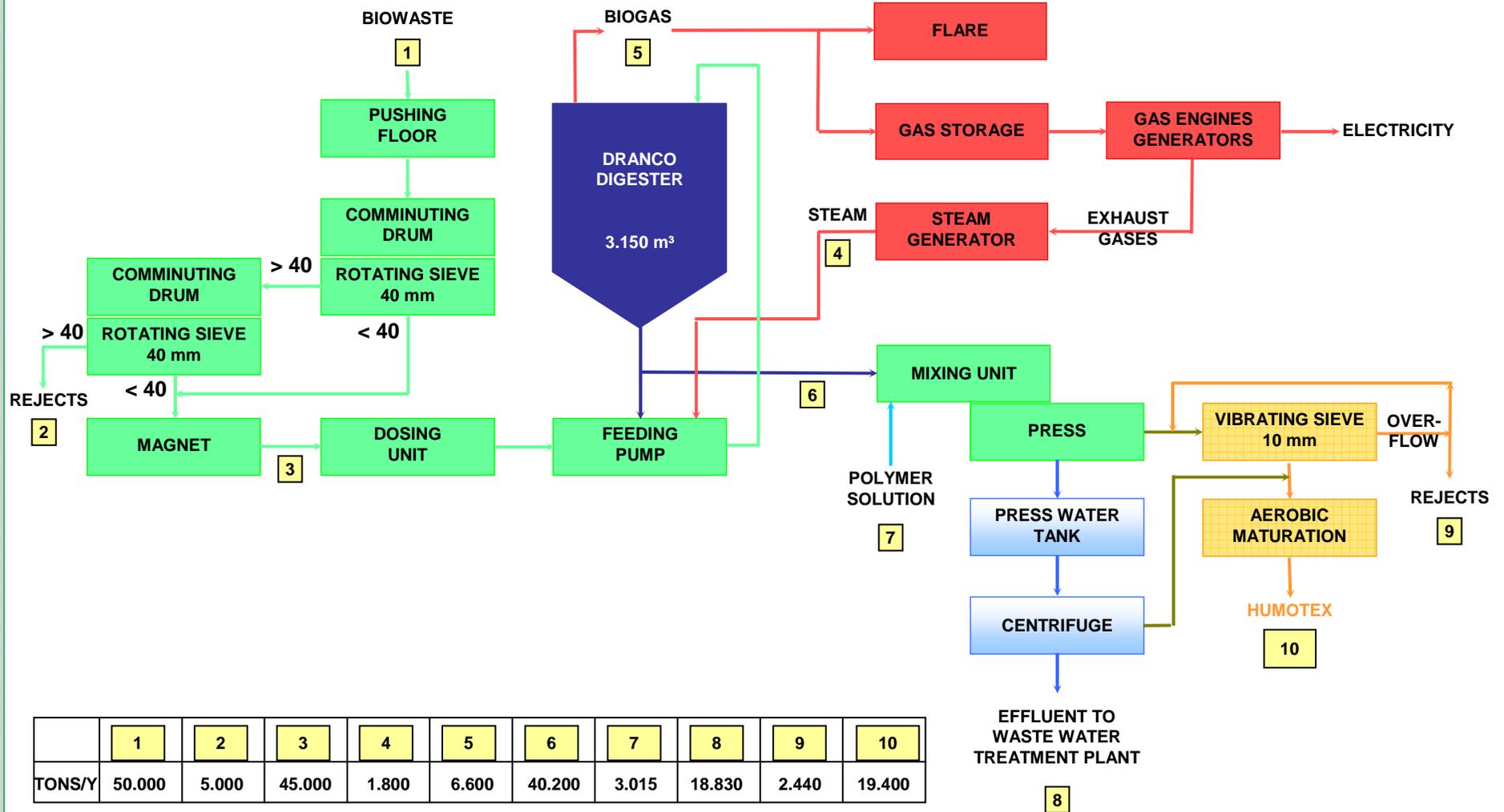
- **NO SCUM FORMATION, NO SETTLING IN TANK**
- **INTENSIVE AND RELIABLE DIGESTION**
- **HIGH FLEXIBILITY (15 TO 40%)**
- **NO MIXING INSIDE THE DIGESTER**
- **OPTIMUM INTEGRATION WITH PARTIAL STREAM DIGESTION WITHOUT EXCESS WASTEWATER**
- **AVOIDS OR MINIMIZES WASTEWATER PRODUCTION**
- **HIGH DEWATERED DRY MATTER IN PRESS CAKE FOR AEROBIC COMPOSTING PHASE**

FLEXIBILITY TOWARDS THE SUBSTRATE

INSTALLATION	SALZBURG AUSTRIA	BRECHT BELGIUM	BASSUM GERMANY
CAPACITY (TON PER YEAR)	20.000	50.000	13.500
KITCHEN WASTE GARDEN WASTE PAPER WASTE	80 % 20 % -	15 % 75 % 10 %	MUNICIPAL WASTE
TOTAL SOLIDS VOLATILE SOLIDS	31 % 70 %	40 % 55 %	57 % 51 %
TOTAL SOLIDS IN THE DIGESTER	22 % (17 - 27 %)	31 % (25 - 37 %)	40 % (35 - 45 %)
NM ³ BIOGAS/TON	135	120	137

BRECHT II PLANT

FLOW SCHEME BRECHT II PLANT



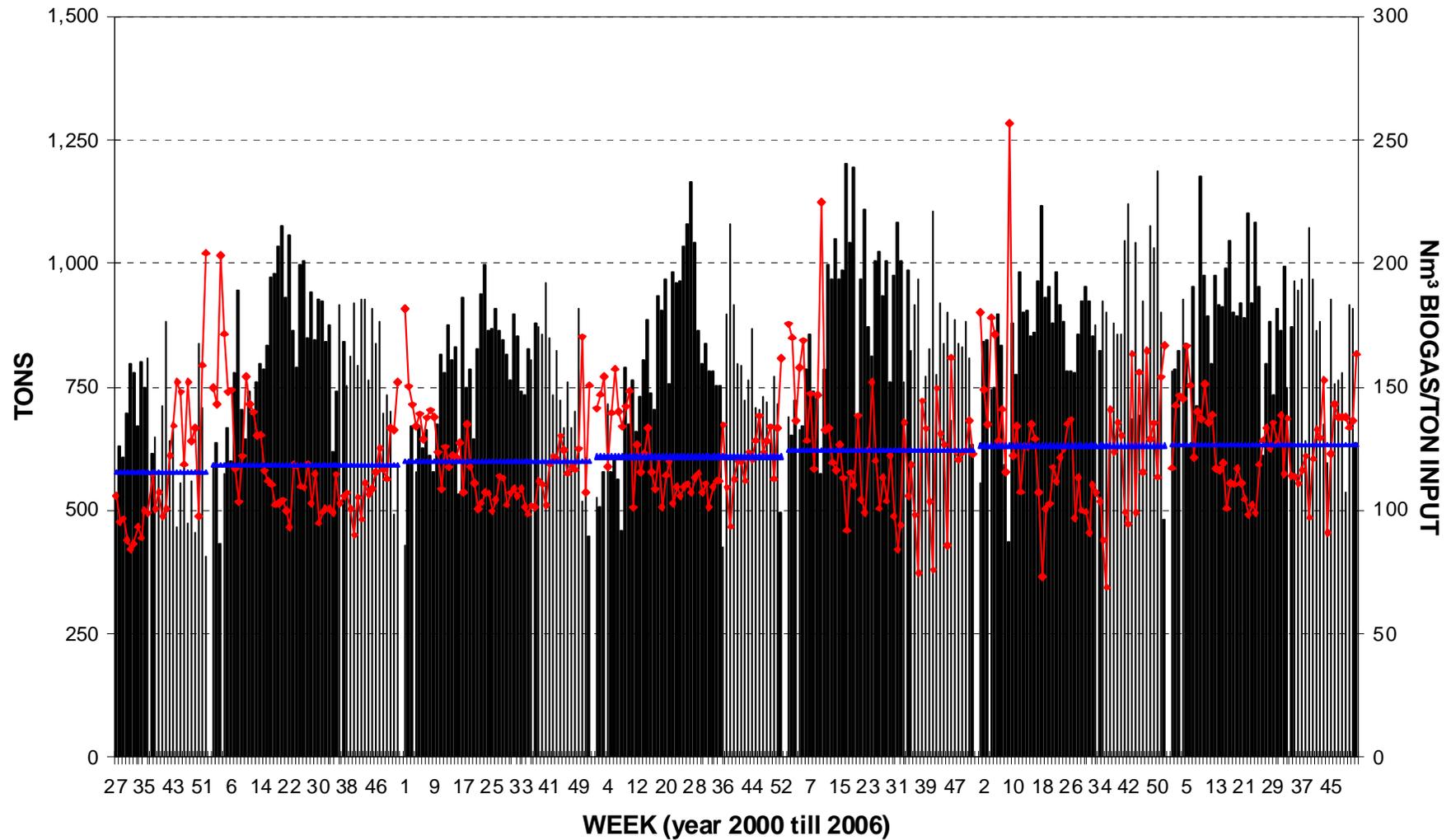
DRANCO: ANAEROBIC DIGESTION OF SOLID WASTE



OPERATION BRECHT II (IGEAN)

	2002	2003	2004	2005	2006
<u>FEEDSTOCK (T/Y)</u>					
- BIOWASTE	45 394	45 691	51 229	52 946	52 943
- <u>OTHER</u>	<u>966</u>	<u>1 776</u>	<u>2 525</u>	<u>2 126</u>	<u>2 030</u>
TOTAL	46 360	47 467	53 754	55 072	54 973
<u>PRODUCTION OF BIOGAS</u>					
- M³ BIOGAS (IN MILLIONS)	5.8	6.0	6.9	6.9	7.0
- M³ BIOGAS/TON INCOMING	125	127	128	125	128
- M³ BIOGAS/TON/DAY	6.8	7.2	7.4	7.2	7.6

TONNAGE INPUT AND PRODUCTION OF BIOGAS



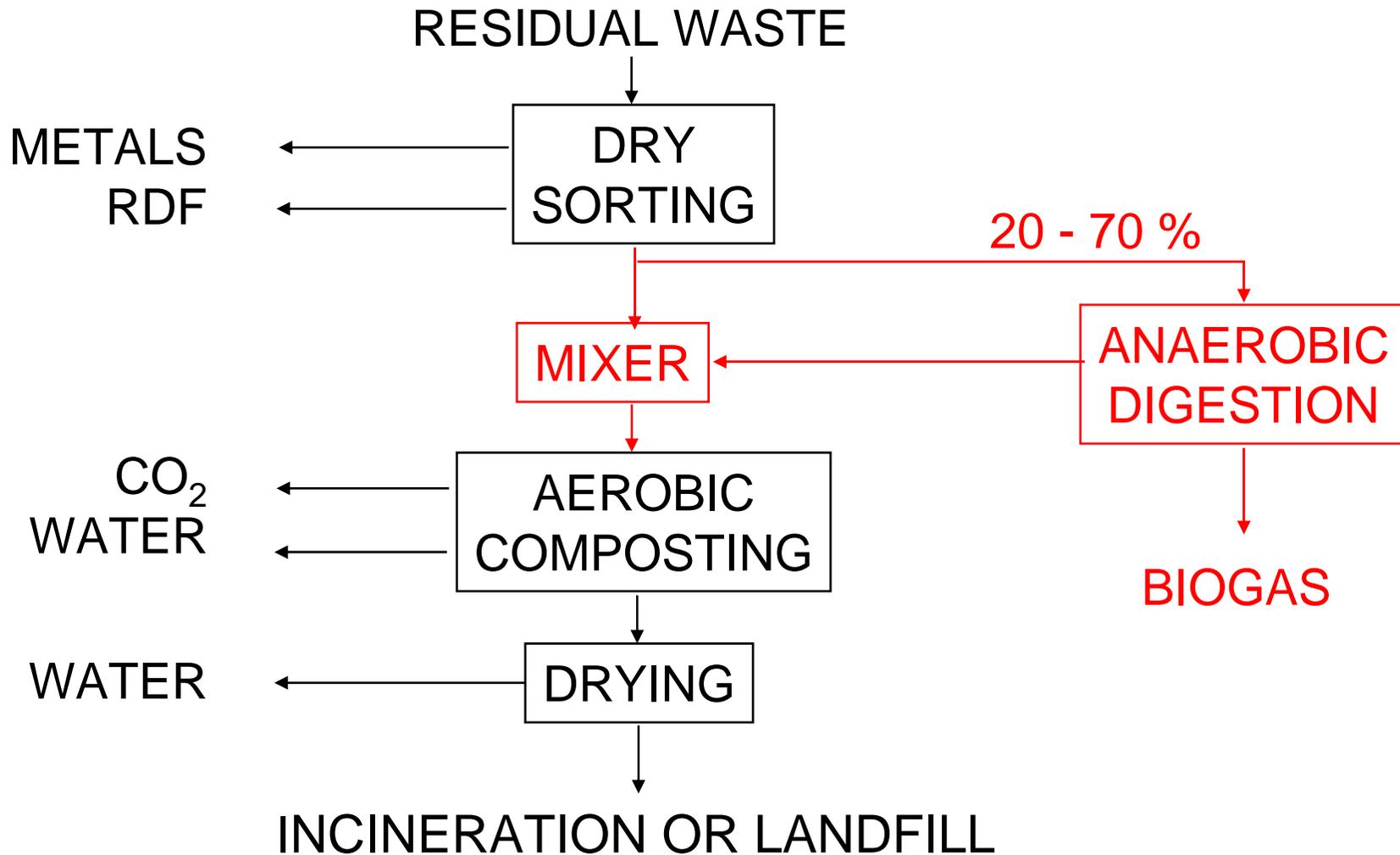
■ INPUT IN REACTOR ◆ BIOGAS PRODUCTION ← AVERAGE BIOGAS PRODUCTION PER YEAR

POHLSCHHE HEIDE PLANT

DRANCO PLANT POHLSCHE HEIDE

- * 100 000 TPY OF MSW**
- * PARTIAL STREAM DIGESTION OF
25 000 TPY OF RESIDUAL WASTE ORGANICS
PLUS 2500 TPY OF SLUDGE**
- * AEROBIC STABILISATION OF DIGESTATE
+ FRESH ORGANICS IN A RATIO OF 1:2
DURING 4 TO 6 WEEKS IN TUNNELS**

PARTIAL STREAM DIGESTION



PARTIAL STREAM DIGESTION VERSUS FULL-STREAM DIGESTION

ADVANTAGES

- **AVOIDS COSTLY DEWATERING STEP :
INVESTMENT - OPERATION**
- **AVOIDS TREATMENT OF EXCESS WASTEWATER**
- **ECONOMICS**

DISADVANTAGES

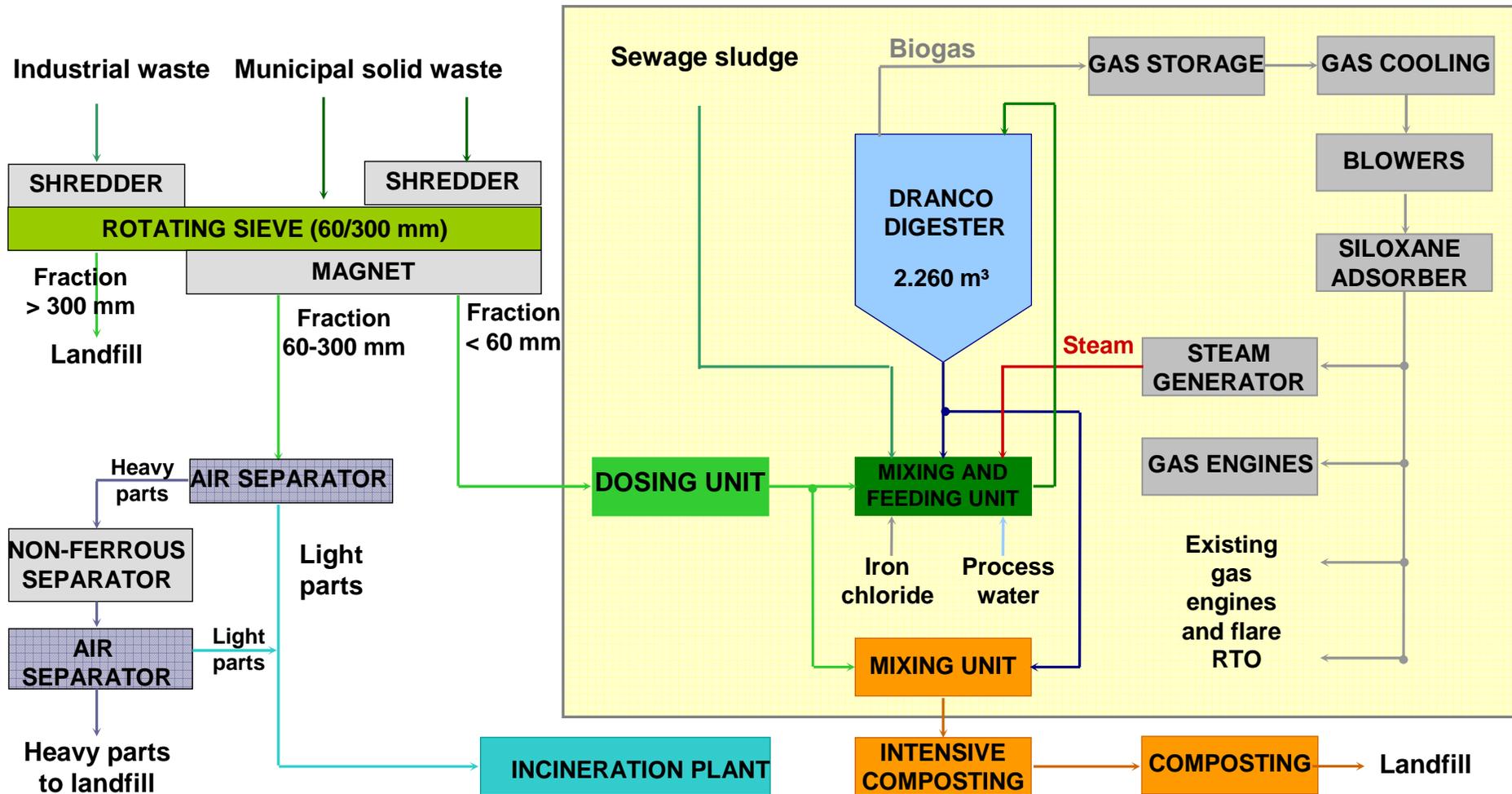
- **LESS ENERGY RECOVERY**
- **LONGER AEROBIC TREATMENT REQUIRED**

DRANCO PLANT POHLSCHHE HEIDE

PARTIAL STREAM DIGESTION IN COMBINATION WITH TUNNEL COMPOSTING (100.000 TPY)



FLOW SHEET DRANCO PLANT POHLSCHE HEIDE



DRANCO PLANT POHLSCHE HEIDE: RESULTS

FEEDSTOCK AFTER PRETREATMENT:

- **500 T OFMSW AND 50 T SLUDGE PER WEEK**
- **59% DRY MATTER AND 49% VOLATILE SOLIDS FOR OFMSW**
- **21% DRY MATTER AND 61% VOLATILE SOLIDS FOR SLUDGE**

DIGESTION:

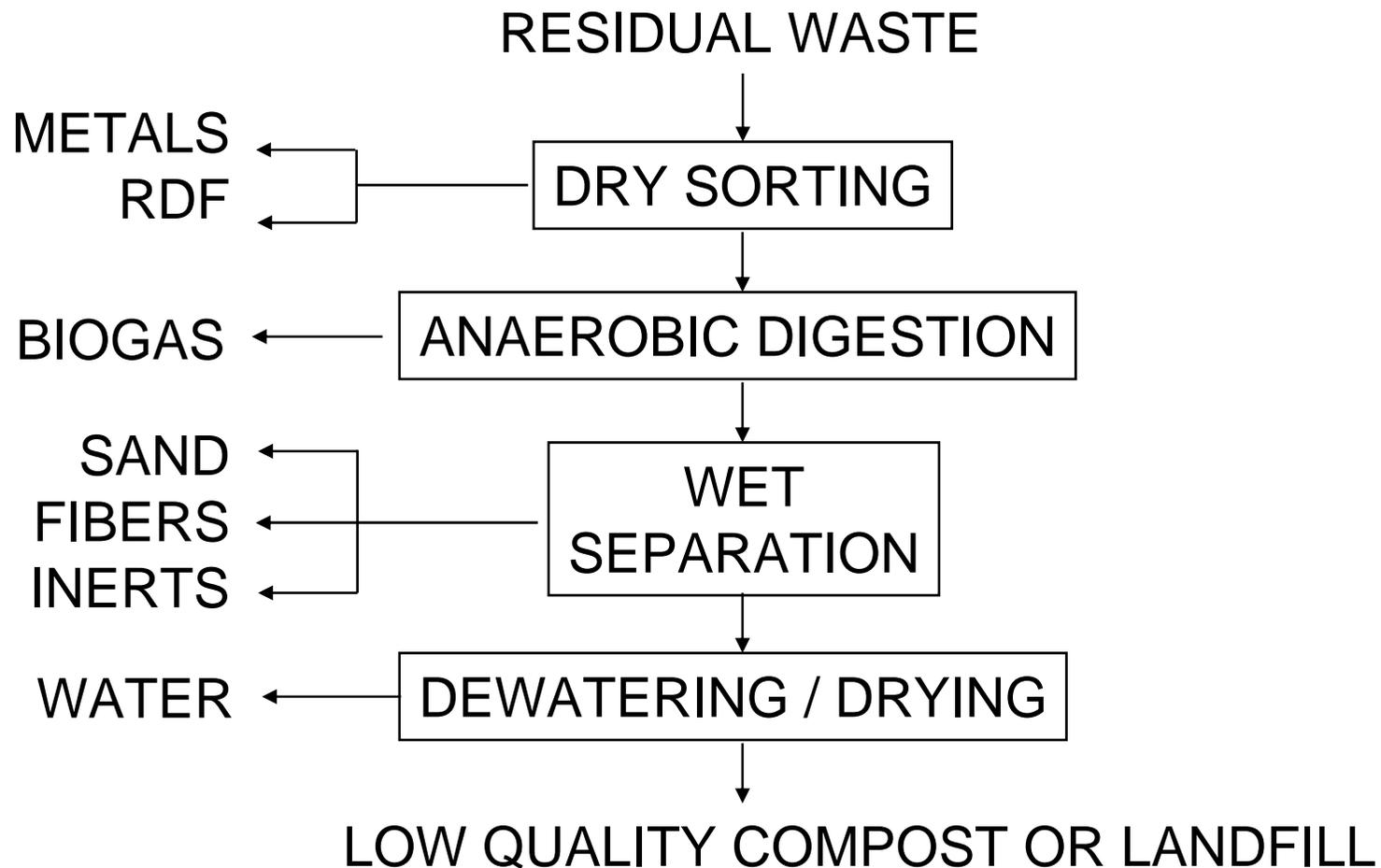
- **120 NM³ OF BIOGAS PER TON FOR OFMSW AND 23.5 NM³ FOR SLUDGE (56.2% METHANE)**

SORDISEP

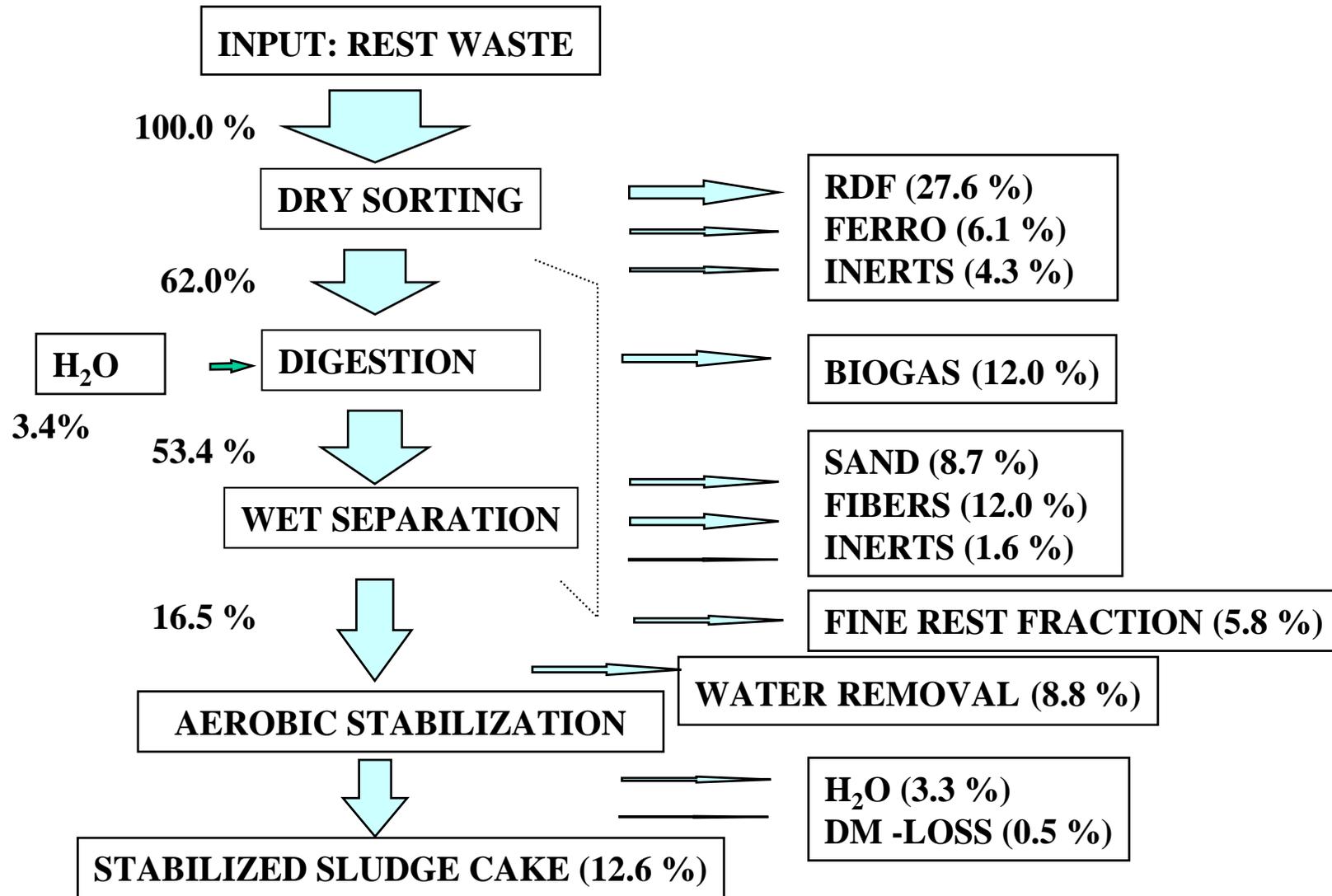
SORting - DIgestion - SEParation

INTEGRATION OF ANAEROBIC DIGESTION INTO MBT-PLANTS

PROCESS FLOW ANAEROBIC MBT-PLANT: FULL STREAM WITH MAXIMUM RECYCLING



SORDISEP



INTEGRATION OF ANAEROBIC DIGESTION INTO MBT-PLANTS

POTENTIAL FOR RECYCLING AND LANDFILL DIVERSION

	AEROBIC	PARTIAL STREAM DIGESTION	FULL STREAM ANAEROBIC	ANAEROBIC (WITH MAX. RECYCLING)
<u>RECYCLING</u>				
- METALS	6%	6%	6%	6%
- SAND	6%	6%	6%	8%
- BIOGAS	-	5 – 10%	15%	15%
- FIBERS	-	-	-	12%
	12%	17 – 20%	27%	41%
<u>LANDFILL DIVERSION</u>				
- RECYCLING	12%	17 – 22%	27%	41%
- LOSS OF WATER	35%	35%	35%	35%
- LOSS OF MASS	6%	3%	1%	-
	53%	55 – 60%	63%	76%
<ul style="list-style-type: none"> • BIOGAS = RECYCLING • RDF OR MIXED WASTE COMPOST = DISPOSAL 				

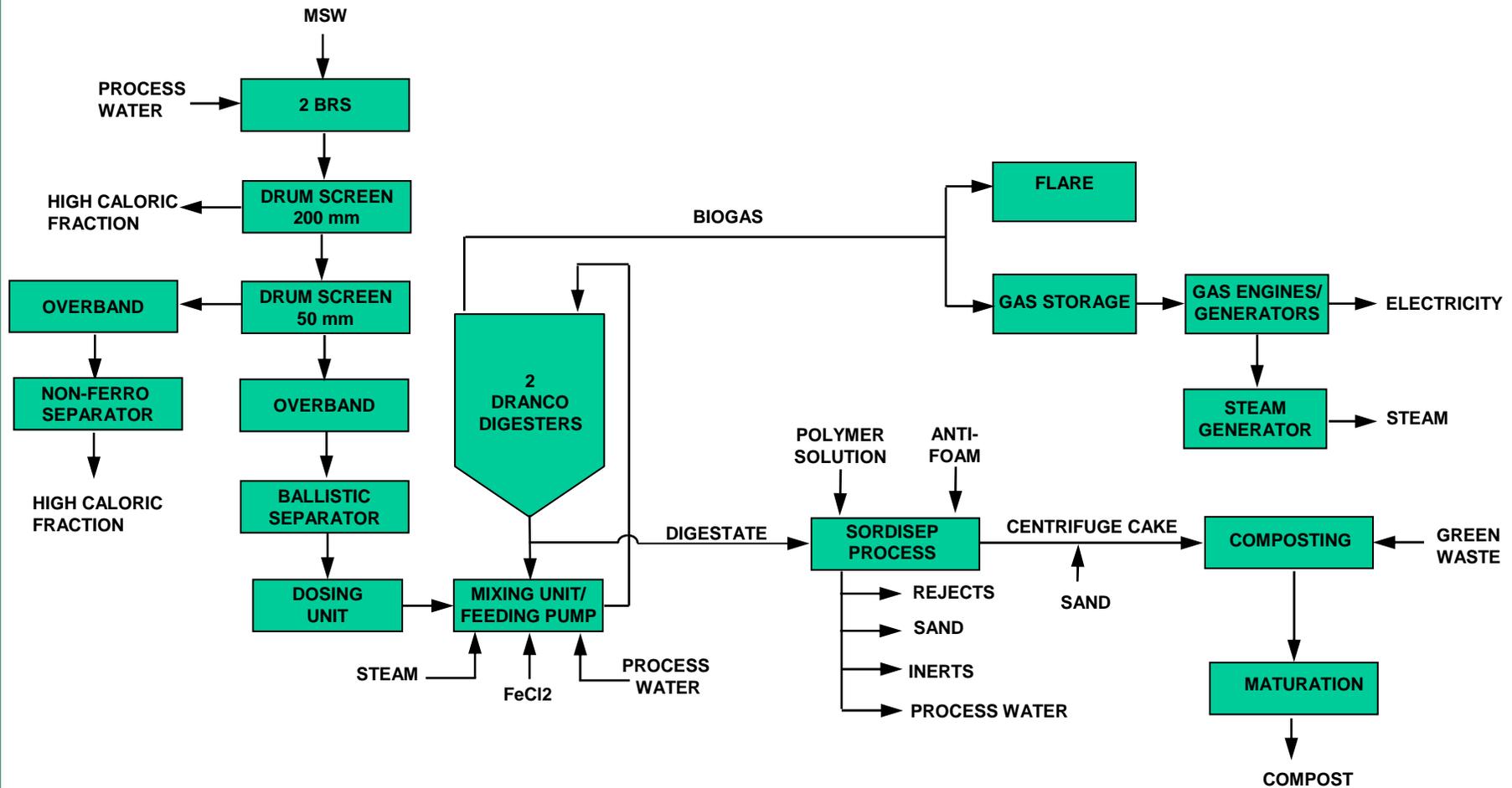
BOURG-EN-BRESSE FRANCE



BOURG-EN-BRESSE (FRANCE)

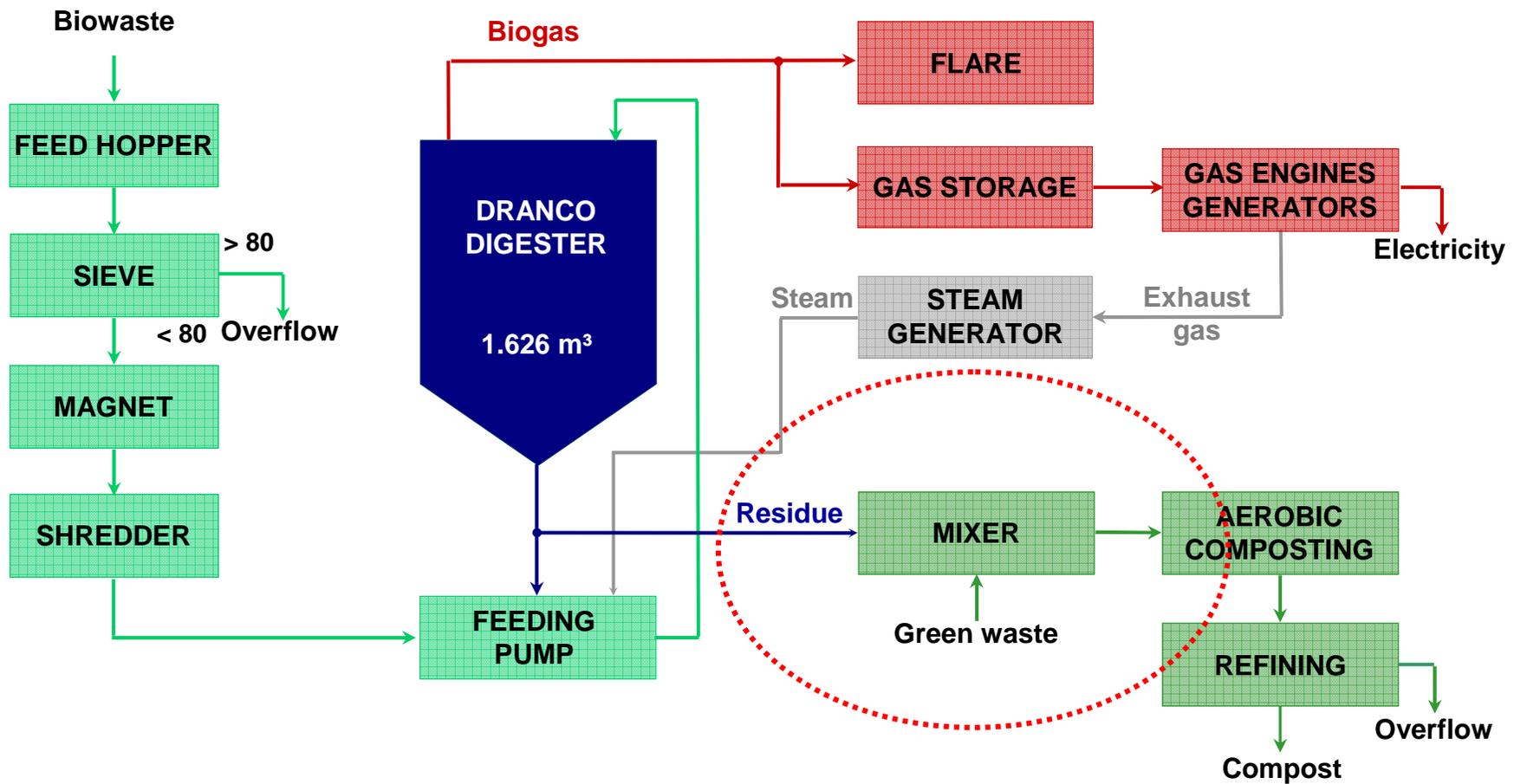
- **CAPACITY: 90 000 T MSW + 15 000 T YARD WASTE**
- **HOMOGENIZING DRUMS: 2 DAYS**
- **SCREENING OVER 200 AND 50 MM.**
- **TWO DIGESTERS OF 2 000 M³**
- **POSTCOMPOSTING DURING 6 WEEKS**
- **REMOVAL OF INERTS**

FLOW SCHEME DRANCO PLANT BOURG-EN-BRESSE



**DRY DIGESTION OFFERS
POTENTIAL INTEGRATION
WITH YARD WASTE COMPOSTING**

FLOW SCHEME DRANCO PLANT TERRASSA (SPAIN)



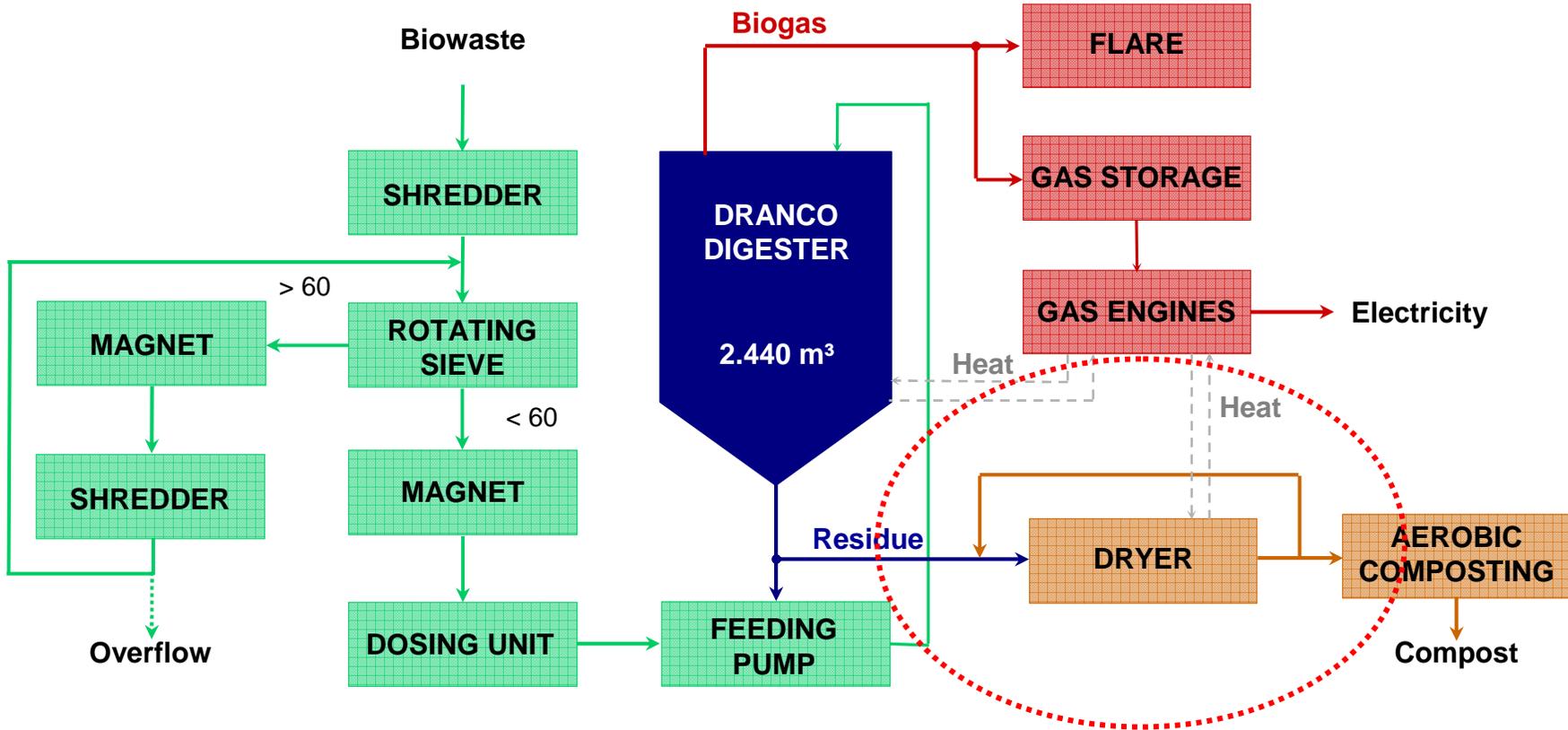
DRANCO INSTALLATION IN TERRASSA



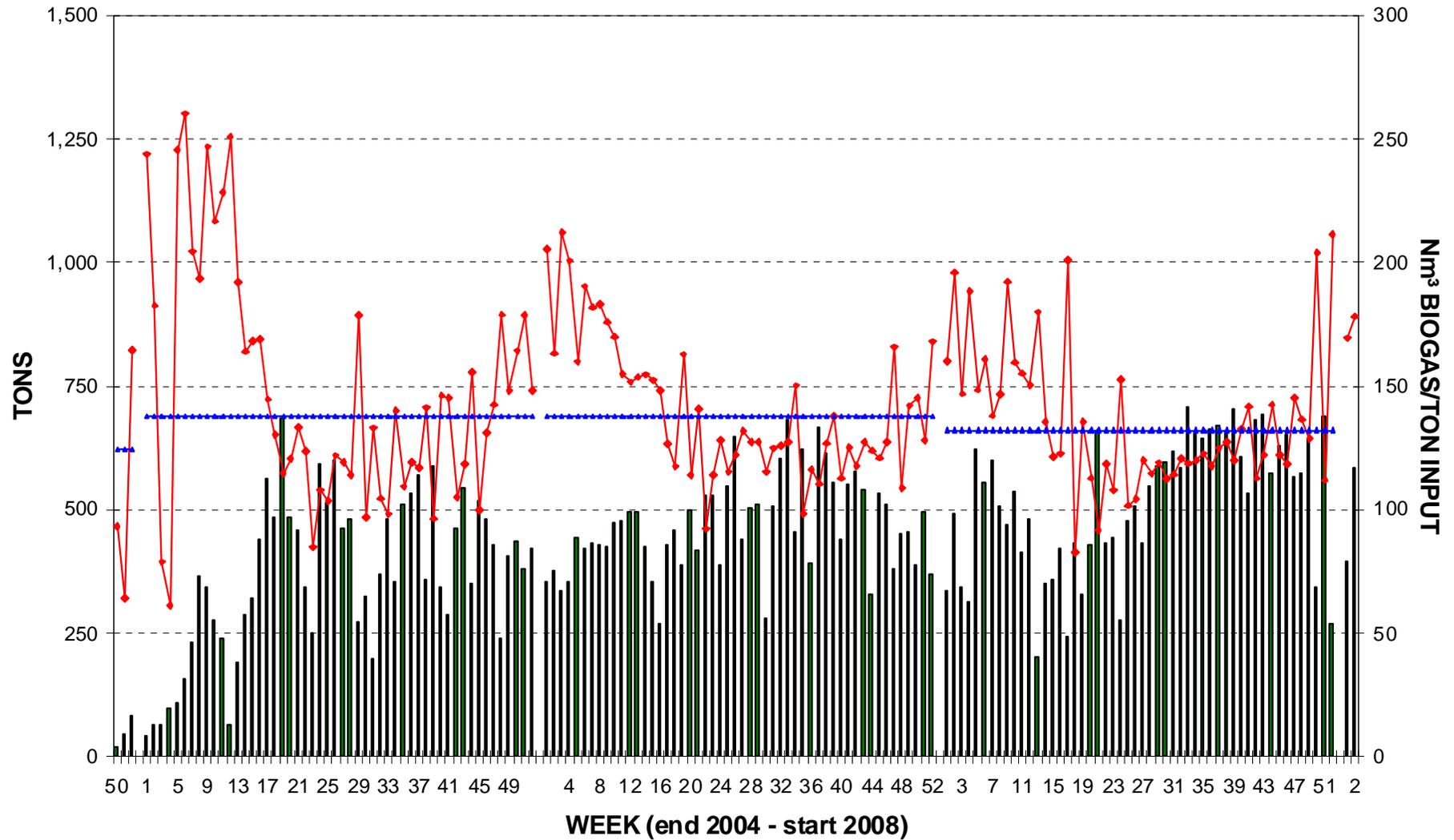
**DRY DIGESTION
CAN BE MORE EASILY COMBINED WITH DRYING
USING WASTE HEAT OF ENGINES**

FLOW SCHEME DRANCO PLANT LEONBERG (GERMANY)

-Treatment of biowaste without wastewater production -



DRANCO PLANT LEONBERG



INPUT IN REACTOR
 BIOGAS PRODUCTION
 AVERAGE BIOGAS PRODUCTION PER YEAR

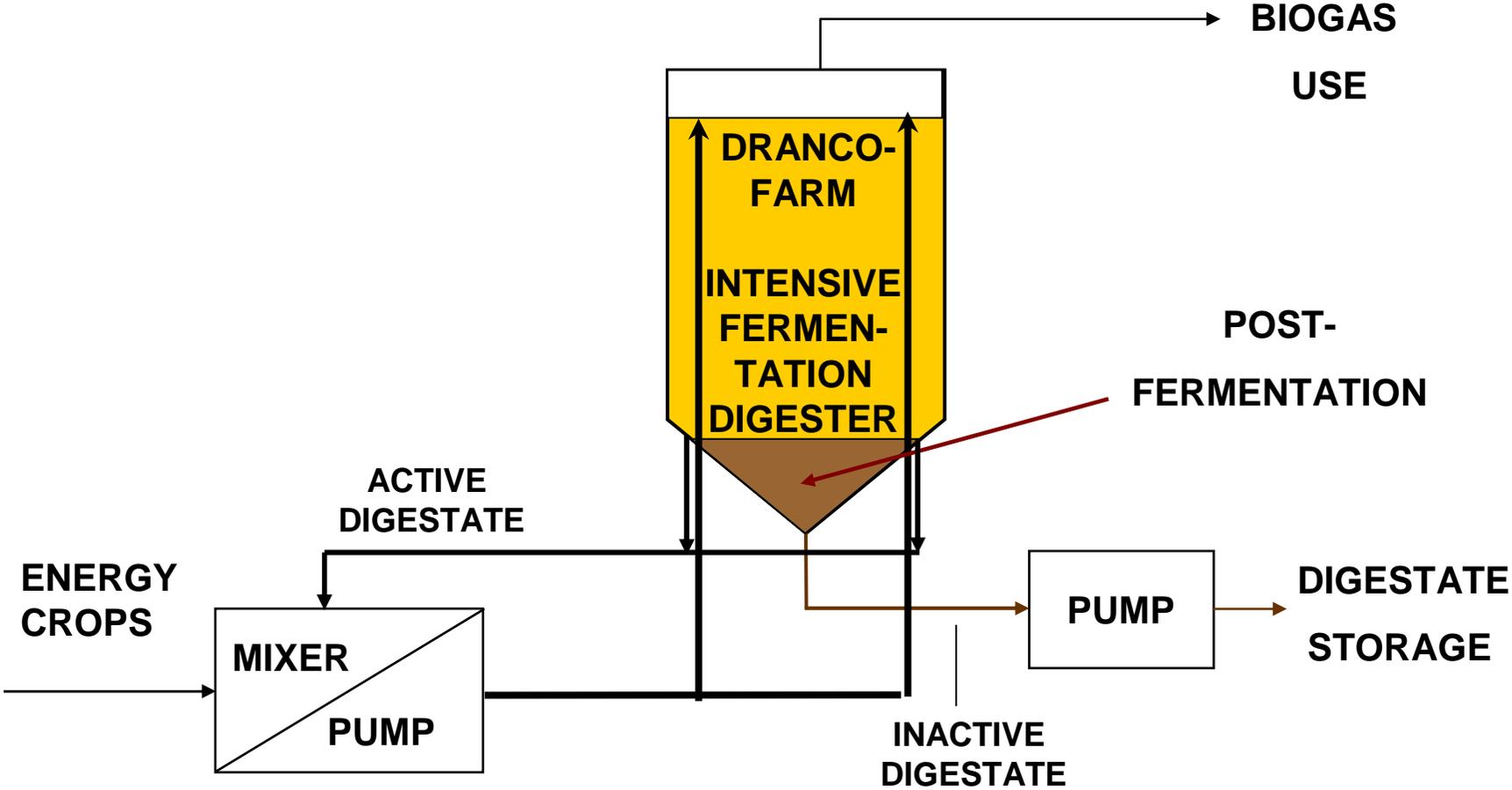
DRANCO INSTALLATION IN LEONBERG



DRYER

DRANCO-FARM NÜSTEDT

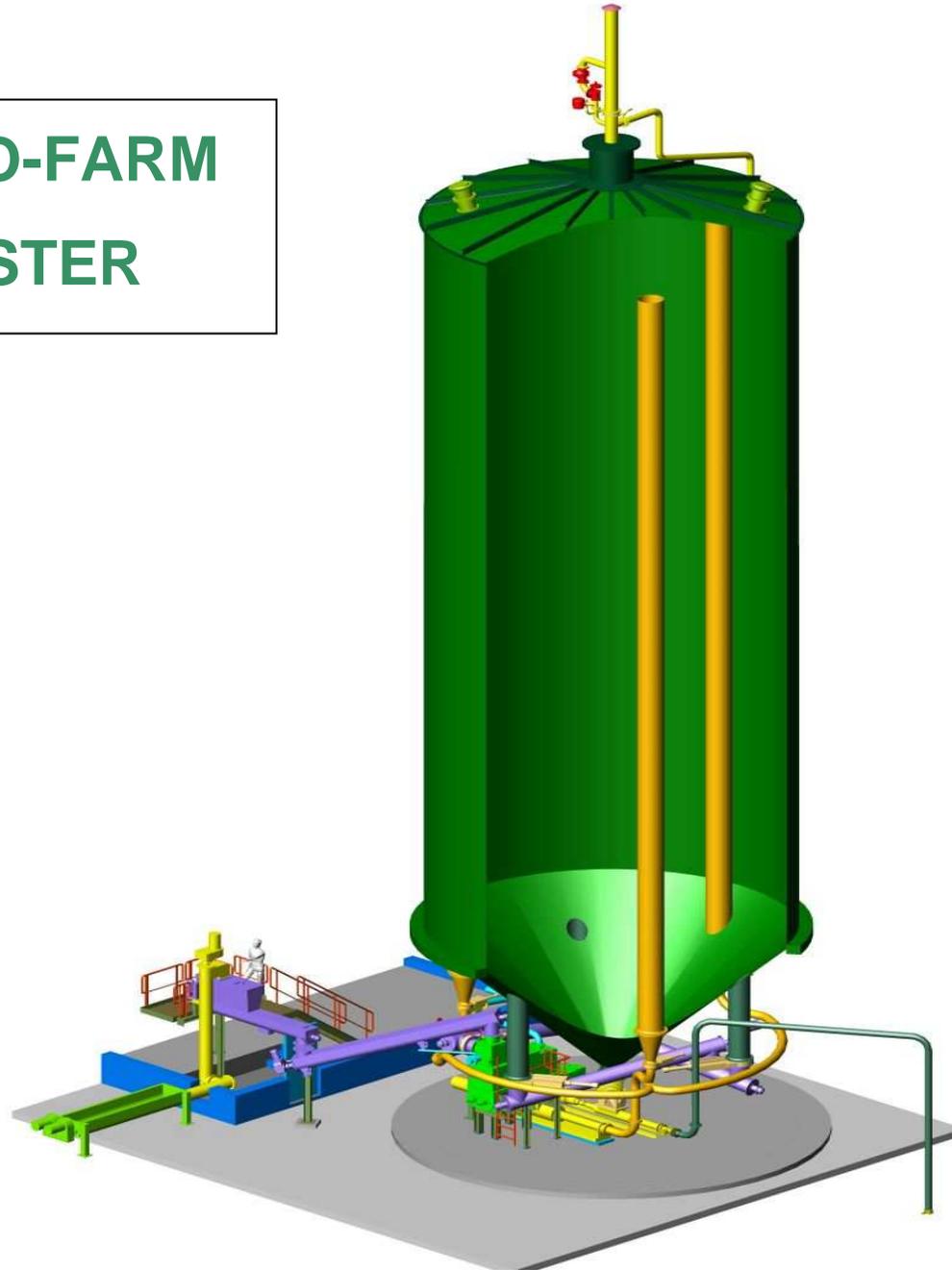
DRANCO-FARM PROCESS



SPECIFIC ADVANTAGES

- * NO MIXING**
- * NO LIQUID MANURE NEEDED**
- LOW PROPER CONSUMPTION ($\pm 5\%$)**
- HEATING WITH COOLING WATER FROM ENGINES
(THERMOPHILIC OPERATION AT 50°C)**
- SMALL SPACE AREA REQUIRED**
- INTENSIVE FERMENTATION
FOLLOWED BY POSTFERMENTATION**

DRANCO-FARM DIGESTER



DRANCO-FARM NÜSTEDT

PROCESS PARAMETERS

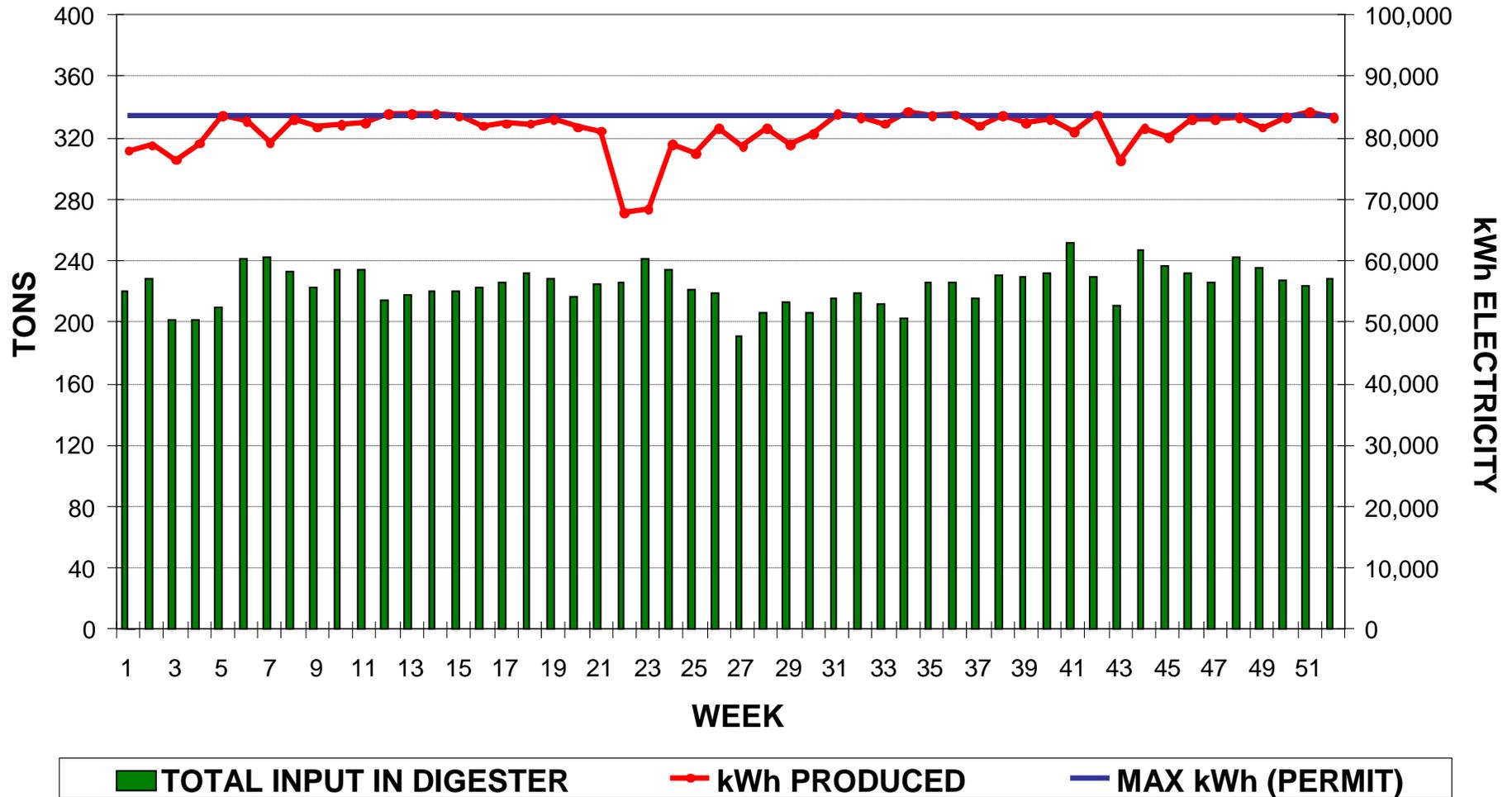
- ✓ **57% METHANE**
- ✓ **90-120 ppm H₂S**
- ✓ **PROPER CONSUMPTION: 5% - 6%**
- ✓ **750 kW + 250 Kw**
- ✓ **750 kW CONTINUOUS GENERATION**

DRANCO-FARM NÜSTEDT



FEEDING PUMP

TOTAL DIGESTER INPUT & ELECTRICITY PRODUCTION - DRANCO-FARM PLANT NÜSTEDT -



DRANCO-FARM NÜSTEDT



THREE GAS ENGINES OF 250 kW

BIOGAS CONSULTING AND SUPPORT

**ALL ROUND CONSULTANCY
AND SUPPORT
BASED ON 25 YEARS
OF EXPERIENCE**

BIOGAS CONSULTING AND SUPPORT

- **BIOLOGICAL SUPERVISION
AND ANALYTICAL ASSISTANCE**
- **ELECTROMECHANICAL SUPERVISION,
MAINTENANCE AND REPAIRS**
- **AUTOMATION**

BIOGAS CONSULTING AND SUPPORT



BIOGAS CONSULTING AND SUPPORT

MORE THAN 20 PLANTS UNDER SUPERVISION

- **MSW, FOOD WASTE, ENERGY CROPS,
MANURE + INDUSTRIAL ORGANICS**
- **DRY - WET
THERMOPHILIC - MESOPHILIC
HORIZONTAL-VERTICAL
COMPLETELY MIXED - PLUG FLOW**
- **PLANTS IN EUROPE, ASIA AND USA
(HALF DRANCO, HALF OTHER TECHNOLOGIES)**

BES DIGESTION PLANT



ADVANTAGES AND CHARACTERISTICS OF BES

- **HORIZONTAL PLUG FLOW DIGESTER WITH HIGH RECIRCULATION RATIO**
- **SHORT CONSTRUCTION PERIOD BECAUSE OF PREFABRICATED AND ROBUST DIGESTER WALLS**
- **HORIZONTAL DIGESTERS WORKING UP TO 13% TS INSIDE**
- **GAS STORAGE ON TOP OF DIGESTERS REDUCES GROUND SURFACE OF THE PLANT**
- **SLOWLY ROTATING AXLE FOR OPTIMAL HEAT AND MATERIAL DISTRIBUTION**
- **SLOWLY ROTATING AXLE AVOIDS SEDIMENTATION AND FLOTATION LAYERS**
- **INDUSTRIAL SYSTEM WITH HIGH QUALITY COMPONENTS AND COMPLETE AUTOMATION ASSURING HIGH RELIABILITY AND PERFORMANCE**

DRANCO REFERENCES

<u>FULLSCALE PLANTS</u>	<u>t/y</u>	<u>SUBSTRATE</u>	<u>YEAR</u>
Brecht I, Belgium	20 000	Biowaste +	1992
Salzburg, Austria	20 000	Biowaste	1993
Bassum, Germany	13 500	Grey waste	1997
Aarberg, Switzerland	11 000	Biowaste	1998
Kaiserslautern, Germany	20 000	Grey waste	1999
Villeneuve, Switzerland	10 000	Biowaste	1999
Brecht II, Belgium	50 000	Biowaste +	2000
Rome, Italy	40 000	Mixed waste	2003
Leonberg, Germany	30 000	Biowaste	2004
Hille, Germany	25 000	Grey waste	2005
Terrassa, Spain	25 000	Biowaste	2005
Munster, Germany	25 000	Grey waste	2005
Pusan, Korea	70 000	Biowaste	2005
Vitoria, Spain	20 000	Mixed waste	2006
Nüstedt, Germany	12 500	Energy crops	2006
Hotaka, Japan	5 000	Biowaste	2007
Alicante, Spain	30 000	Mixed waste	2007
Tenneville, Belgium	40 000	Biowaste	2008
Kempton, Germany	18 000	Biowaste	2008
Seoul, South-Korea	30 000	Biowaste	2009
Bourg-en-Bresse, France	90 000	Mixed Waste	2010
	15 000	Yard Waste	



THANK YOU FOR YOUR ATTENTION !