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# LANDFILL GAS OPERATIONAL CHALLENGES IN POLAND

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Kraków, 12-14 October 2011*

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# EU and Polish Regulations

## **LANDFILL DIRECTIVE 1999/31/WE**

### Procedures for landfill gas control and monitoring

- Representativeness & frequency (monthly, six-monthly)
- LFG composition & emissions, atmospheric conditions, LFG control system efficiency
- Processing and utilisation of LFG or flaring if energy recovery not possible
- Minimising the negative effect on environment and human health

## **PL WASTE BILL of the 27 April 2001 (Art.52 )**

- Building permit for a landfill
- Protection of life, health and environment
- Requirements for collection, processing and utilisation or destruction of LFG

## **PL REGULATION OF THE MINISTER OF THE ENVIRONMENT of the 9 December 2002**

### Landfill monitoring

- LFG monitoring
- Representativeness & frequency (monthly, six-monthly)
- LFG composition & emissions, atmospheric conditions, LFG control system efficiency

## **PL REGULATION OF THE MINISTER OF THE ENVIRONMENT of the 24 March 2003**

### Requirements for localisation, building, exploitation and closure of particular landfill types

- Requirement for installation for LFG collection
- Requirement for cleaning and utilisation of LFG, or flaring, if energy recovery is not possible

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# Active LFG Control Systems

CONCEPT	POSITIVES	NEGATIVES
PUMPED VENTILATION TRENCHES (SUCTION)	GOOD LOCAL GAS CONTROL	RISK OF SIGNIFICANT AIR INGRESS INTO THE WASTE AND UNDERGROUND FIRES
AIR-FLUSHED VENTILATION TRENCHES (PRESSURE)	GOOD LOCAL GAS CONTROL	RISK OF SIGNIFICANT AIR INGRESS INTO THE WASTE AND UNDERGROUND FIRES
PUMPED ACTIVE GAS WELLS (VERTICAL & HORIZONTAL), VENTED TO ATMOSPHERE OR WITH BIOFILTERS	LOW COST PUMPING STATION	EMISIONS TO THE ATMOSPHERE OF HARMFUL AND ODOROUS GASES. POSSIBILITY OF BLOCKAGE AND DAMAGE DURING LANDFILL SETTLEMENT GENERATION OF EXPLOSIVE ZONES
PUMPED ACTIVE GAS WELLS (VERTICAL, HORIZONTAL, TEMPORARY, SACRIFICIAL, PERMANENT) – GAS COMBUSTED IN A FLARE	GOOD GAS CONTROL SAFE AND ENVIRONMENTALLY FRIENDLY DESTRUCTION OF HARMFUL GASES	HIGH COST OF PUMPING STATION AND FLARE. NO PROFIT (UNLESS JI PROJECT). POSSIBILITY OF BLOCKAGE AND DAMAGE DURING LANDFILL SETTLEMENT GENERATION OF EXPLOSIVE ZONES
PUMPED ACTIVE GAS WELLS (VERTICAL, HORIZONTAL) – GAS COMMERCIALY UTILISED	GOOD GAS CONTROL SAFE AND ENVIRONMENTALLY FRIENDLY DESTRUCTION OF HARMFUL GASES COMMERCIAL AND PROFITABLE UTILISATION OF THE GAS, POSSIBLE OFFSET OF THE COST OF GAS INFRASTRUCTURE BY PROFITABLE ENERGY SALES	COMMERCIAL VIABILITY OF THE PROJECT DEPENDANT ON THE RENEWABLE ENERGY PRICES. HIGH COST OF PUMPING STATION, FLARE AND ENERGY RECOVERY INFRASTRUCTURE. NO PROFIT (UNLESS JI PROJECT). POSSIBILITY OF BLOCKAGE AND DAMAGE DURING LANDFILL SETTLEMENT GENERATION OF EXPLOSIVE ZONES
FORCED VENTILATION OF DEVELOPMENTS AT RISK	RELIABLE PROTECTION FOR HIGH RISK DEVELOPMENTS.	COSTLY, COMPLICATED, USED AS A LAST RESOURCE

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# LFG Control and Energy Recovery Scheme



Gas wells

Collection pipework

Manifolds

Dewatering devices

Pumping station

Flare

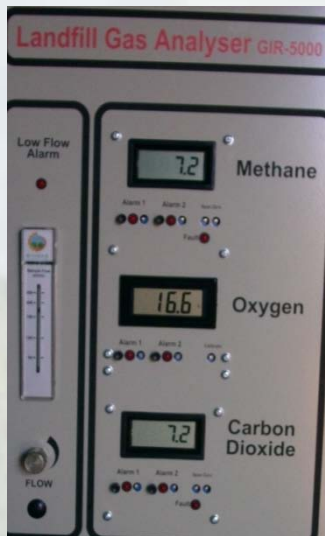
Gas utilisation plant

– boiler, engine, direct use



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# LFG Control and Energy Recovery Scheme



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Site specific engineering solutions

High safety level

Efficient gas control and destruction of methane and harmful components (BAT)

Monitoring of the gas control system

Simplicity, redundancy and flexibility

Several decades of operation

Installation by specialist companies

Quality control

Maintenance of the system

Minimum energy requirement

Maximum energy recovery

Avoidance of impractical and costly solutions

# Examples of LFG Plants



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# Examples of Landfill Sites



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# LFG Project Development



LFG & CHP Plant - Mława

- Site specific conditions
- Environmental requirements
- Engineering solutions
- Economy of the project
- Administrative requirements

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# Development Challenges



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Site evaluation

Pumping trial

Concept

Project

Negotiations

Administrative procedures

Grid connection

Procurement of plant

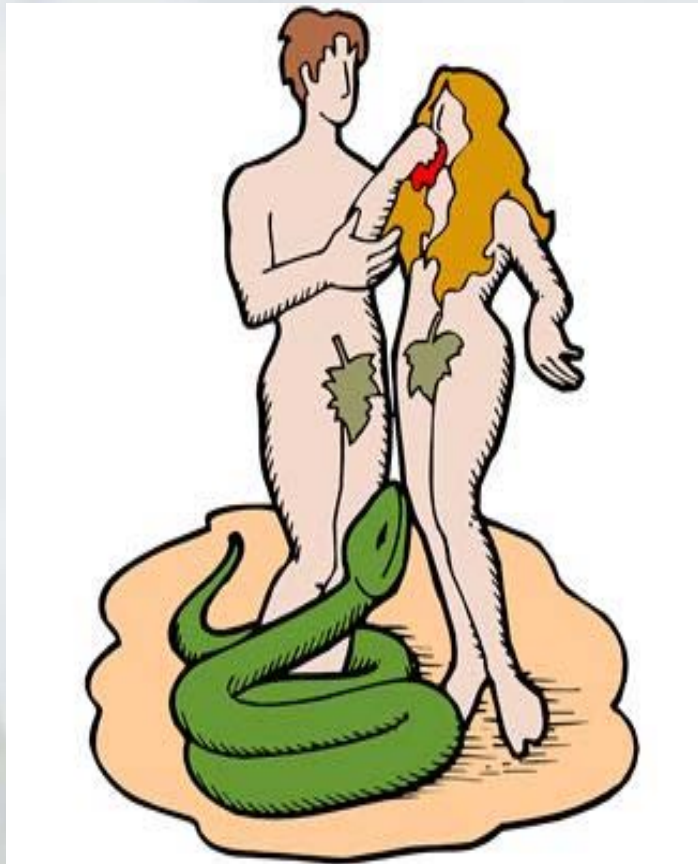
Gas system installation

Commissioning



# Operational Challenges of LFG Control Systems

## Capital sins



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Lack of complex approach  
– gas & leachate, restoration

Lack of flexibility and redundancy in design

Lack of diversity of energy recovery  
– electricity only, few installations with CHP

Site specifics not considered

Safety

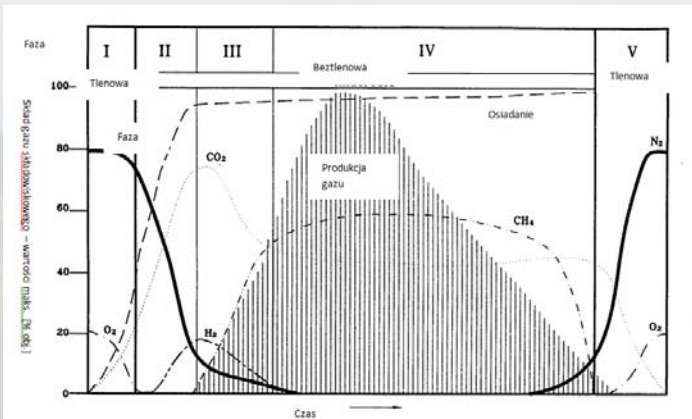
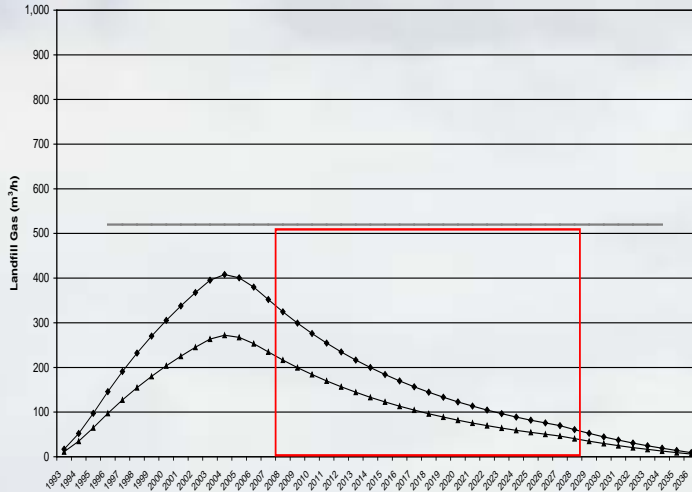
Elementary design errors  
– pressure losses, flares, booster selection

Costly, “automated” solutions  
– impractical & expensive

Poor performance of the systems  
– undersized, oversized, maintenance

# Operational Challenges of LFG Control Systems

## Technical



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**Landfill is a live organism**

**Nothing is certain except of the change**

Concept & design – thinking ahead

Installation & Commissioning

Operation & Maintenance

Balancing of the gas field

Changes and challenges – troubleshooting

Monitoring

Instrumentation

Understanding and interpretation of results

# Operational Challenges of LFG Control Systems

## Technical



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Landfill site changes

– natural & operational

Changes in gas generation

Leachate

Capping

Settlement

Waste tipping & surcharging

Engineering works

# Operational Challenges of LFG Control Systems

## Non-Technical



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## Administrative

- Local authorities
- Central control
- Level of knowledge
- Global, country and particular interests

## Economical

- Pollution charges – venting/flaring/generating
- Investments of private investors
- Operators do minimum unless forced or have commercial economical interest

## **LFG potential is not fully exploited**

- small energy recovery projects not viable
- environmental control enforcement

# Positive Developments

## Government / Ministry of the Environment initiatives

Green, Red, Brown certificates  
Technical Guidance  
Procedural Guidance  
Educational activities  
Research  
Legislation

## Jl projects

Link with UNFCCC activities

## National Environmental Protection Fund

Landfill closure and restoration co-financing

## GIOŚ – Head Environment Protection Inspectorate

Enforcement of the law

WYTYCZNE W ZAKRESIE  
KONTROLI I MONITORINGU  
GAZU SKŁADOWISKOWEGO



Sfinansowano ze środków  
Narodowego Funduszu Ochrony Środowiska i Gospodarki Wodnej



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Sfinansowano ze środków  
Narodowego Funduszu Ochrony Środowiska i Gospodarki Wodnej  
na zamówienie Ministra Środowiska

Listopad 2010

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# More Challenges...



## Education & Communication

### Continuous professional development

local authorities, environment protection  
inspectors, landfill operators, energy  
authorities, users

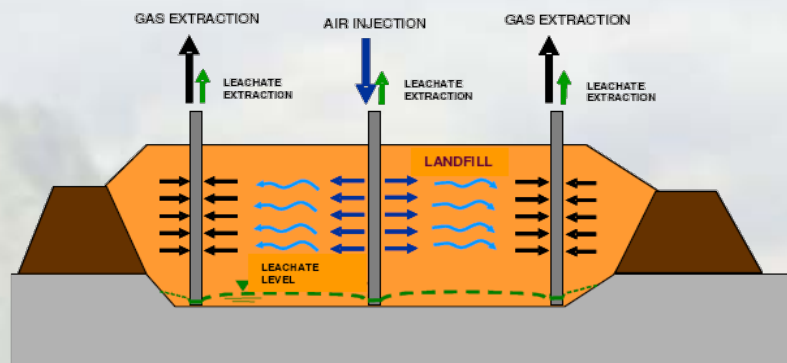
### Promotion of innovative technologies

### Internal regulations

### European legislation

Active participation of Poland

Polish presidency in 2011



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# THANK YOU FOR YOUR ATTENTION DZIEKUJĘ ZA UWAGĘ

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