



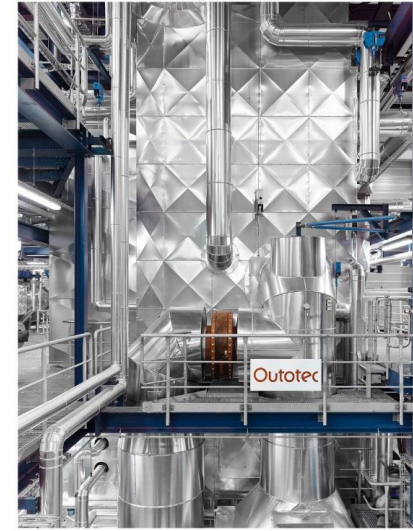
奥图泰绿色技术助力可持续能源发展  
Outotec's Green Technology towards a  
sustainable Energy Development

保定，2018年4月

周龙义，技术经理

# Agenda目录

- Company overview  
公司简介
- Portfolio of technologies  
主要技术
- Sludge incineration technologies  
污泥焚烧技术
- Ash treatment technology ....Phosphorous recovery  
灰处理技术-磷回收
- Reference plants  
业绩厂
- Environmental technologies  
环保技术



# Key points 关键信息

- State- of- the - art Sludge Incineration technology  
– Europe's most modern plant in Switzerland
- 最先进的污泥焚烧技术 – 欧洲最现代化的瑞士工厂
- Long experience in sludge handling and incineration – able to provide flexibility / alternatives for optimised plant design incl sludge storage/handling, driers, plant layout
- 在污泥处理和焚烧方面拥有丰富的经验 - 能够为优化的工厂设计提供灵活性/替代方案，包括污泥储存/处理，干燥机，工厂布局
- Outotec is more than just incineration...power production, creating a valuable resource from ash, upstream sludge processing
- 奥图泰不仅仅是焚烧...还有电力生产，以及从灰烬和上游污泥处理中创造有价值的资源
- Long history in China – since the 1960's – more than 280 sites covering multiple industries in almost every province!
- 中国历史悠久 - 自20世纪60年代以来 – 在中国涵盖不同行业的280多个业绩几乎覆盖每个省份
- Global supply operation in China 在中国拥有全球供应链业务
- On- going R&D in municipal environmental areas
- 在市政环境领域进行不断的研发
- Extensive portfolio of environmental technologies
- 广泛的环保技术组合

Strong emphasis on collaboration and JVs with Chinese Partners  
高度重视与中国合作伙伴的的合资与合作



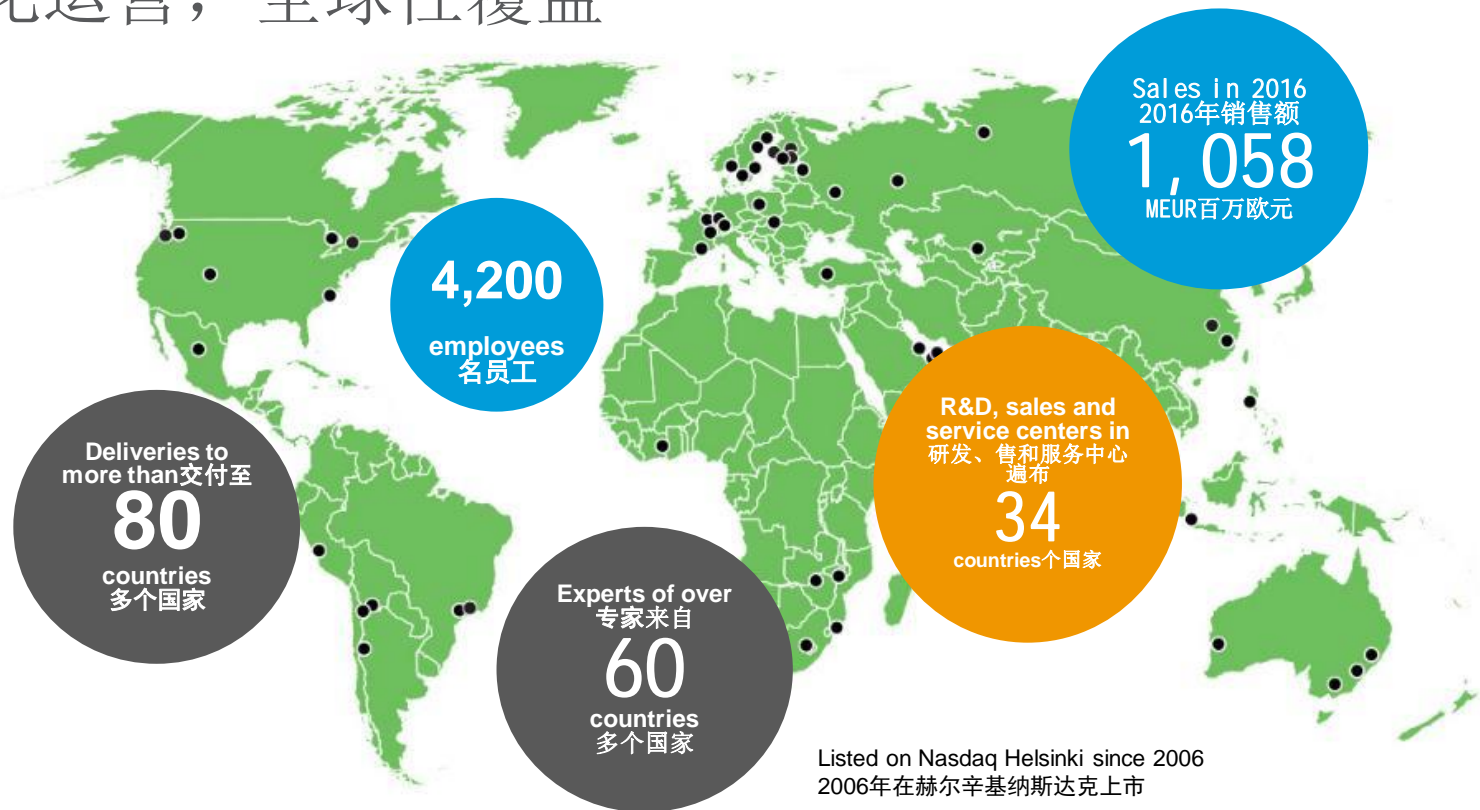
# Outotec – a process technology company

## 奥图泰 — 来自北欧的工艺技术公司

- Outotec provides leading technologies and services for the sustainable use of Earth's natural resources.
- 奥图泰提供领先的技术和服务，确保可持续地利用地球上的自然资源。
- As the global leader in minerals and metals processing technology, we have developed many breakthrough technologies over the decades for our customers in mining and metals industries.
- 作为选矿和金属冶炼技术领域内的全球领导者，奥图泰在过去的几十年中已经为矿冶行业的客户开发了众多突破性的技术。
- We also provide innovative solutions for industrial water treatment, the utilization of alternative energy sources and the chemical industry.
- 同时，奥图泰还为工业水处理、替代能源和化工领域提供创新的解决方案。
- Outotec shares are listed on NASDAQ Helsinki.
- 奥图泰在赫尔辛基纳斯达克证券交易所上市。



# Local operations, global presence 本地化运营，全球性覆盖



Wide supplier network with established long-term relationships  
拥有广泛的供应商网络，并与供应商建立了良好的长期合作关系



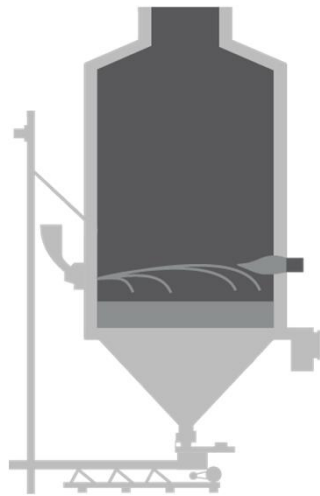
# Outotec thermal method for sludge treatment, 60 years leading technical innovation & experience 奥图泰污泥热法处理 - 60余年的全球技术革新经验



Zurich, Switzerland  
Sludge incineration  
瑞士苏黎世污泥焚烧厂

**Sludge Incineration: Global benchmarks 污泥焚烧：全球标杆**

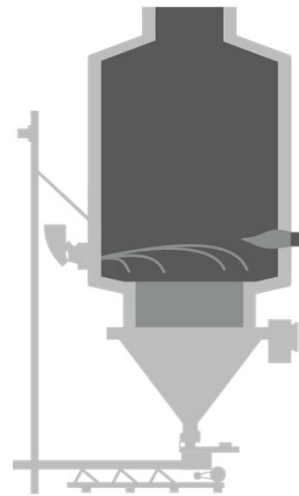
## Outotec fluidizing bed technologies 奥图泰流化床技术



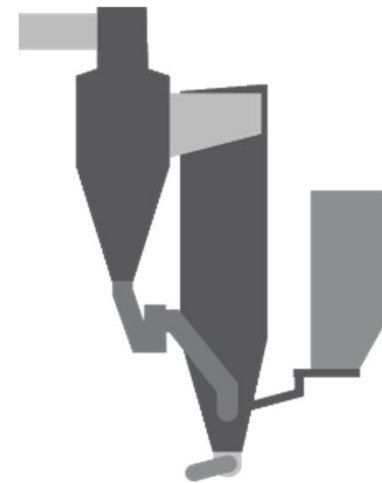
**BFB**  
鼓泡流化床  
20 – 300 MWth



**FB sludge incineration**  
流化床污泥焚烧  
30,000-450,000 t/a



**gasifier**  
气化炉  
200 MWth



**CFB**  
循环流化床  
600 MWth

Fluidizing bed system adapted at more than 170  
municipal and industry sites

流化床系统服务于170多个市政、工业领域

氧化铝煅烧  
alumina  
calcination



黄金焙烧  
gold roasting



生物质、污泥焚烧与气化  
Incineration and gasification of  
biomass and sludge



铁矿石还原  
iron ore reduction

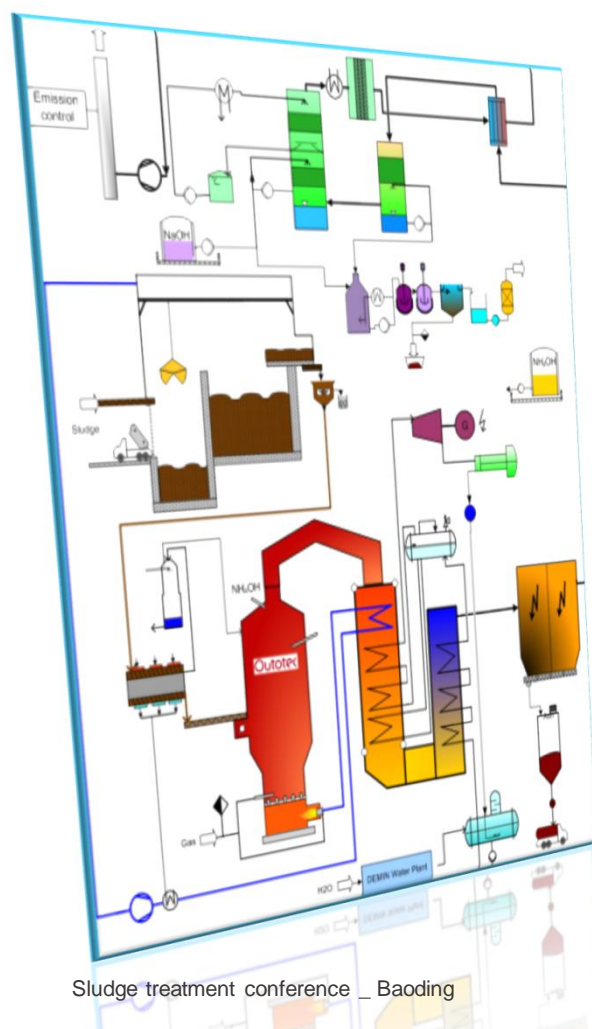


锌焙烧  
Zinc roasting





# Typical FB energy system 典型流化床能源系统



- 污泥储存 sludge storage
- 预干化 pre-drying
- 流化床 fluidizing bed
- 锅炉 boiler
- 除灰 de-dusting
- 烟气处理 flue gas treatment
- 除汞 Hg removal
- 洗涤废水处理 scrubber fluent treatment
- SNCR
- 发电 power generation

Outotec fluidizing bed  
sludge incinerator  
奥图泰流化床焚烧炉



# Challenging emissions in sludge incineration

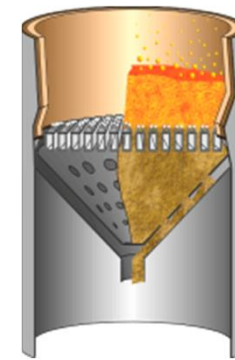
## 污泥焚烧排放标准的挑战

Guaranteed emissions 排放保证值 [mg/Nm <sup>3</sup> ]			
Dust 粉尘	< 10	NO <sub>x</sub>	< 80
Pb & Zn	< 1	HCl	< 10
Hg	< 0.1	HF	< 1
Cd	< 0.1	NH <sub>3</sub>	< 5
SO <sub>2</sub>	< 50	CO	< 50
PCDD/PCDF二恶英, 呋喃 < 0.1 ng TEQ/Nm <sup>3</sup>			

# Features of Outotec Fluidizing Bed sludge Incinerator

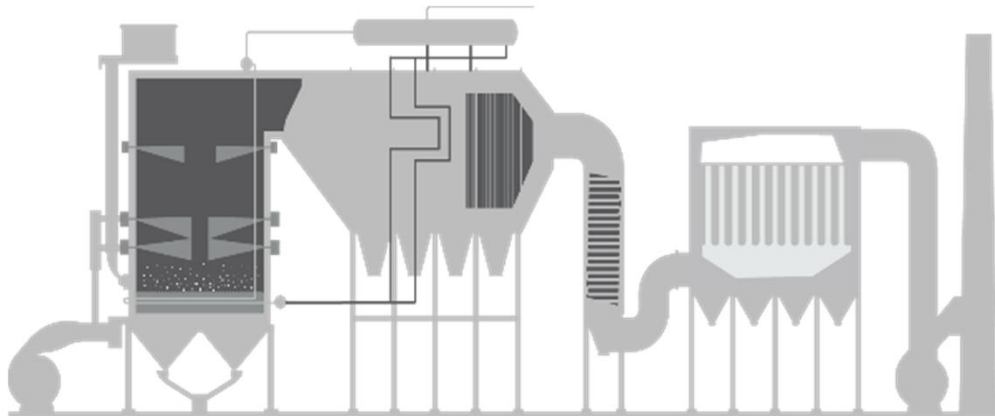
## 奥图泰流化床污泥焚烧系统的特点

- ✓ High combustion ratio, little carbon in ash 燃烧率高，灰中碳残留量低
- ✓ Quick heat-up of fuel 燃料迅速加热
- ✓ Less fuel left in burning chamber, (no post-burning in emergency stop)  
燃烧室内燃料残余量小 紧急停炉时没有滞后燃烧)
- ✓ Lime stone fed to FB for DeSOx 在流化床中投加石灰脱硫
- ✓ No moving part in the space with hot air 热空气区域没有运动部件
- ✓ All ash is fly ash 全部的灰均为飞灰
- ✓ Co-burning of other fuels, e.g. screenings, RDF, lignite, coal, etc.  
掺烧其它燃料，如栅渣、RDF、褐煤、煤等。



Outotec bed self-cleaning  
circulation system  
奥图泰床层自净循环系统

Removing of noncombustible,  
feeding of clean bed material,  
secure continuous operation  
自动去除不可燃烧物、回注清  
洁的床层层料、确保连续运行



## Very flexible to handle different fuels 燃料灵活性

(agriculture waste 农业废物) 紫苜蓿种子秸秆 扁桃树枝叶 扁桃核壳 扁桃木 苹果木杏木 大麦秆 豆秆 樱桃核 鸡粪 橘树 咖啡渣 玉米芯 玉米秆 轧棉废料 棉籽壳 棉花秆 奶牛粪 切块大蒜 无花果废料 无花果木 蒜皮 洋葱皮 葡萄藤 葡萄果渣 葡萄架 肥料和麦秆 油桃木 燕麦秆橄榄核 橙子皮和酱 内脏肥料 桃核 桃木 梨木 泥煤 山核桃壳 阿月浑子(开心果) 阿月浑子木 李木 西梅核 西梅木 赛马场剪草屑 稻壳 稻草 红花杆 向日葵籽壳 烟草浆 番茄渣 核桃壳 核桃木 小麦秸秆



农业、生物质  
agriculture  
waste, biomass



污泥sludge

(industry waste 工业废物) 油脂、浮渣和筛屑 硬纸板污泥 汽车粉碎残余物 纤维素吸附剂 地毯残渣 焦炭 纤维素 蒸馏剩余物 木炭 医疗废物 造纸干化污泥 造纸污泥 油浸粘土 PET/乙二醇液体 石油运输船污泥 石油焦 聚烯烃 胜特龙 轮胎衍生燃料 未燃烧燃料

Over 250 kind of fuel, mixed fuel  
超过250种燃料、混合燃料

(municipal waste 市政废物) 废弃物衍生燃料RDF, 污泥

(wood 木头) 树皮 硬木材 铁轨横木 锯木屑 软木材 镀硼酸锌刨花板废物 人造板废物 刨花碎片 砍伐碎片 城市木质废物 木屑颗粒



Waste 废弃物 / RDF



煤coal

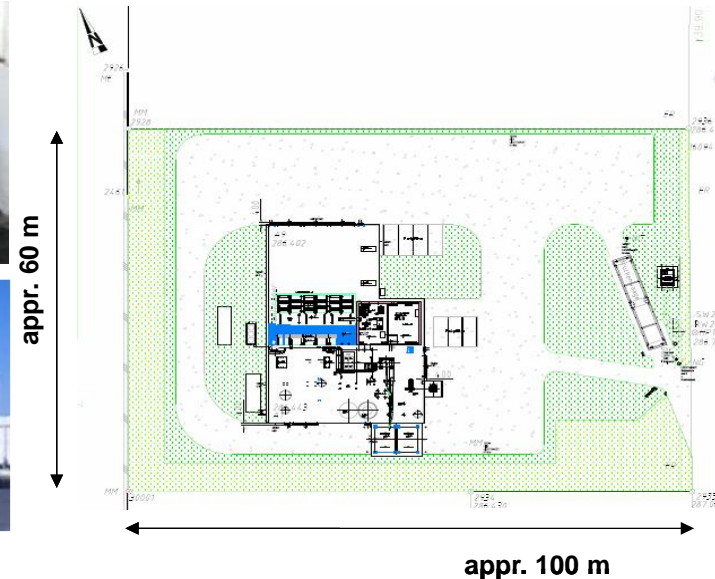
(fossil fuel 化石燃料) 无烟煤 煤灰 亚烟煤 沥青 木质素 亚硫酸盐蒸煮液



# Fluidizing bed energy system, suitable for small waste water treatment plant 面向小规模污水处理厂的流化床能源系统

年处理量 annual capacity  
年运行 running hours  
锅炉 boiler  
额外输出能量 energy output  
烟气排放 flue gas emission

30,000 t/a  
8000h/a  
1.8MW  
1.0MW  
 $\text{NO}_x < 54 \text{ mg/m}^3$   
 $\text{NH}_3 < 5 \text{ mg/m}^3$



## P-Recycling-Ash physical and chemical properties 磷回收-灰的物理及化学特性

- Ash is a mineral phosphate concentrate with more or less impurities & pollutants, depending on the feedstock  
灰是一种矿物性的磷酸盐富集物。取决于原料，它或多或少地含有杂质或污染物
- Like rock, ash is not a fertilizer  
与岩石类似，灰不是肥料
- Ash needs processing to become a suitable raw material or a product  
需要对灰进行加工，使之成为可用的原料或产品



# Outotec ASH DEC process, recirculation of P, P recovery combined with fluidizing bed system 奥图泰ASH DEC工艺、循环利用磷 --与流化床系统整合在一起的磷回收



Outotec ASH DEC process is a thermo-chemical process which eliminates heavy metals from the ash while making nutrients plant available  
奥图泰ASH DEC工艺是一种热化学工艺，可以将用于生产肥料的飞灰中的重金属去除。

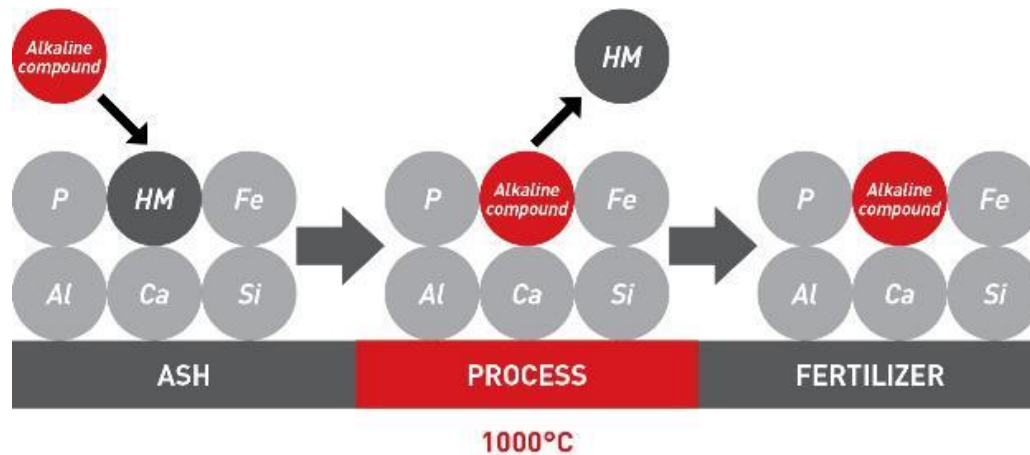


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# The ASH DEC Process

## ASH DEC工艺

- Concentrating nutrients 营养物富集
- Removing pollutants; HM = arsenic, cadmium, lead  
去除污染物; 重金属HM=砷, 镉, 铅
- Sodium phosphates ( $\text{CaNaPO}_4$ ) available to crops  
可为农作物提供磷酸钙钠( $\text{CaNaPO}_4$ )



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## Product finish: NPK large scale production 最终产品：大规模生产NPK

Example: production of NPK fertilizers  
from AN, SOP and treated ash, scale  
12 tph, at Lonza AG; Visp, Switzerland

范例：由AN，SOP和处理过的灰中生产  
NPK化肥，规模为每小时12吨，厂位于  
瑞士的 Lonza AG; Visp



# Sludge incineration plant, Werdhölzli, Zurich 苏黎世韦德霍兹利污泥焚烧厂



Outotec EPC delivery 奥图泰EPC总包

燃料 fuel	municipal sludge 市政污泥
处理量 capacity	100,000 t/a
蒸汽 steam	61 bar, 450°C
发电 power generated	900 kWel
区域供热 area heat supply	5,000 kWth



# Zurich Plant 苏黎世污泥焚烧厂





# Thermal-power plant from biomass, EREN Corlu, Turkey 土耳其EREN Corlu生物质热电联产电厂



Outotec EPC delivery 奥图泰EPC总包  
 燃料 生物质和造纸污泥, 废料  
 fuel biomass, paper sludge, waste  
 处理量capacity 450 000 t/a  
 发电Power generation 30 MweI



废料



纸浆污泥



废弃物



市政污泥



## SNB Brabant sludge incineration plant, Netherland, largest in EU 荷兰布拉班特, 欧盟最大的污泥焚烧工厂



燃料 fuel 市政污泥 municipal sludge  
来源 100座污水厂  
sludge from 100 set of waste water treatment plants  
处理量 capacity 400 000 t/a

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Sustainable use of  
Earth's natural resources