

The Future of LFG Utilization

- 渗流液蒸发系统

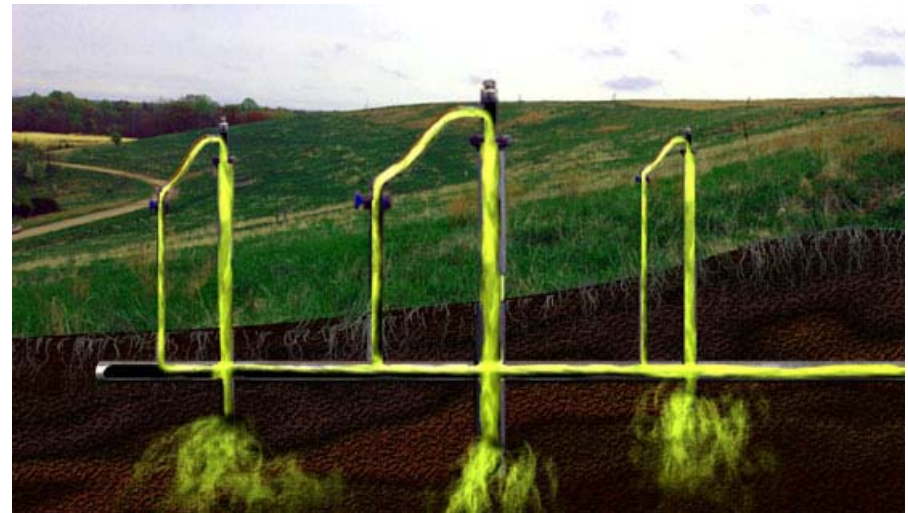
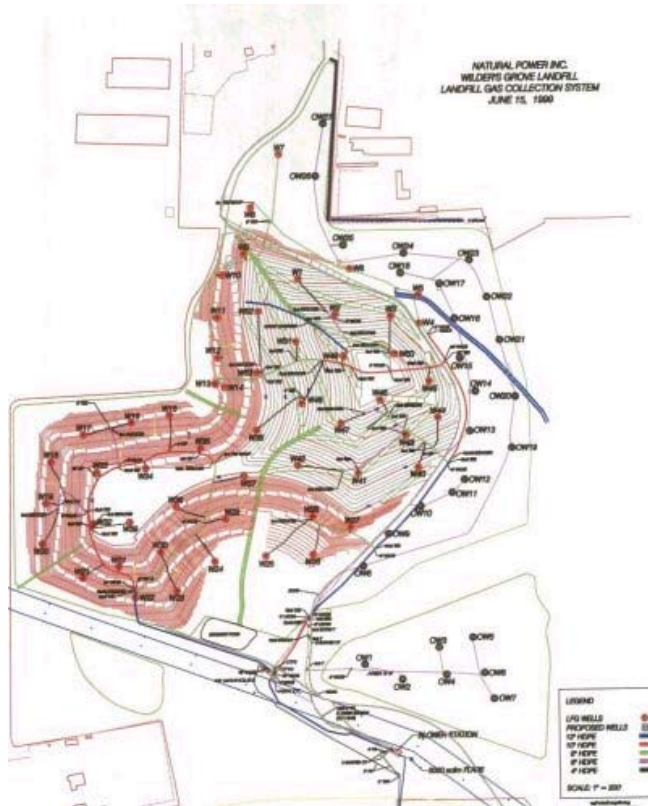


Presentation Outline (内容简介)

- **LFG Control & Utilization Options & Examples** (填埋气的收集, 控制, 和利用)
- **Leachate Evaporator Technology and History** (渗流液蒸发系统技术和发展历史)
- **G4 – LFR the future of LFG Utilization** (渗流液蒸发系统的未来)

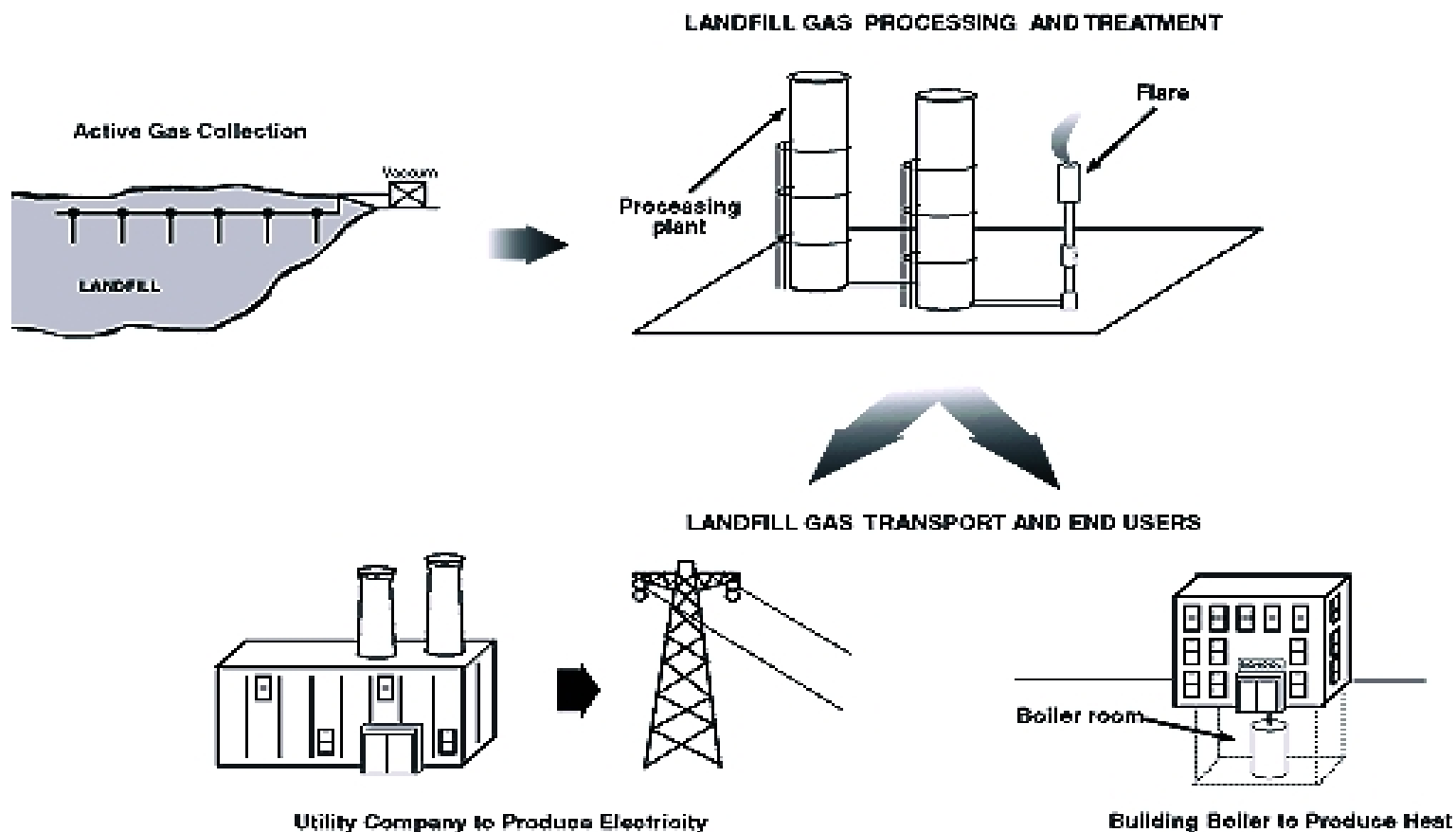
LFG Collection Management

(填埋气的收集)



Typical Utilization Options

(填埋气的利用)



Solar Powered Vent Flares (太阳能排放火炬)



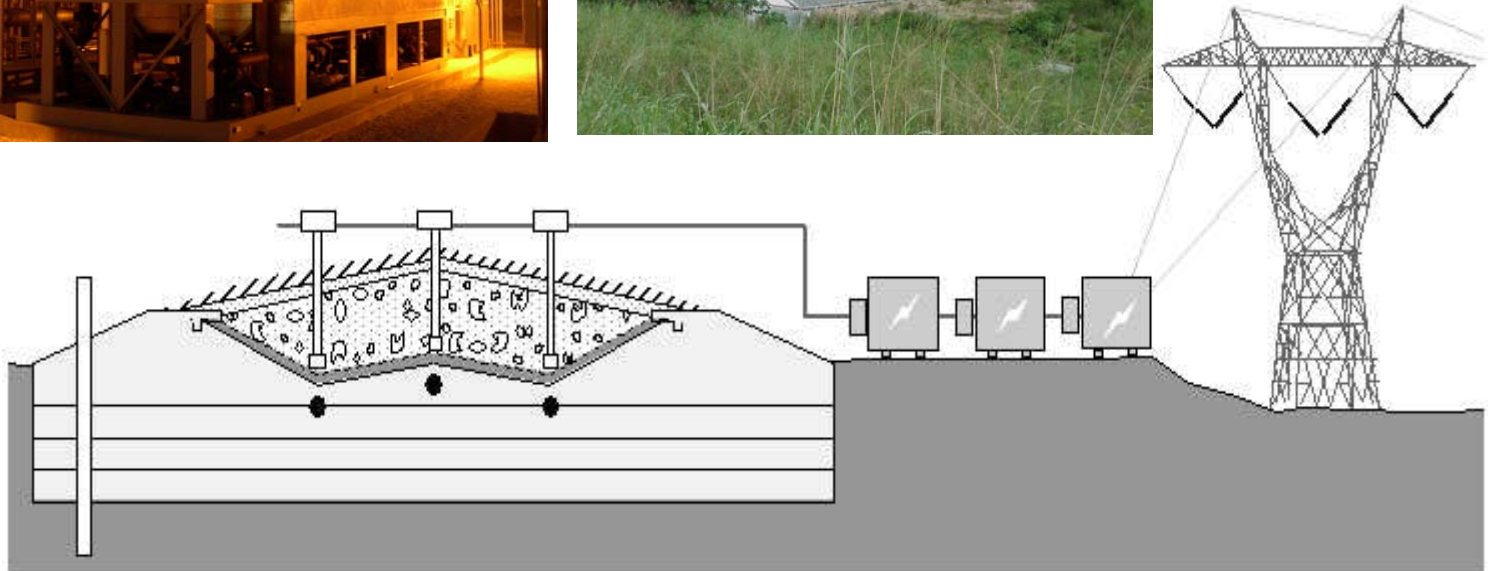
Candle Stick Flare (开放式火炬)

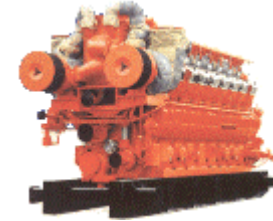


Enclosed Flare (封闭式火炬)



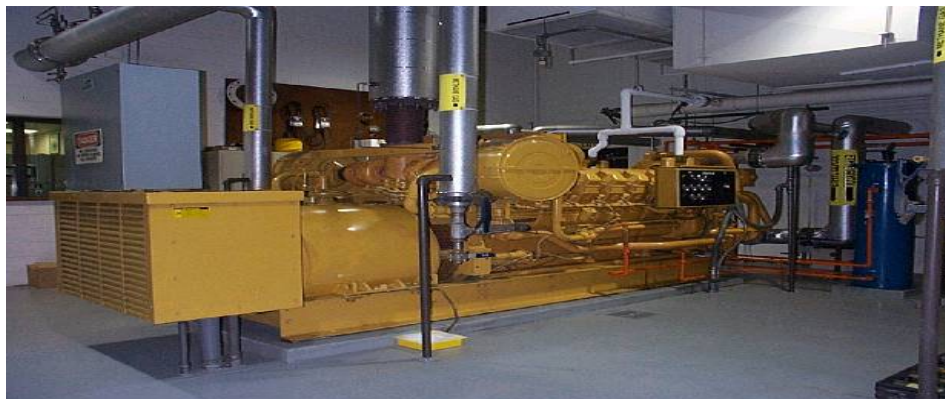
Electricity Generation (发电)





Internal Combustion Engine

- Individual Unit Sizing range from 150 KW to 2+ MWs
- Advantages
 - Relative Low Cost
 - High efficiency and reliability
 - Most common technology
- Investment Cost
 - USD\$800-1,500 per KW



Direct Use of LFG (直接利用)



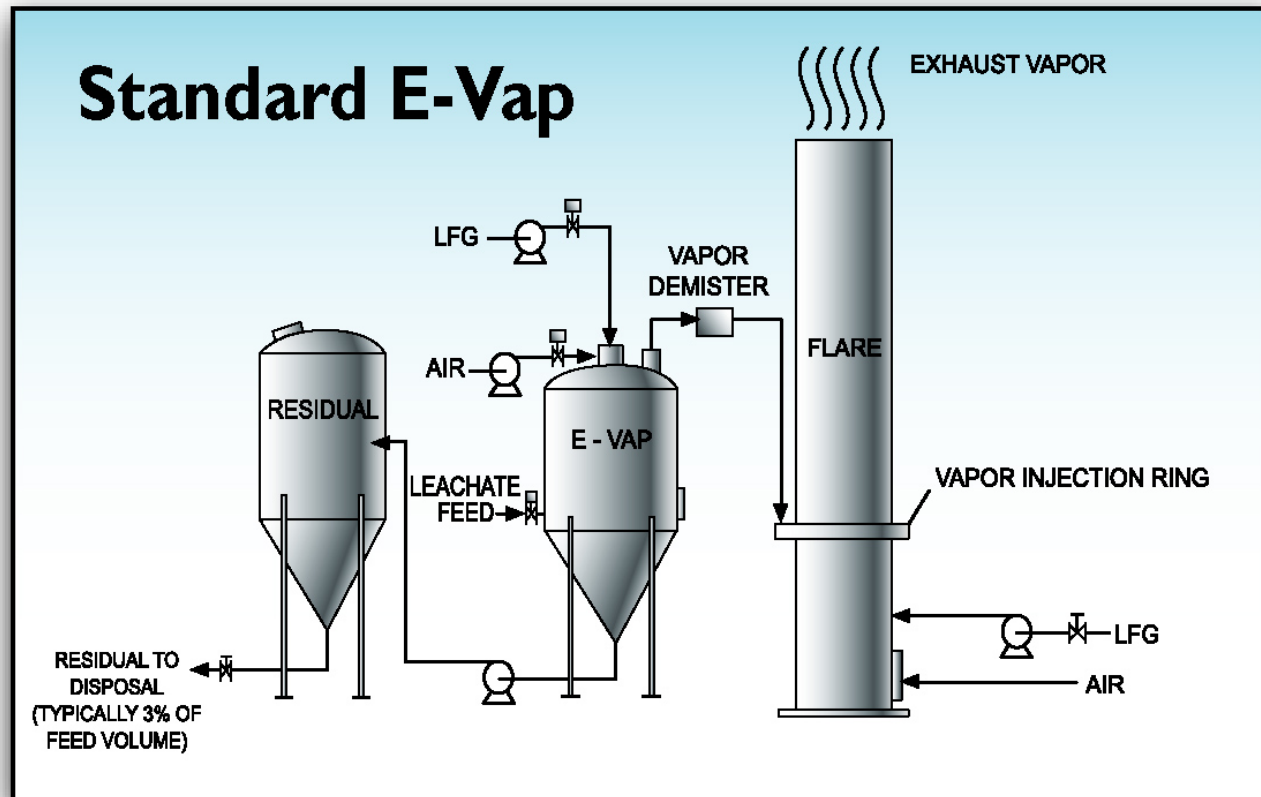
Waste Gas to Treat Waste Water?

利用废气来治废水!



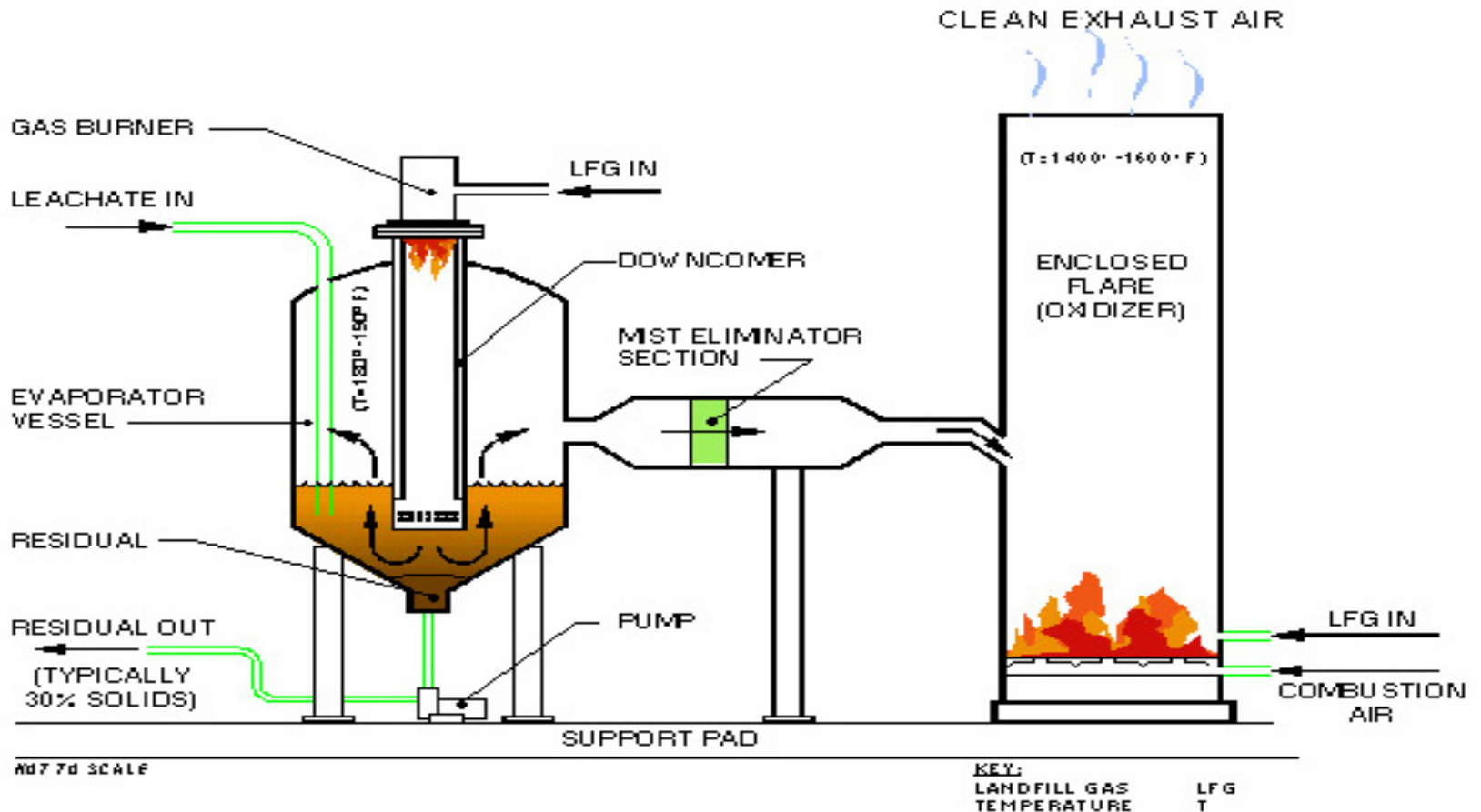
Leachate Evaporator

渗流液蒸发系统



Process Details

设计细节



Why Evaporator? (优点)

- No Solid Heating Surface (无固体加热表面)
- No Scale Build-up (很少结垢)
- Operates at mild conditions (温和的运行条件)
- Effluent is Virtually Odorless (无味排放)
- Vigorous Mixing and high efficiency heat transfer (高效混合及传热)
- Waste Gas to treat Waste water (利用废气来治废水)

32 M³/day Leachate Evaporator MI, USA, 1990 (第一代设备)



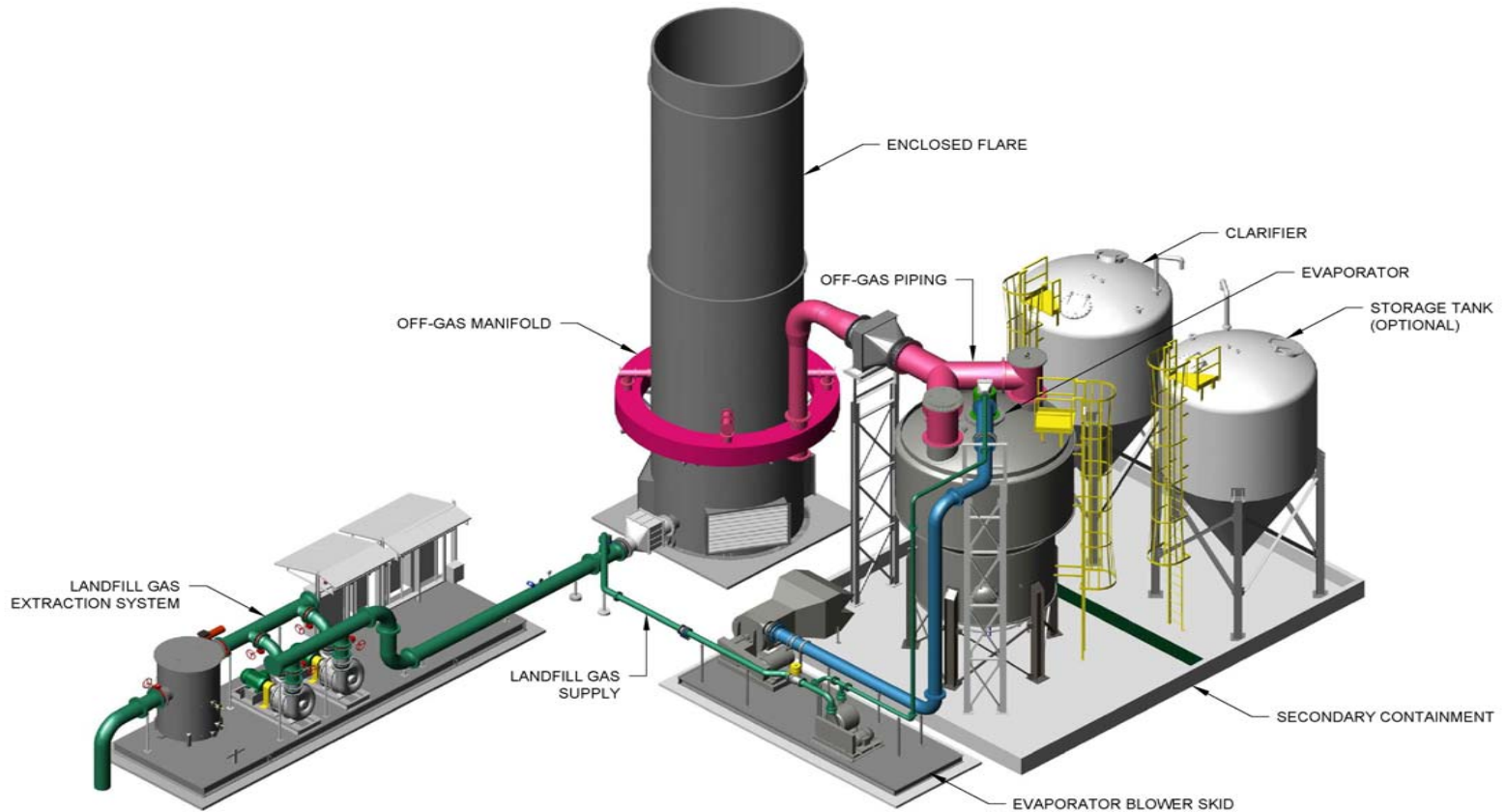
40 M³/day Leachate Evaporator Brazil, 1999 (第二代设备)



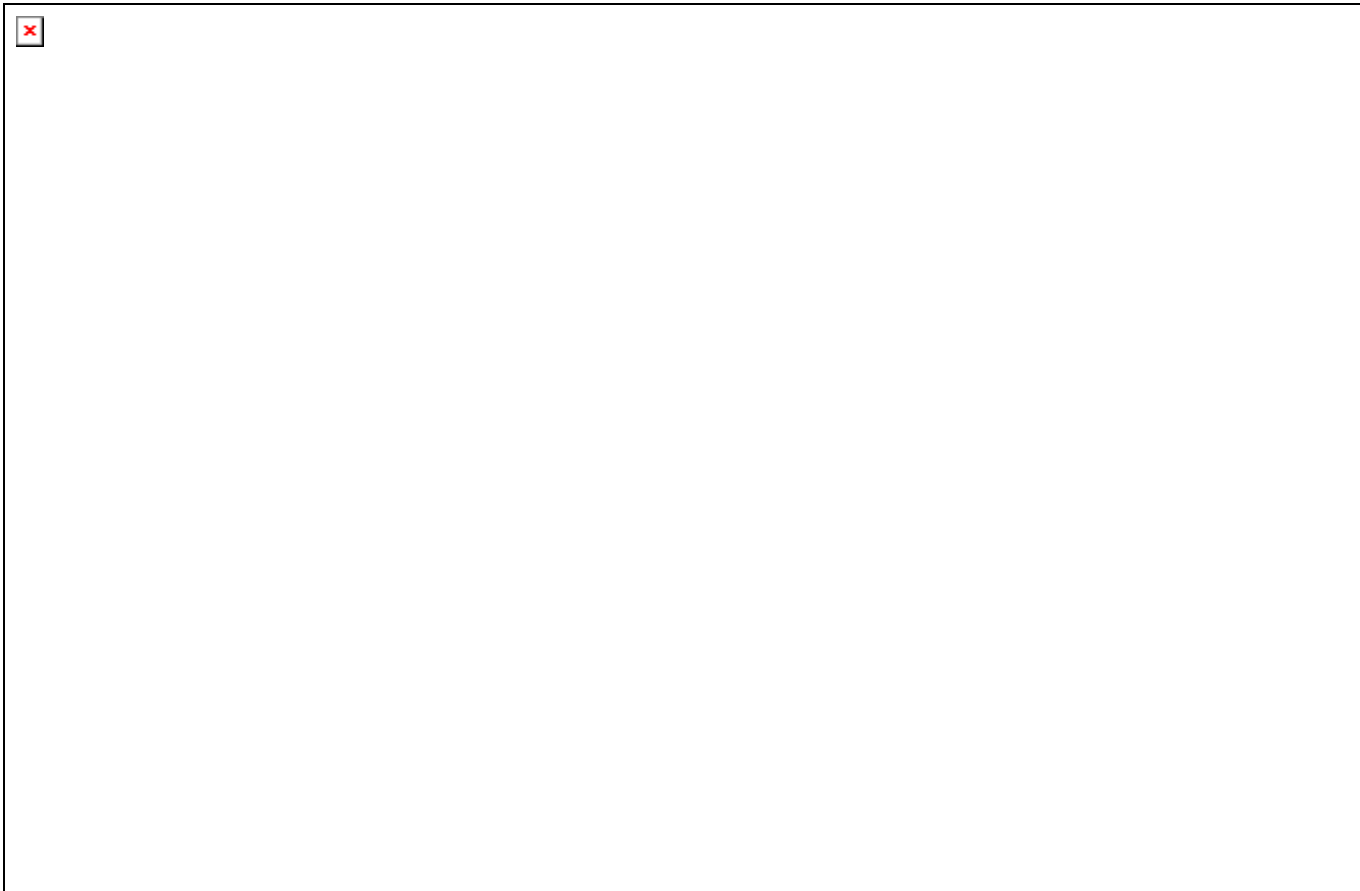
40 M³/day Leachate Evaporator Unit Beijing, China, 2004 (第二代设备)



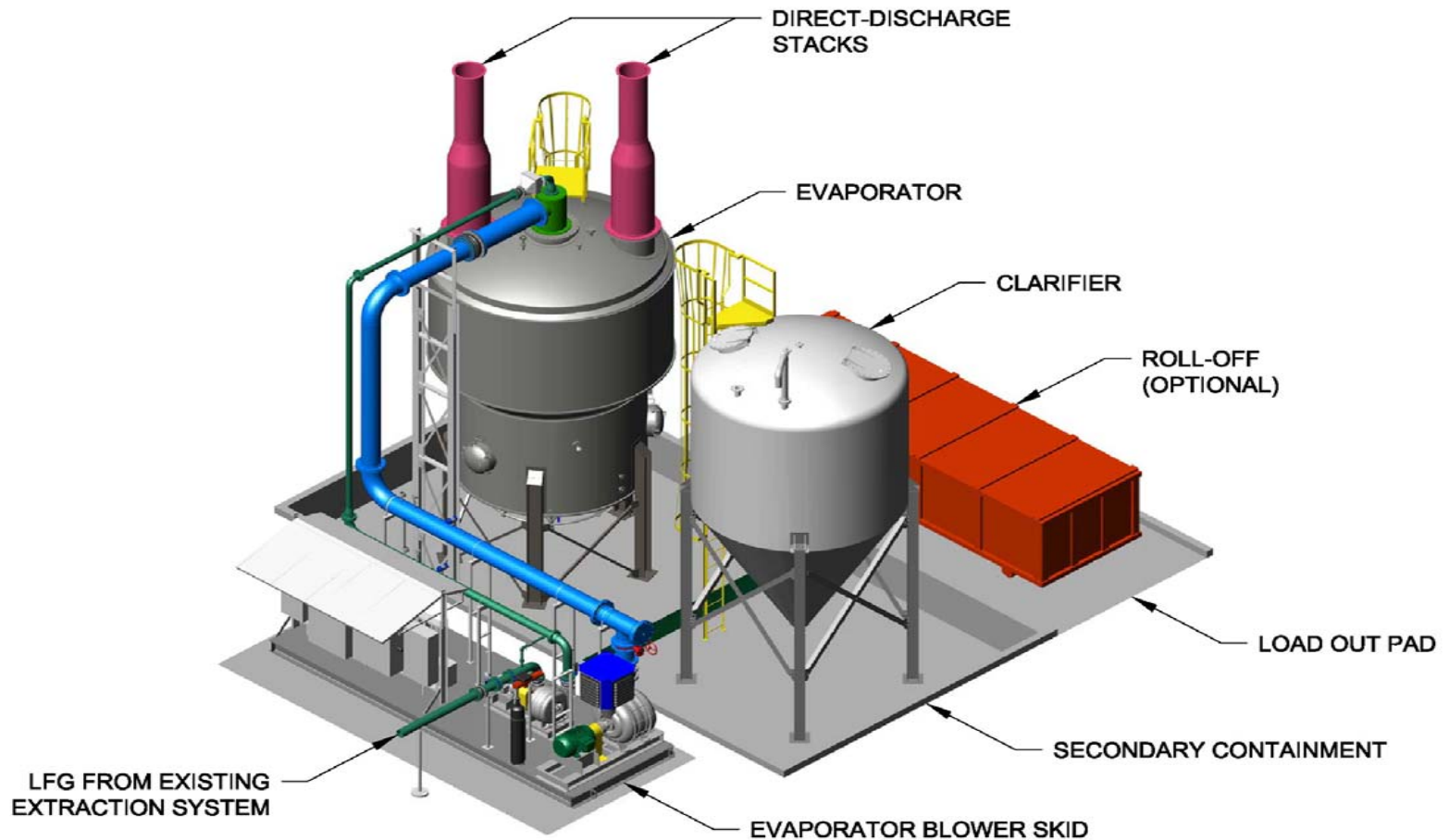
G3 E-Vap Technology (第三代设备)



80 M³/day Leachate Evaporator Florida, USA (第三代设备)



Low Fuel Ratio (LFR) Direct-Discharge G4 Technology (第四代设备)



Advantages of G4 (优点)

- Low LFG requirements - 330 M³/hr for 40 cubic meter / day system
- Own and operate cost is around \$0.05/gallon (based on US Data)
- Relative small footprint, 35 meter by 35 meter required
- Delivery schedule is around 7 months
- Carbon credits available similar to flares

Leachate Evaporator Installations (业绩)

- ✓ Over 12 operating US based developed projects
- ✓ 2 G4 units are currently operational in the US; 1 G4 is under production
- ✓ International Projects are: (direct sale)
 - Auckland, New Zealand 1999 G1 then converted to G2
 - Sasa Landfill, Brazil 2000 G2
 - Anding Landfill, Beijing, China 2004 G2
 - Caracas, Venezuela 2006 G3

Contact Information (联系信息)

Sheng Zeng

曾生

Contact Info:

Mobile: +1 832 407 0068

Office: +1 281 368 4046

Fax: +1 281 368 4097

Email: sheng.zeng@shawgrp.com

Address:

1430 Enclave Parkway

Houston, TX 77077

USA