

Landfill Gas to Carbon Markets

垃圾填埋气的市场化

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- **Why choose EcoMethane?**
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- **Ensuring Synergies between Landfill Operations and LFG Capture Systems**
垃圾填埋场的日常管理与产气系统的配合一致



Content 内容

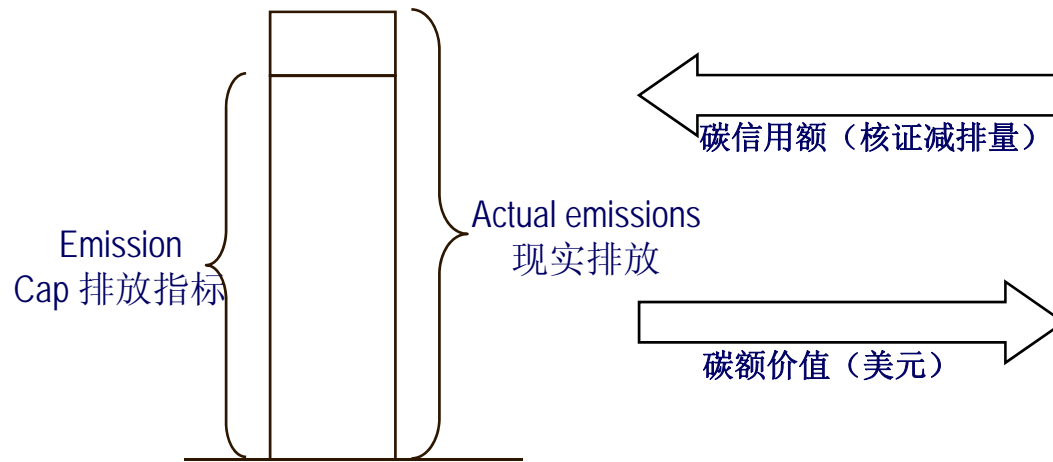


- **Landfill gas to energy project and CDM**
垃圾填埋气收集利用项目和**CDM**

What is CDM

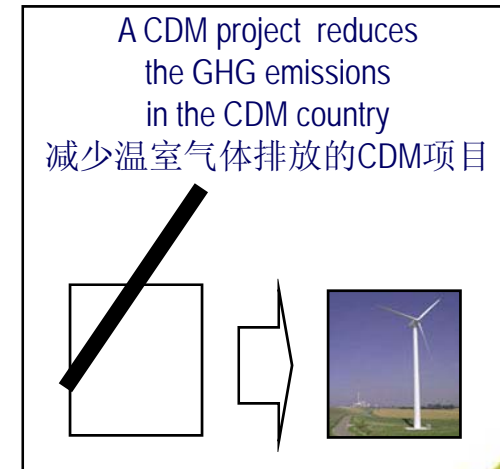
什么是CDM项目

Annex I 发达国家



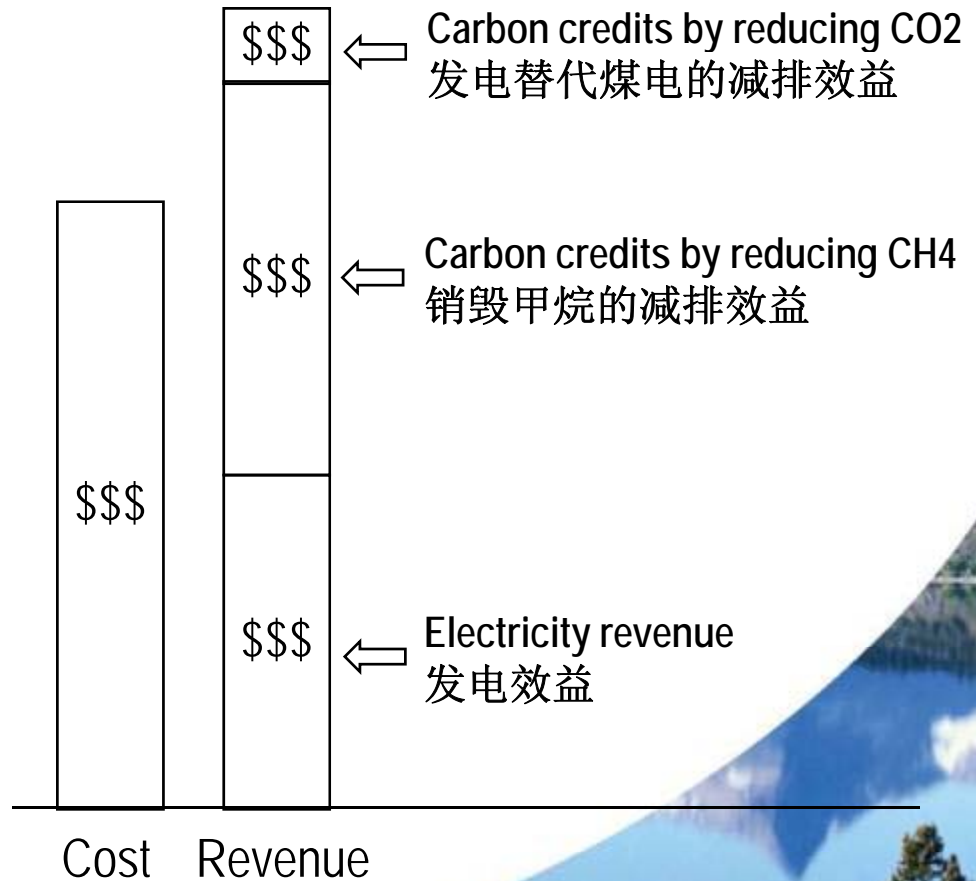
Buyer 买家

Non - Annex I 发展中国家



Seller 卖家

Landfill gas to energy CDM project 垃圾填埋气收集利用CDM项目





Content 内容



- **What does EcoSecurities do?**

益可简介

EcoSecurities is the world's leading originator, developer and trader of carbon credits.
益可环境是世界领先的碳信用额寻购、开发和交易商。

Carbon Credit portfolio at 30th June 2007 comprised of:

至2007年6月30日，公司碳信用额资产库包括：

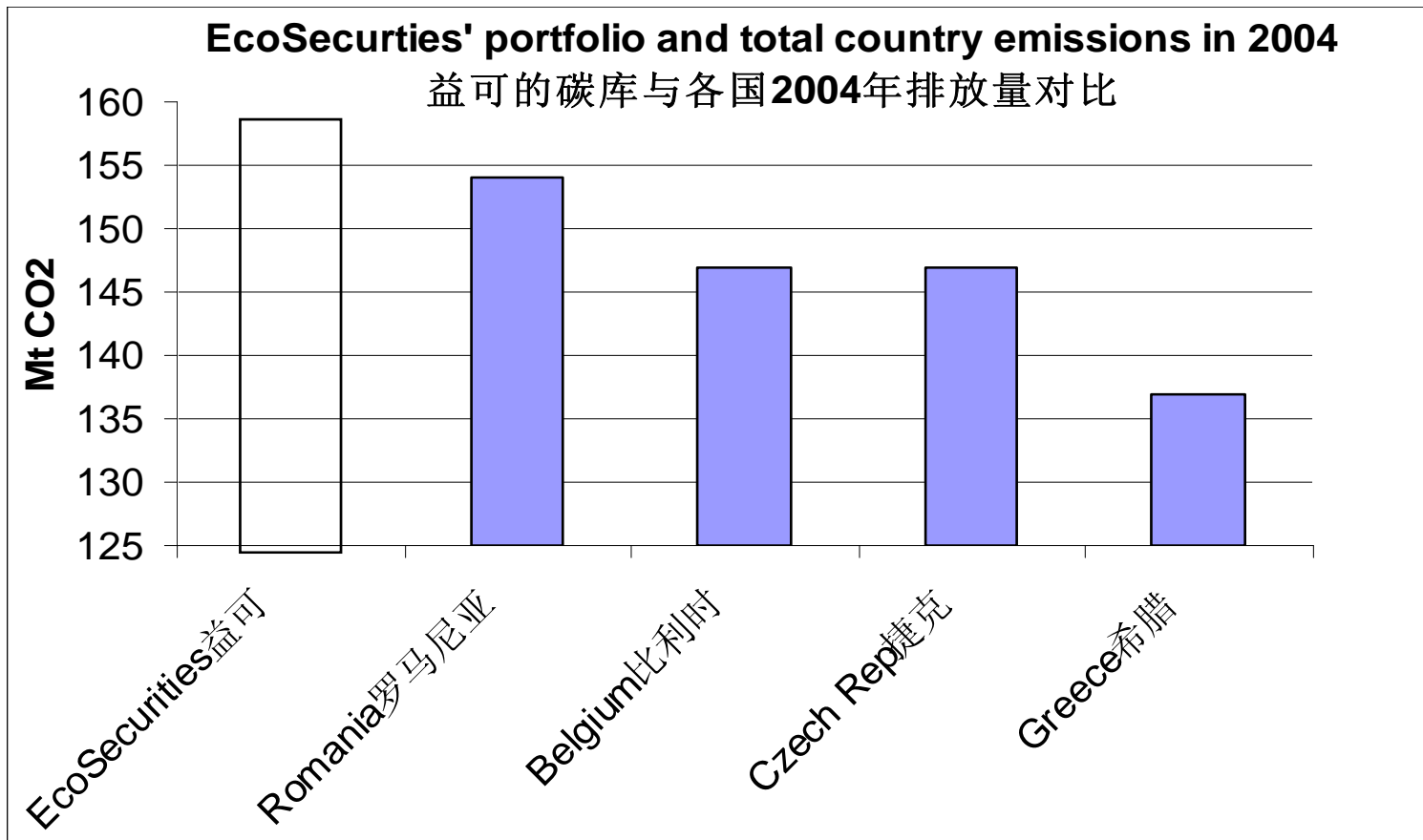
- **433** projects
433个项目
- spanning **36** countries, using **18** technologies
跨36个国家，运用18种技术
- **86** projects registered with the CDM Executive Board
86个已在CDM—EB注册
- **355** projects have secured financing and 149 projects are operational
355个资金到位，149个已投产运行

Projects have the potential to generate over 178 million carbon credits until 2012


预计到**2012**年底前能产生超过**1.78**亿吨碳信用额

178 million tons? 1.78亿吨意味着什么?

178 Mt CO₂ >2004 country emissions of Romania, Belgium, Czech Rep, Greece
1.78亿吨减排量高于罗马尼亚、比利时、捷克、希腊各国在2004年的排放量



Top One Buyer 买家榜首位



Top 15 buyers	Projects
EcoSecurities	146
IBRD (International Bank of Reconstruction and Development)	55
Agrinergy	41
Cargill International	40
EDF Trading	38
Carbon Asset Management Sweden	38
ENEL	34
Trading Emissions	34
Energy Systems International	28
Kommunalkredit	25
CAMCO	20
Noble Carbon	20
Mitsubishi UFJ Securities	18
Danida	18

According to UNEP Risoe Centre's CDM Report (May 07), EcoSecurities ranks No1 Carbon Buyer. Its number of projects is more than any other buyers. 根据联合国环境规划署丹麦Risoe中心于2007年5月发布的《CDM市场报告》，EcoSecurities名列买家榜首位，项目数量远超其它买家。

网址：

<http://www.cdmpipeline.org/cers.htm>

Global Network, One-stop Service 遍布全球、一站式服务

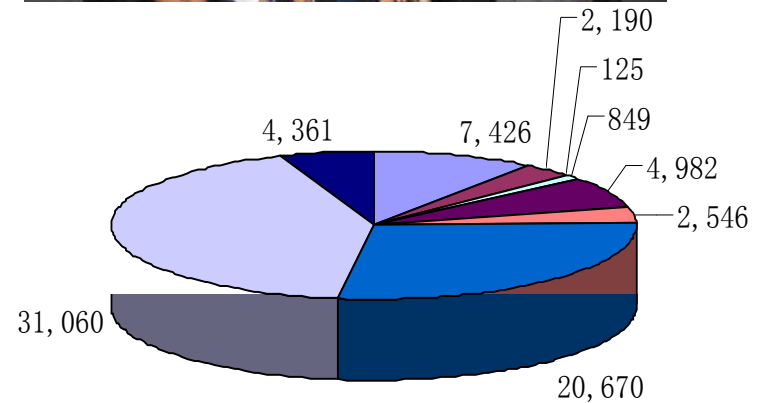


EcoSecurities' one-stop services: From origination to commercialisation
益可环境独到的一站式服务：从碳信用额寻购到交易

EcoSecurities in China

益可环境在中国

- Office founded in 2005 中国分公司成立于2005年
- Offices in Beijing and Chengdu 北京和成都设有办事处
- First China Project get CER issued 开发了第一个得到CER签发的项目
- More than 150 China Projects under Development 目前在手150多个中国项目
- Technology Type 项目种类



- Biomass 生物质能 (13 个项目)
- Wind 风电 (4个项目)
- AD 厌氧沼气 (1个项目)
- Cement 水泥 (6个项目)
- CMM 煤层瓦斯 (3个项目)
- Landfill 垃圾填埋 (4个项目)
- N2O 氧化亚氮 (26个项目)
- Hydro 水电 (80个项目)
- Waste gas 余压废气利用 (5个项目)

EcoSecurities' experience in landfill gas CDM projects 益可环境在垃圾填埋气CDM项目方面的经验

- Developed the first landfill gas CDM project in the world, 11 projects registered in EB
成功开发世界上第一个垃圾填埋气项目， 11个项目目前已在EB注册
- Developed the first Chinese landfill gas CDM, 4 projects got LOA
成功开发中国第一个垃圾填埋气项目， 4个项目目前已获中国政府批准
- Participated in developing ACM0001—consolidated baseline methodology for landfill gas project activities
参与开发ACM001——垃圾填埋气体项目活动的统一方法学

EcoSecurities' registered landfill gas CDM project

益可环境已在EB注册的垃圾填埋气CDM项目

Project Name 工程名称	Host Party 东道国	Emission Reduction 减排量
巴西NovaGerar垃圾填埋气体用于能源项目 <u>Brazil NovaGerar Landfill Gas to Energy Project</u>	巴西 Brail	670133
在Matuail垃圾填埋场，达卡，孟加拉国的垃圾填埋气体抽取及利用 <u>Landfill Gas Extraction and Utilization at the Matuail landfill site, Dhaka, Bangladesh</u>	孟加拉国 Bengal	80000
Cosmito 垃圾填埋气体项目（对旧的Cosmito垃圾堆放处气体抽取系统的改进） <u>Cosmito landfill gas project (Improvement of Gas Extraction System in Old Cosmito Dump)</u>	智利 Chile	84724
Copiulemu垃圾填埋气体项目-用来对工业和家庭垃圾进行储藏和转变、垃圾回收和控制、处理配置的中心 <u>Copiulemu landfill gas project (Center for the Storage and Transfer, Recovery and Control of Waste, Treatment and Disposal of Industrial and Household Waste)</u>	智利 Chile	90125
南京天井洼垃圾填埋气体用于电力项目 <u>Nanjing Tianjingwa Landfill Gas to Electricity Project</u>	中国 China	246107
巴西 MARCA 垃圾填埋气体用于能源项目 <u>Brazil MARCA Landfill Gas to Energy Project</u>	巴西 Brail	231405
Hiriya 垃圾掩埋项目 <u>Hiriya Landfill Project</u>	以色列 Israel	93452
Aguascalientes – 甲烷垃圾填埋气发电项目 <u>Aguascalientes – EcoMethane Landfill Gas to Energy Project</u>	墨西哥 Mexico	162593
Ecatepec – 垃圾填埋气发电项目 <u>Ecatepec – EcoMethane Landfill Gas to Energy Project</u>	墨西哥 Mexico	209353
济南垃圾填埋发电项目 <u>Jinan Landfill Gas to Energy Project</u>	中国 China	112908
Korat垃圾发电 <u>Korat Waste To Energy</u>	泰国 Thailand	310843

EcoSecurities' landfill gas CDM projects in China

益可环境在中国的垃圾填埋气CDM项目

Project Name 项目名称

Current Status 目前状态

南京天井洼垃圾填埋气发电项目 <u>Nanjing Tianjingwa Landfill Gas to Electricity Project</u>	Got CER 获得CER
济南垃圾填埋气发电项目 <u>Jinan Landfill Gas to Energy Project</u>	Registered in EB 完成EB注册
南宁城市生活垃圾填埋气发电项目 Nanning Landfill Gas to Energy Project	Request for registration 提交注册
昆明五华垃圾填埋气发电项目 Kunming Wuhua Landfill Gas to Energy Project	Request for registration 提交注册
临沂垃圾填埋气项目 Linyi Landfill Gas to Energy Project	Signed ERPA 签订购买协议
潍坊垃圾填埋气项目 Weifang Landfill Gas to Energy Project	Signed ERPA 签订购买协议
重庆长生桥垃圾填埋气发电项目 Chongqing Changshengqiao Landfill Gas to Energy Project	Signed ERPA 签订购买协议



Content 内容



- **Development models of Landfill Project**
垃圾填埋气项目的开发模式

Development of Landfill Gas Project

垃圾填埋气项目的开发

- Including the following steps 包括如下步骤：
 - Obtain financing 获得资金
 - Technical advisory (e.g. feasibility study) 技术顾问（例如：可行性研究）
 - Design, construction, operation and maintenance of the biogas collection system 沼气收集系统的设计、建造、运行和维护
 - Installation, operation and maintenance of the flare 火炬系统的安装、运行和维护
 - Installation, operation and maintenance of the biogas utilisation system 沼气利用系统的安装、运行和维护
 - Project development under the CDM 开发CDM项目
 - Project justification, baseline studies, public consultation, national approval, registration with the UN 项目的合格性、基准线研究、公众咨询、获取东道国批准、在联合国注册
 - Trading of Certified Emission Reductions (CERs) 完成CERs交易

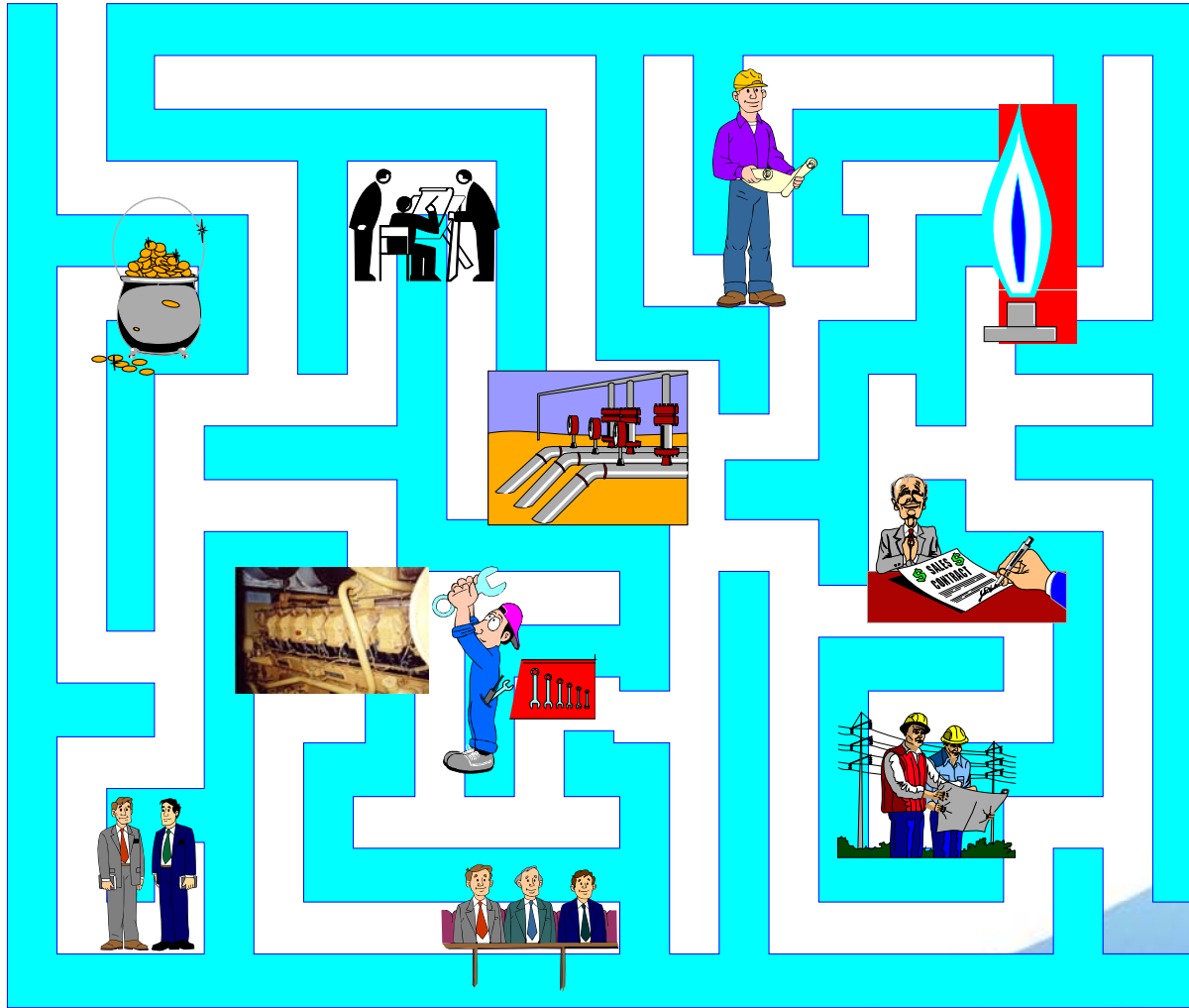
Traditional Development Models

传统开发模式



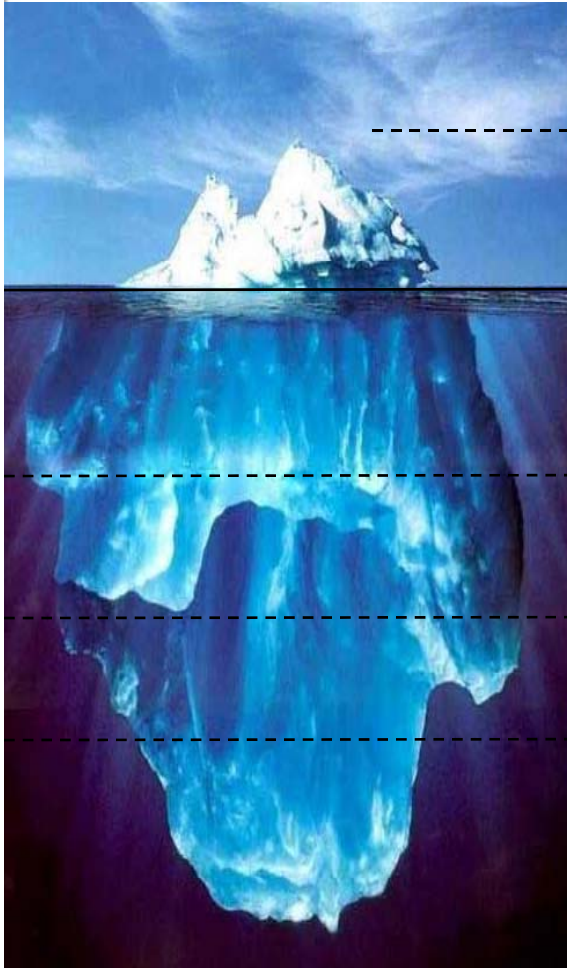
Building the Project . . .

建设项目困难重重.....



Beware of Hidden Costs

隐性成本的存在



- Equipment 设备
- O&M 运营
- Management 管理

Apparent costs
显性成本

- Opportunity costs (late start) 机会成本
- Overrun budgets 预算超支

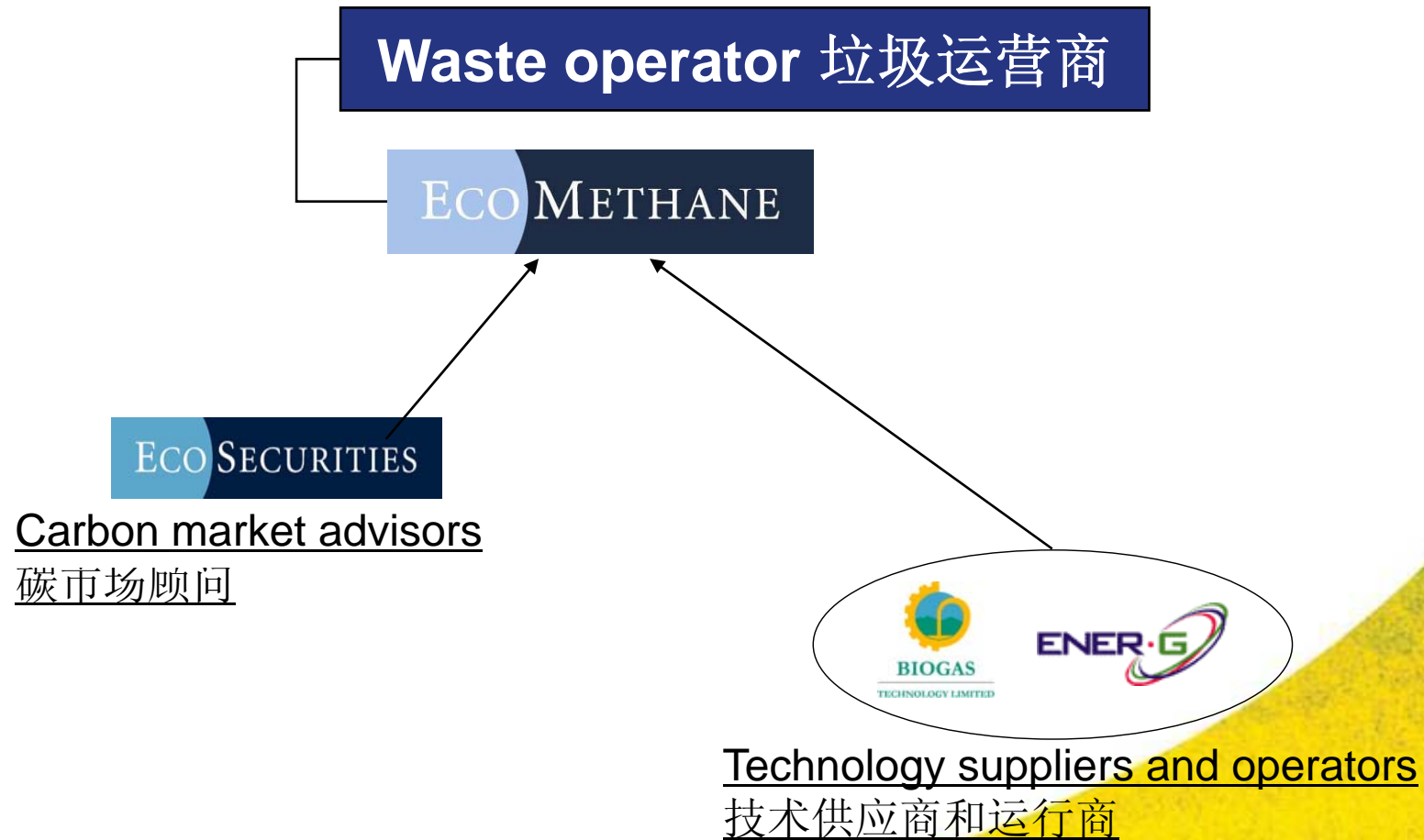
Total real costs
总的实际成本

- Operational risks 运营风险:
- Reduced CER generation CERs产生量的减少
 - Equipment failure 设备故障

Hidden costs
隐性成本

- Administrative expenses and other transaction costs (lawyers, consultants) 管理成本和其它交易成本

Integrated Development Models 综合开发模式





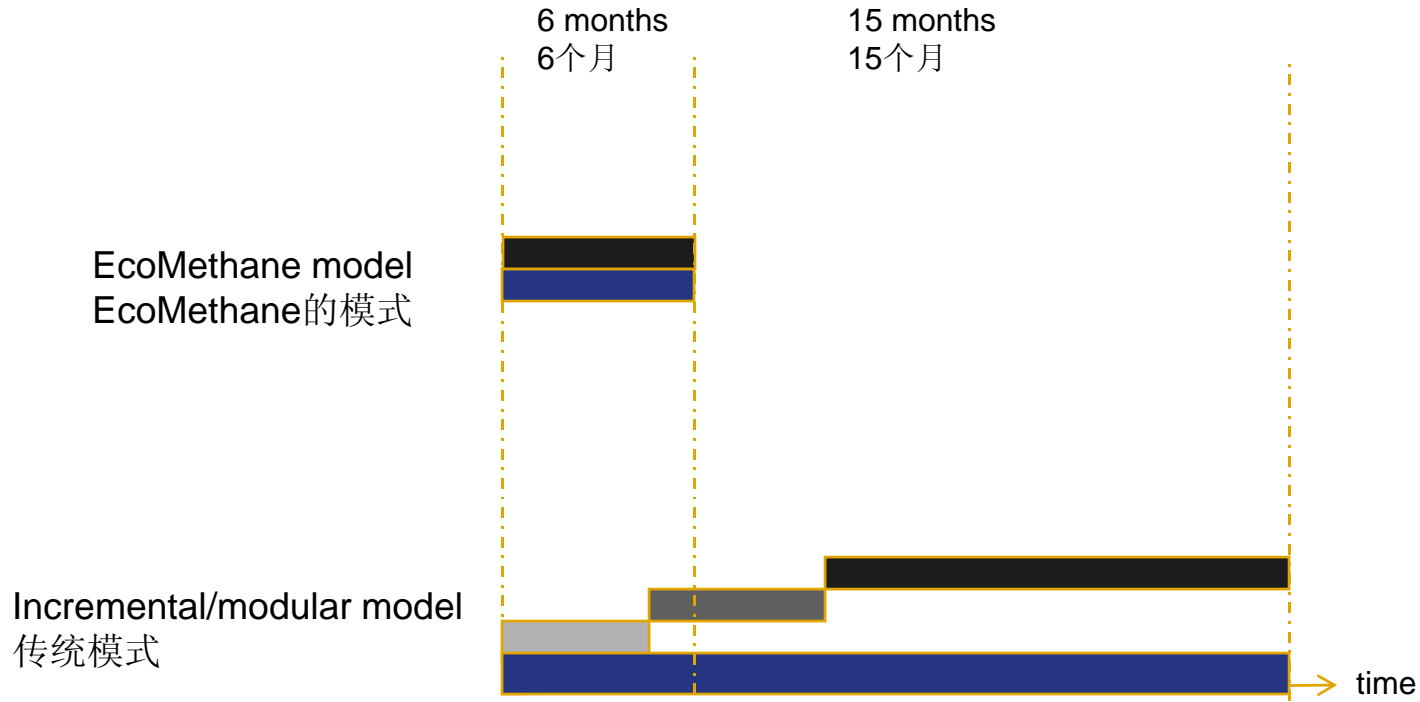
Content 内容



- **Why choose EcoMethane?**
为何选择**EcoMethane**

Timing of each model

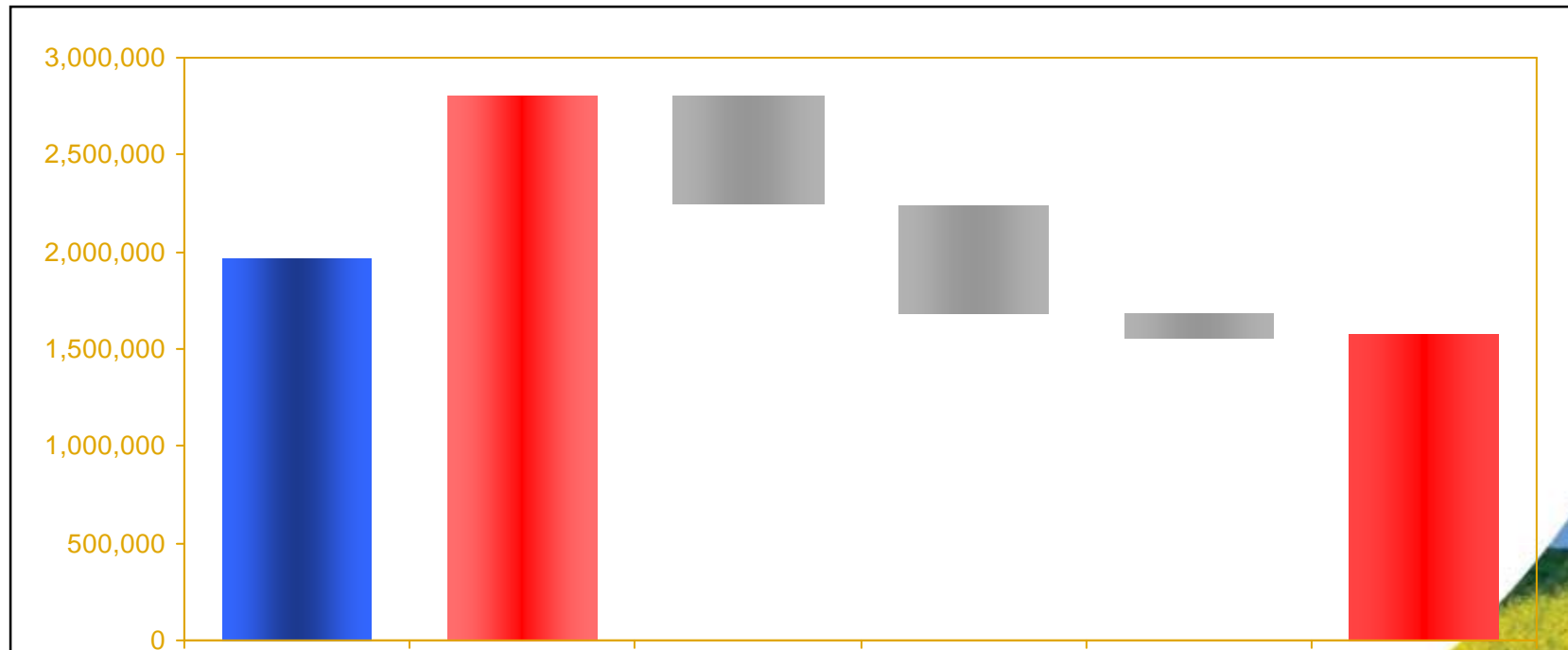
两种模型的时间进度比较



- Feasibility study 可行性研究
- Financing 融资
- Construction (terms of reference, bidding, selection, construction) 建设
- Evaluation and registration of carbon credits 碳交易

Benefit of each model

两种模型的收益比较



Royalty payment to client with Eco Methane Model
EcoMethane确保给客户的收益

Potential profit to client if develops project by its own
客户自己开发项目时可能的收益

Lost revenue due to late start (opportunity cost: 1yr of CERs)
由于项目投产较晚而造成的收益损失 (1年的CERs)

Risk of low CER production (10%)
CER产生量不足 (差10%) 的风险

Internal transaction costs
内部交易成本

Net "Real profit to client"
客户实际可得的净收益

Case Study --Nanning Landfill Project 案例分析--南宁垃圾填埋气发电项目



Capacity: 3.85MW

CER volume: 186,000tCO₂e/year

Expected Registration date: 1st Nov 2007

Operation Start date: 1st Nov 2007

装机：3.85MW

CER量：每年186,000吨CO₂e

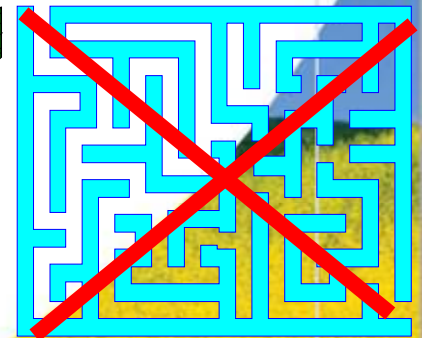
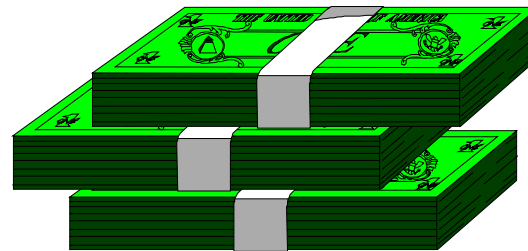
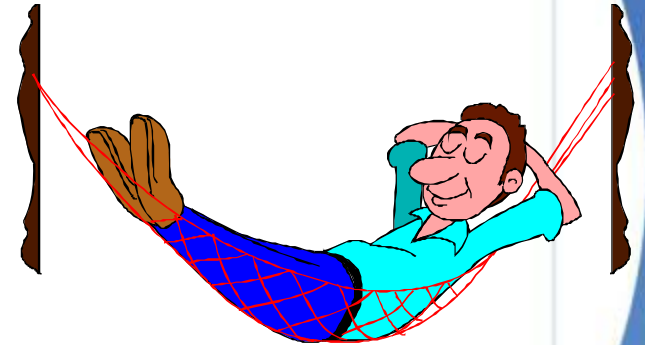
预计注册日期：2007年11月1日

投产期：2007年11月1日

EcoMethane's Solution

EcoMethane的解决办法

- **One partner** 一个合作伙伴
- **We take care of everything** 我们负责所有，包括：
 - Construction 建设
 - Operation 运营
 - Technical problems 技术问题
 - Project development under the CDM CDM项目开发
 - Carbon credit trading 碳交易
- **Produces revenues much quicker** 很快产生收益
- **We pay you a royalty** 我们保证您的收益
- **You don't assume any risk** 您不承担任何风险





Content 内容



- **Ensuring Synergies between Landfill Operations and LFG Capture Systems**

垃圾填埋场的日常管理与产气系统的配合一致



Landfill Management 垃圾场的管理



- Landfill Operation has a direct impact upon the ability to capture and utilise landfill gas (LFG)

垃圾场的日常操作直接影响到垃圾填埋气的收集和利用

- Correct Management is important to achieve:

正确的管理至关重要:

1. Maximum Landfill Gas yield

1. 使垃圾填埋气产气量最大化

2. Accessibility to the site and compatability with LFG collection system.

2. 能够使垃圾填埋气的收集更容易。



Key Elements 关键因素



1. **Compaction** 压实
2. **Leachate** 渗滤液
3. **Coverage** 覆盖
 - Minimises composting and maximises anaerobic digestion for maximum LFG
 - 最小化有氧，最大化厌氧，从而使产气量最大化
 - Allows good access to the site for machinery
 - 垃圾场的覆盖便于机械作业
4. **Compatability** 扩展性
 - Allows a system to be installed whilst landfill operations continue.
 - 当垃圾场日常填埋作业时，能够同时进行垃圾填埋气收集。



1. Compaction 压实



- Compaction reduces air within waste, maximising anaerobic digestion and maximising LFG_{pro} production
- 压实可以减少垃圾里的空气，最大化厌氧能力，使产气量最大化
- Settling is minimised, which helps prevent damage to pipes and wells
- 减少沉淀物，避免破坏管道和集气井
- The site as a whole is also more stable, allowing a good basis for construction.
- 压实可以使集气作业有稳固的基础。



...Compaction 压实



- A compactor should be used to achieve increased compaction rates
压实机用来提高压实率
- A compactor will improve both conditions for equipment installation and will allow more waste to be deposited at the site
压实机可以加固设备安装的基础，并且可以增加库容





2. Leachate 渗滤液



- Leachate is one of the most overlooked problems
渗滤液是之一个比较突出的问题

Landfill lacking any leachate control system
渗滤液没有进行处理



Properly controlled leachate collection system
渗滤液处理系统



- Leachate accumulation in the landfill undermines LFG generation
大量的渗滤液会减少垃圾产生的沼气量



3. Coverage 覆盖



- Closed areas need a final impermeable cap to seal the waste and to allow the natural anaerobic decomposition process take place

封场的时候需要用不渗透的材料进行覆盖，以使得产气在自然的厌氧过程发生



Uncovered waste 未覆盖

- Helps relieve leachate, vermin and odour problems

覆盖还可以做到雨污分流，并解决气味的问题



Properly covered landfill 正常覆盖



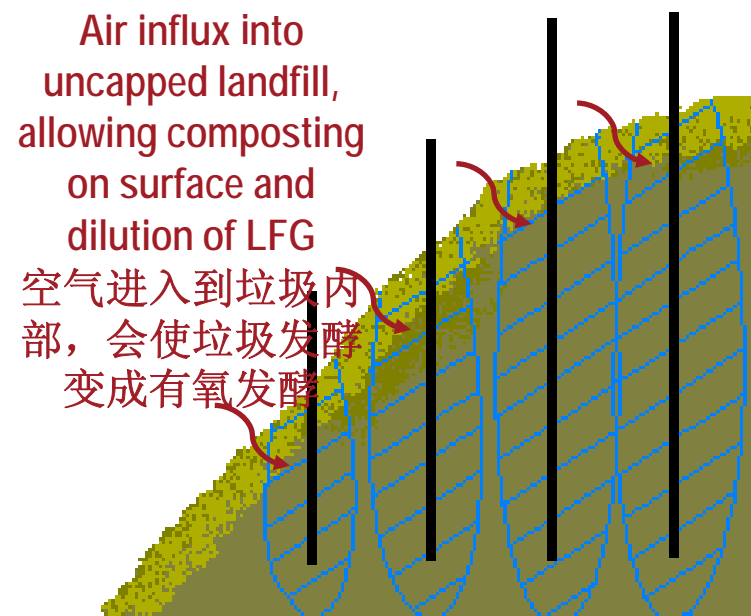
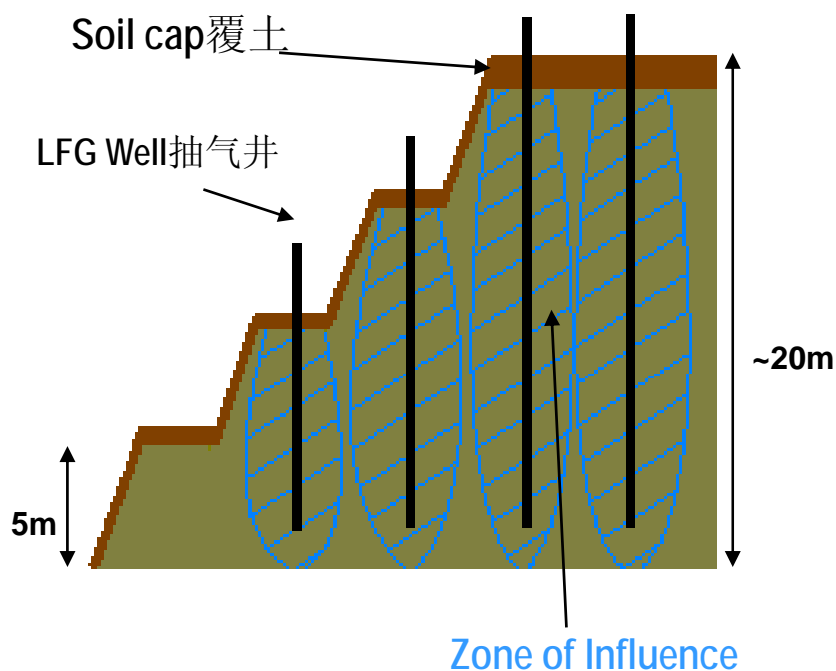
...Coverage 覆盖



Large exposed flanks of waste will provide easy access for air ingress into the landfill if and when a LFG collection system is installed
安装气体收集系统后，覆盖的边坡容易使空气进入。

Well Managed 有覆盖

Badly Managed 未覆盖

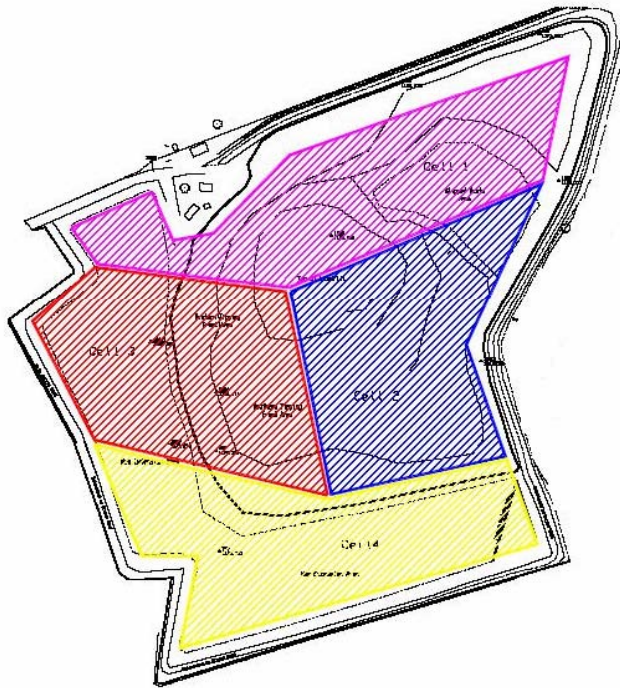




4. Compatability扩展性



- The site should be split up into small manageable cells, with each in turn being filled to completion.
垃圾场应该分区填埋，每一个区域应该填到一定深度再去填埋其他区域。
- An ordered, cell system for waste deposition allows for the optimisation of a LFG collection and flaring system.
有序、分区作业对填埋气的产生至关重要。



- As each cell is capped and completed and as long as they are adjacent to other completed cells that have an active gas management system installed, then the system could be expanded on a modular basis.

当一个分区被填满并覆盖后，它就可以和相邻的已有的抽气系统相连接，整合成一个新的系统进行抽气。



Management criteria 管理标准



For a site to be appropriate for LFG collection the following basic management criteria must be fulfilled:

为了能够确保垃圾填埋气的正常收集，需要遵守如下标准：

- 1.Regular compaction 定期压实
- 2.A leachate drainage system must be installed 安装渗滤液导排系统
- 3.Regular and sufficient covering of the waste 定期、足够的覆盖
- 4.A compartmentalised method of filling the site to allow a permanent LFG collection system to be set up and extended appropriately in a modular fashion.

分区填埋能够确保气体收集系统同时进行，并具有良好的扩展性。

Thank you 谢谢



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