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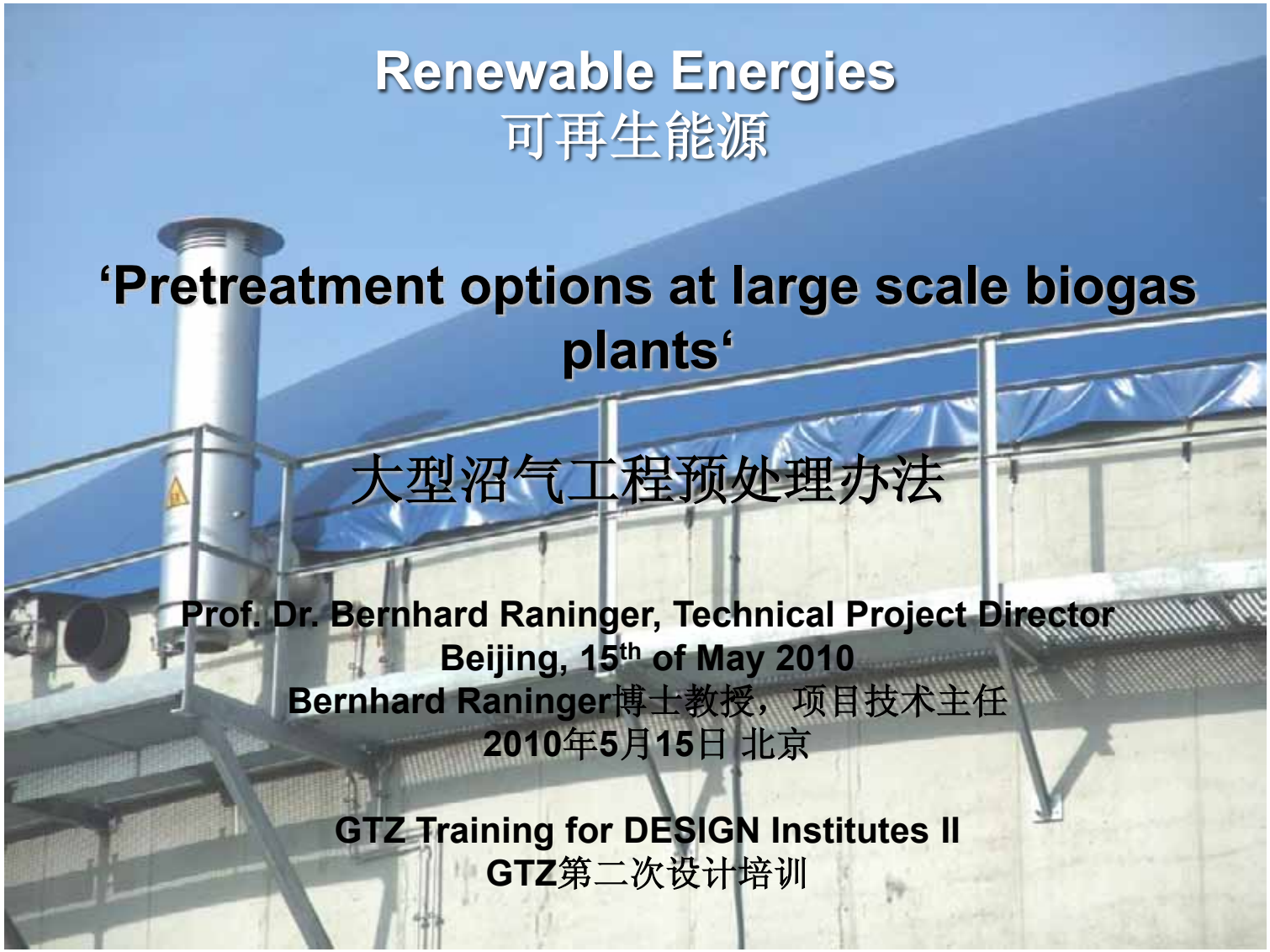


Renewable Energies
可再生能源

‘Pretreatment options at large scale biogas plants‘

大型沼气工程预处理办法

Prof. Dr. Bernhard Raninger, Technical Project Director
Beijing, 15th of May 2010
Bernhard Raninger博士教授，项目技术主任
2010年5月15日 北京

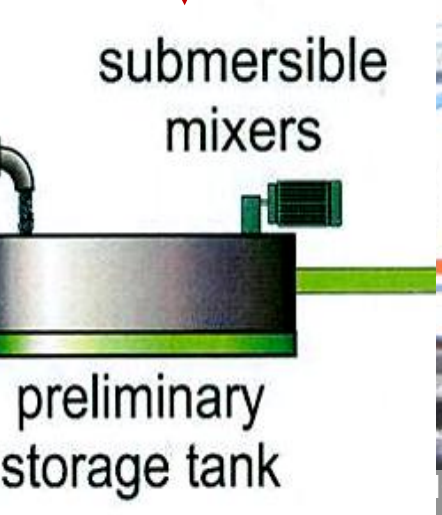
GTZ Training for DESIGN Institutes II
GTZ第二次设计培训

KNOTEN WEIMAR

AgroTechService

Storage & Feeding liquid feedstock
液态原料储存和进料

Liquid waste: 液态废弃物
Deep bunker 深槽
or storage tanks 储存罐



Feeding of corn silage for bio-methane generation
玉米青贮原料用于生产生物甲烷

Storage & quantitative Feeding 储存和进料

Walking floor 地面

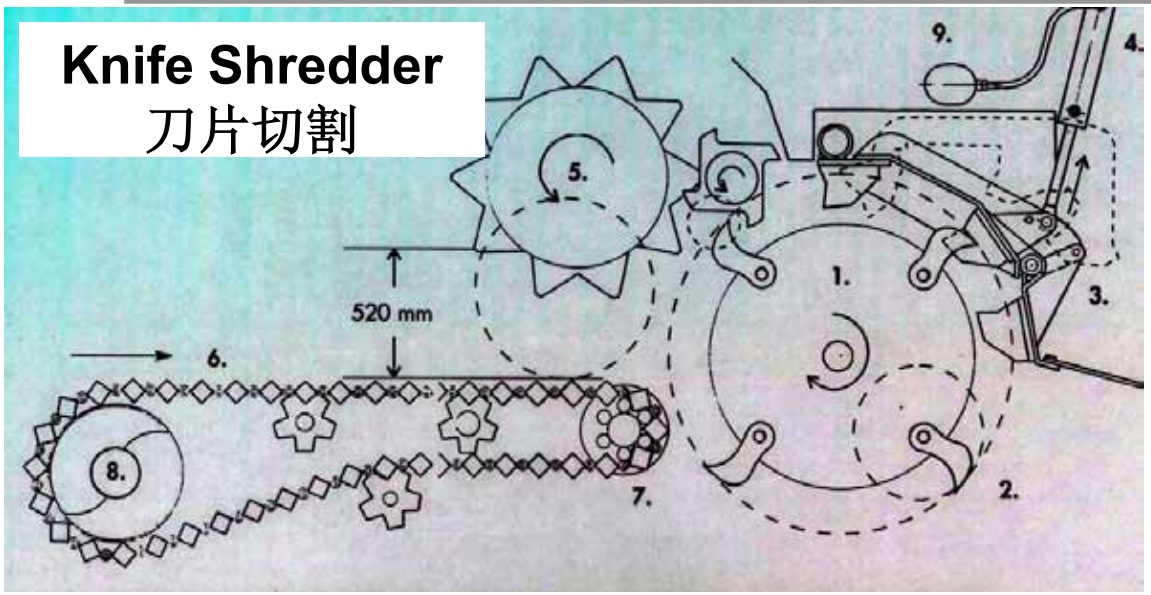
Reciving, Storage & Feeding 储存和进料

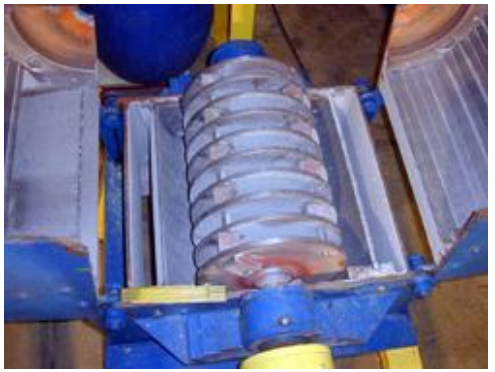
Flat bunker for solids
平地或深槽

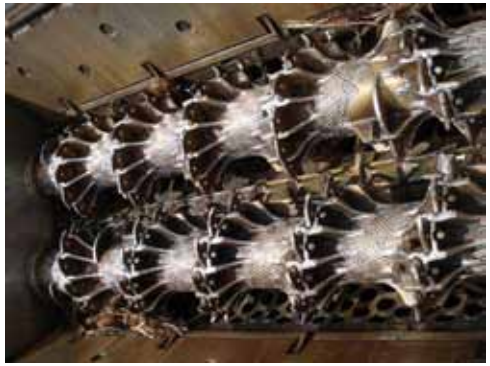
Screw grinder – mixing and dosing unit
螺旋混合给料设备

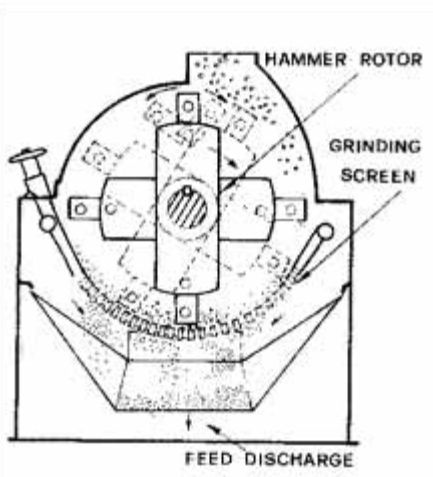
Solid Feedstock: Grinding by Screw-, knife- or hammer mills
固体原料:用螺旋、刀片切割或研磨机使其碎片化

Knife Shredder
刀片切割









Hammer Mills
研磨挤压机

Pretreatment of feedstock materials 原料预处理

(d) Increase the accessibility for microbiological degradation (inner material surface) 增加原料表面积以利于微生物降解

Biogasproduction of grinded straw after 10, 20 & 30 days 碾碎的秸秆10，20及30天发酵沼气产量

	10 days	20 days	30 days
	m^3 / kg organic substance		
小麦秸秆 Wheat straw:			
切碎（3cm） chopped (3 cm)	0,11	0,17	0,23
粉碎（0.1-2mm） milled (0,1 – 2,0 mm)	0,22	0,33	0,37

Pretreatment of solid and liquid feedstock materials原料预处理

(a) Improve transport ability and homogeneity for pumping, mixing, flowing
增加运输能力和原料均匀度有利于泵送,搅拌和流动

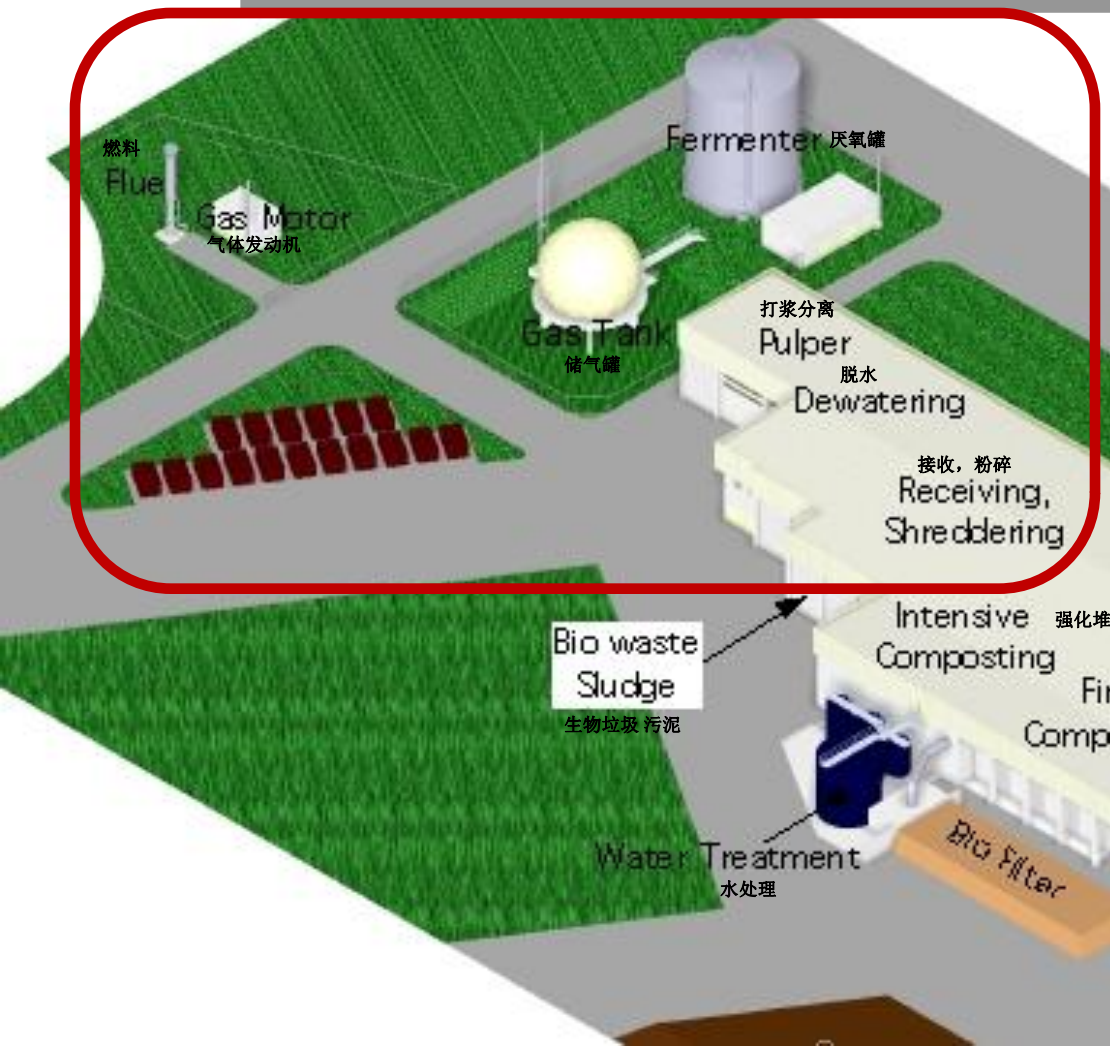
Grinding by: screw-, knife- or hammer mills
螺旋切割

Pulper, swim-sink separation 浮渣破碎沉积分离

Rotavapor for suspensions
悬浮固体切割机

AD of BMW, Wels Austria, 有机生活垃圾的厌氧消化 25.000 t/a, KCA Linde

AD of BMW, Wels Austria
有机生活垃圾的厌氧消化 25.000 t/a, KCA Linde Germany



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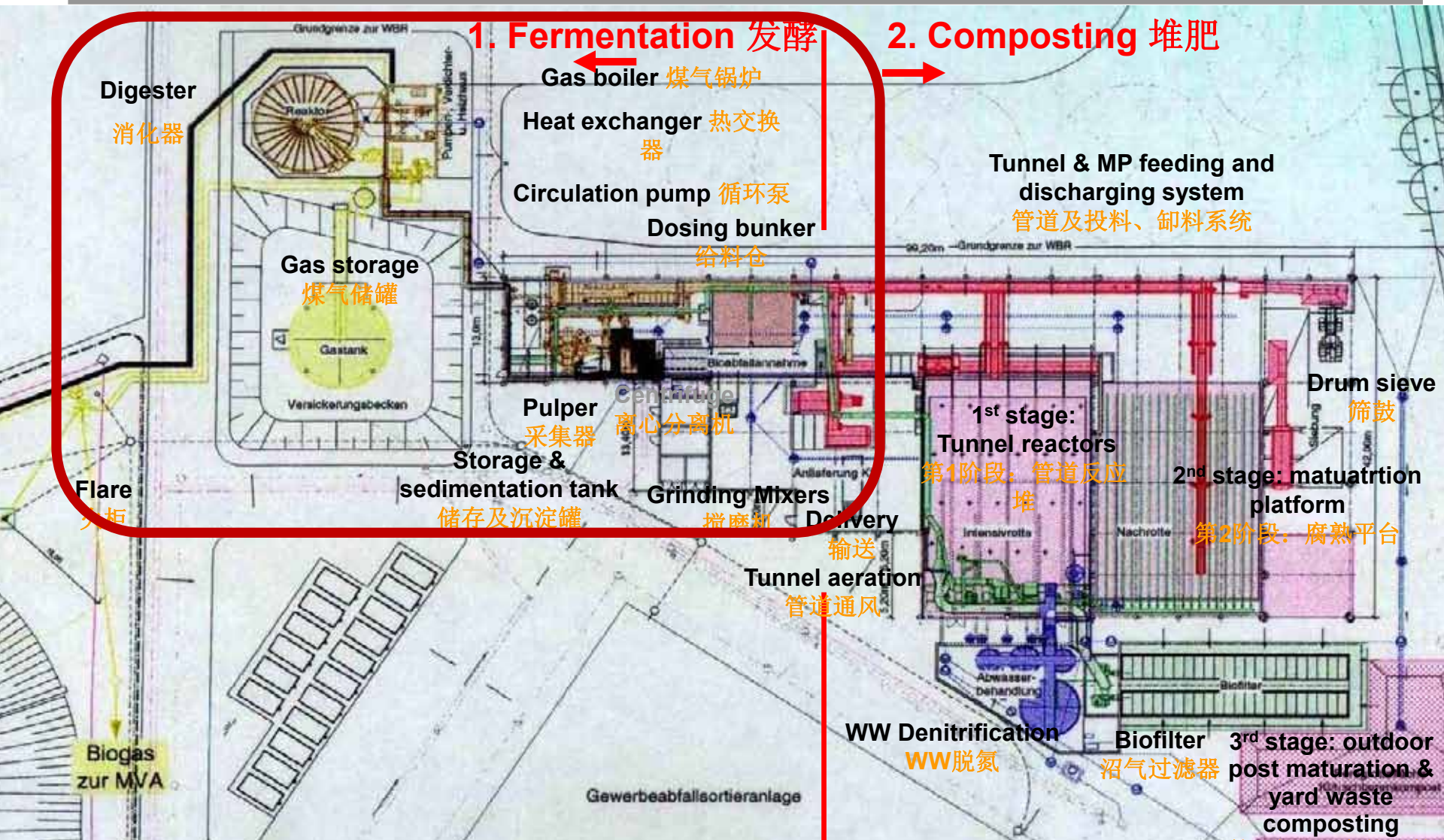
BMW & agro waste AD & Composting 生物质及农业废弃物的发酵及堆肥

WELS Process flow 25,000 t.a – 1 mio m3 Biogas p.a WELS工艺流程 25,000吨/年 - 100万m³生物气/年



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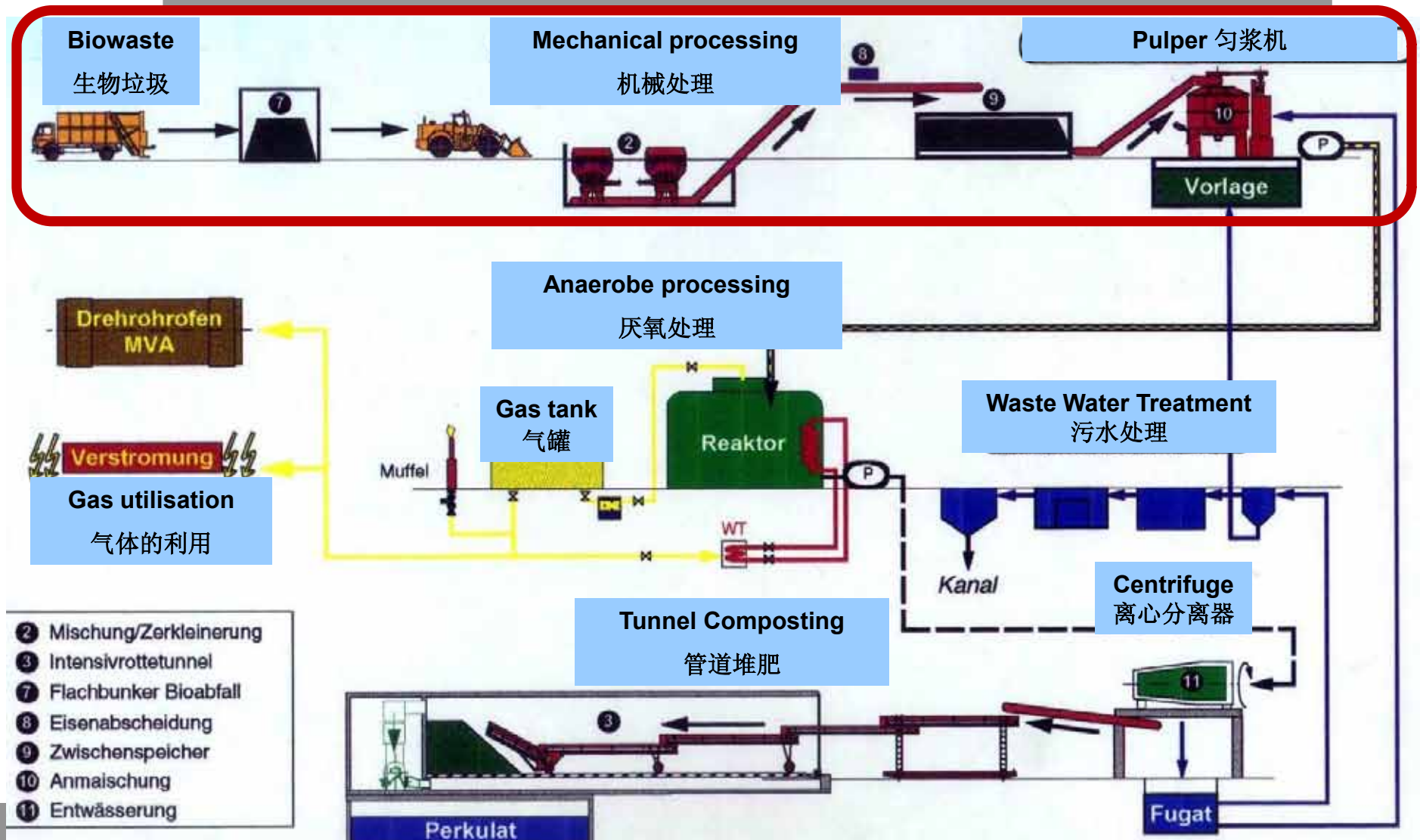
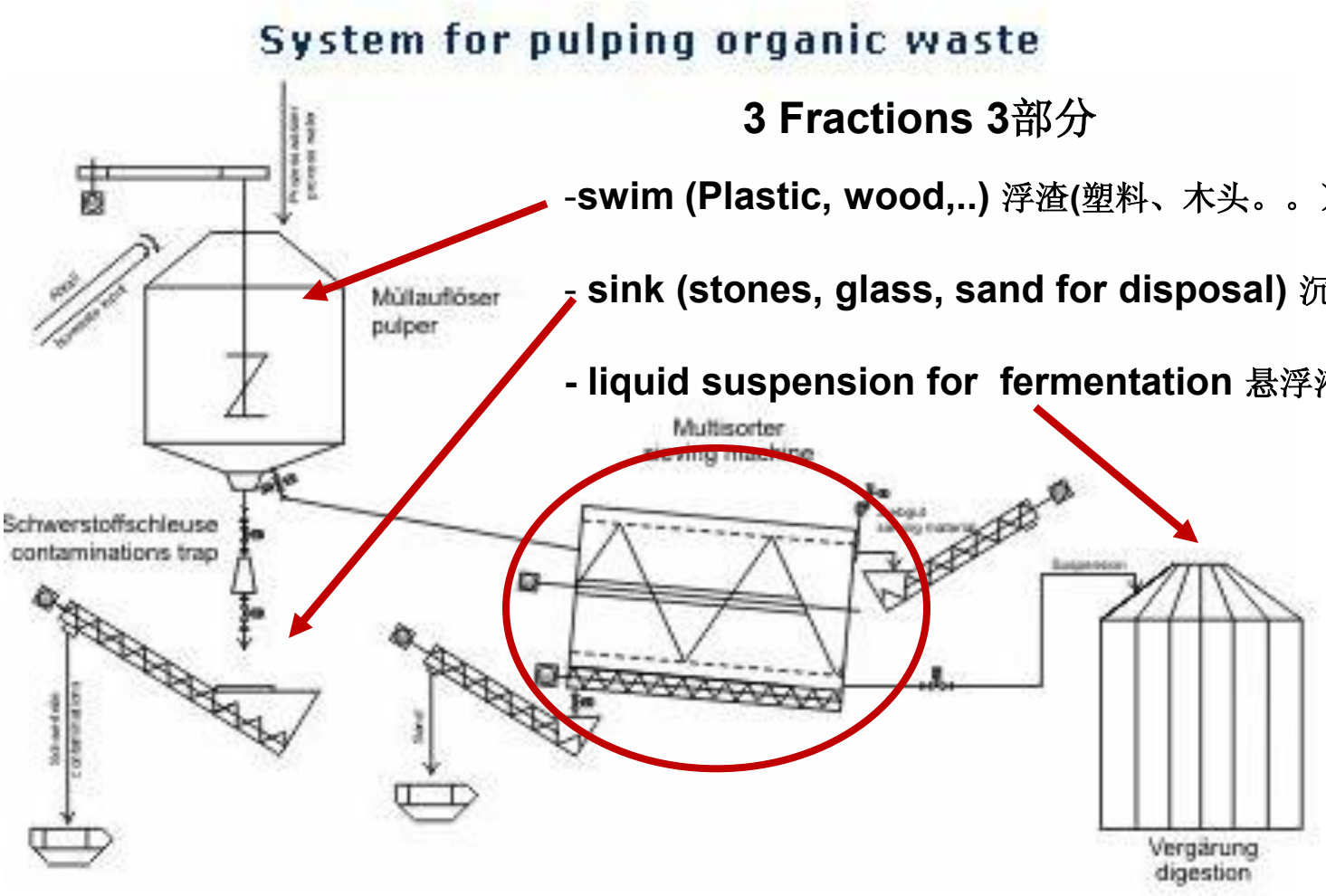
Preprocessing at WAV Biowaste Biogas Plant
生物垃圾沼气厂预处理



Anaerobic Digestion of Bio-Waste 生物垃圾的厌氧发酵
Hydro-pulper for liquid digestion technology 水体碎浆机用于液体发酵

With leachate circulation
滤液回旋

Pulper option a: Anaerobic digestion of Bio-Waste suspension for liquid digestion technology 生物垃圾的厌氧发酵 水体碎浆机用于液体发酵



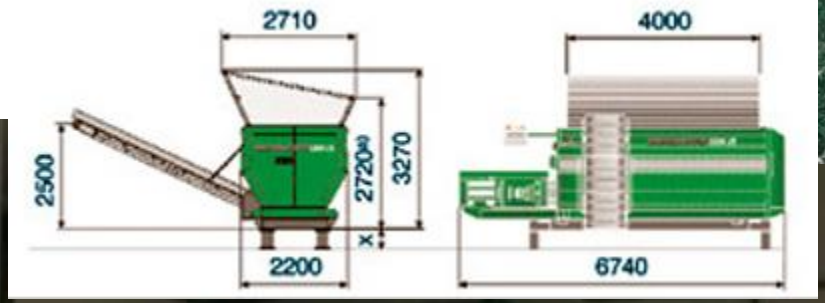
3 Fractions 3部分

-swim (Plastic, wood,..) 浮渣(塑料、木头。。）

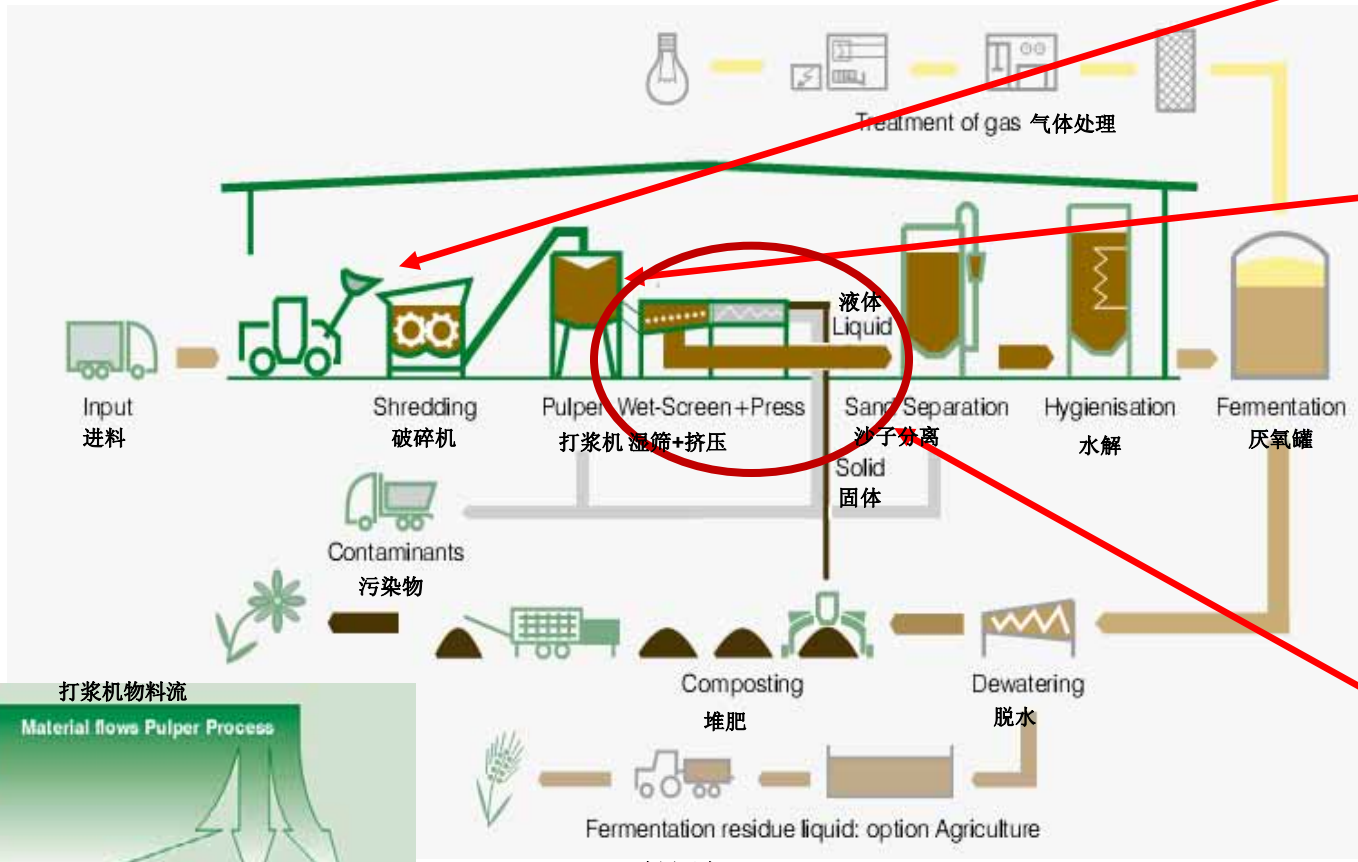
- sink (stones, glass, sand for disposal) 沉淀 (石头、玻璃、沙子)

- liquid suspension for fermentation 悬浮液 — 发酵

Processing of BMW for Biogas Plant – Screw grinder
生物垃圾沼气厂预处理- 螺旋磨床



Pulper option b: Anaerobic digestion of liquid pulper effluent 打浆机应用 b：打浆机液体出料厌氧发酵



Technology of the specific extrusion press: 挤压工艺：

BioPress/Co

accumulation of Biomass

in a Press-process +

Co-fermentation digestion

同时生物挤压
生物质在挤压过程中积累并发酵

BioPress/

accumulation of Biomass

in a Press-process +

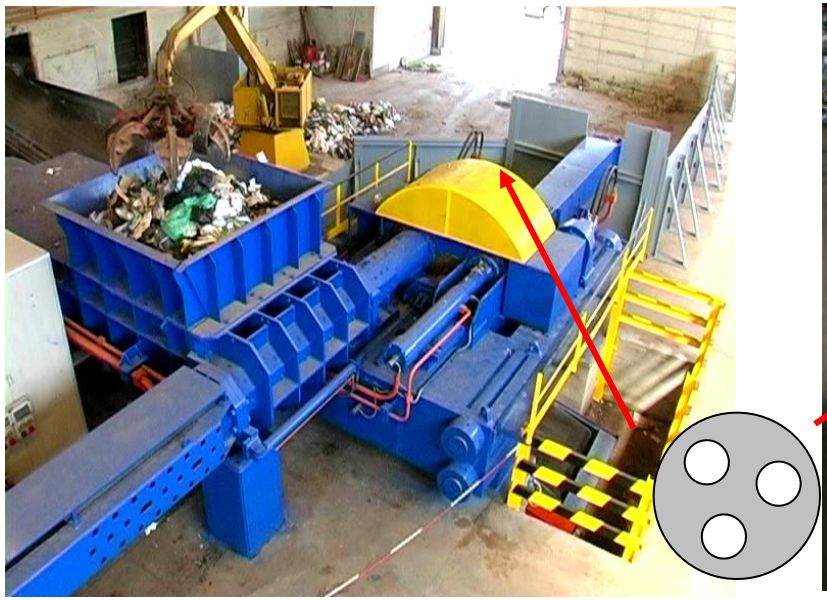
each other form of fermentation

生物质在挤压过程中积累，发酵单独进行

Technology of the specific extrusion press 挤压工艺：

Waste is compacted 废弃物被压实

- with high pressure (up to 1,000 bar = 10^8 Pa) 通过高压（最大可达1,000 bar = 10^8 Pa ）
- using a horizontally orientated screw extruder and 使用水平螺旋挤压机
- compression chambers with cylindrical, wear resistant, replaceable and perforated matrixes 压力舱中有圆柱形耐磨损可替代的有空的基质
- diameters of the holes: Possible between 2 and 50 mm 孔的直径：2到50mm
- 3 compression chambers are arranged in an angle of 120 ° to one another in a rotary drum. 3个压力舱以120度角放置在一个滚筒内。



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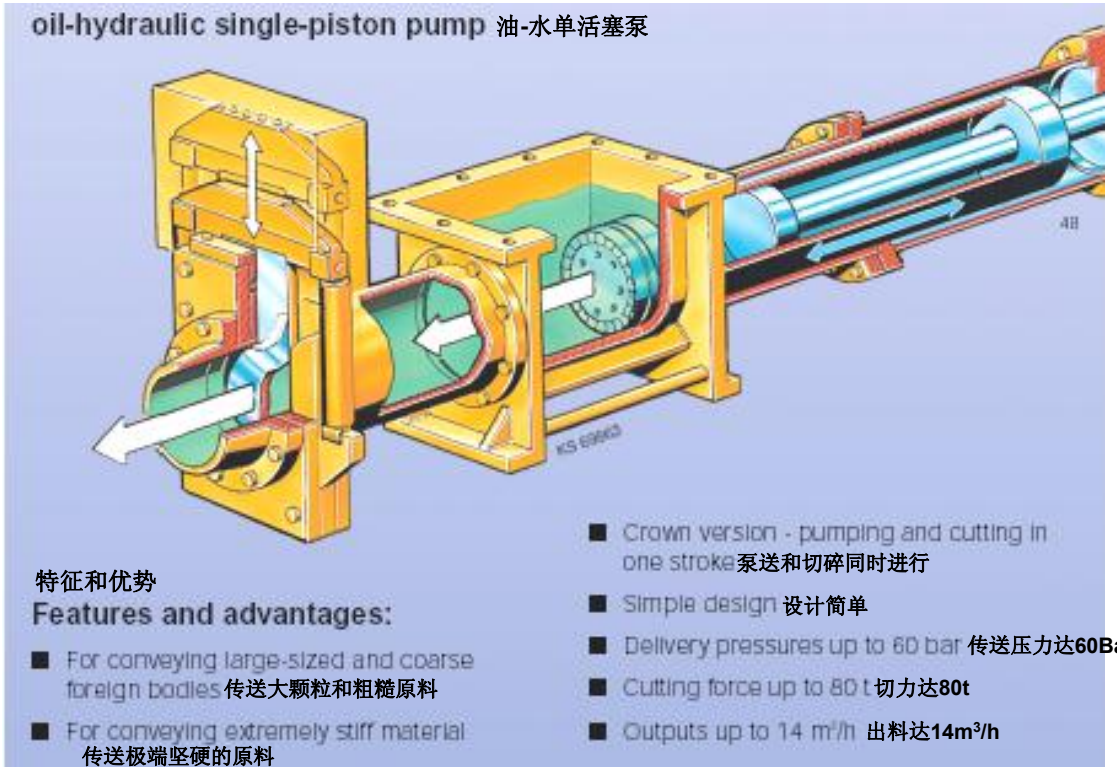
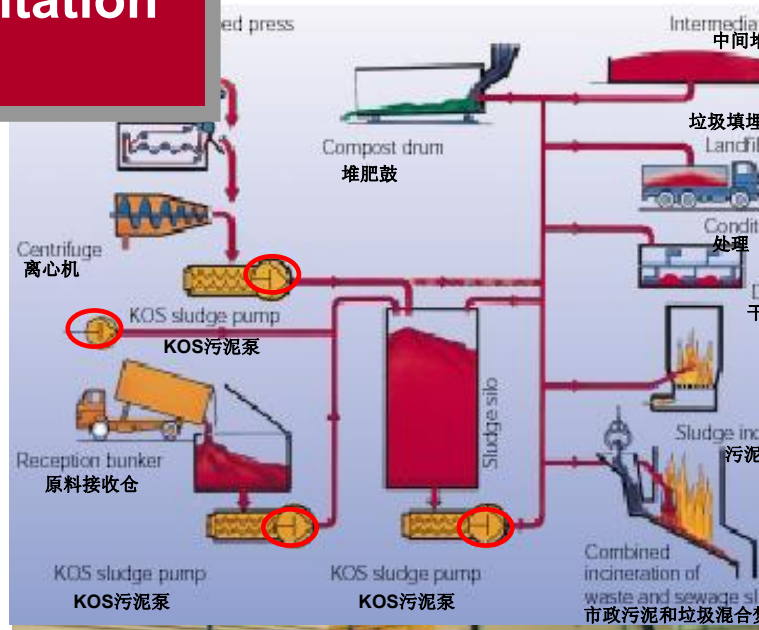
Anaerobic Digestion of Bio-Waste 生物垃圾厌氧发酵

High pressure piston pumps for dry fermentation

用于干发酵的高压活塞泵





80 –120 bar pressure 压强80-120 bar

- solids pumps are to transport and dose sewage slugde & biowaste (<35 % DS)

- 固体泵主要传送污泥及生物垃圾(<35%DS)

Thank You! 谢谢！

Technical Project Director
Optimization of Biomass Utilization Project
生物质能项目主任：

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