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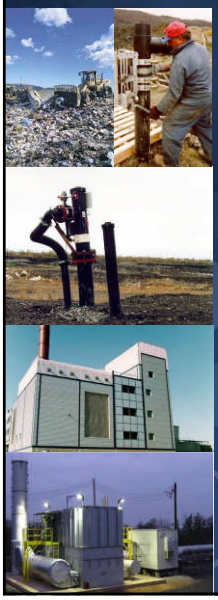

BIOTHERMICA VAMOX® TECHNOLOGY AN INNOVATIVE WAY TO MONETIZE CARBON CREDITS FROM VENTLATION AIR METHANE

by

Biothermica Coal Carbon Inc
in cooperation with Eco-Alliance

September 22, 2010

Outline

1. Biothermica group overview
2. Opportunity: Carbon revenues from VAM destruction
3. The VAMOX® technology: How it works
4. Biothermica demonstration project with JWR, Alabama, USA
5. Project feasability studies at Ukrainian mines
6. Biothermica business approach in Ukraine

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BIOTHERMICA GROUP OVERVIEW

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Biothermica mission

Founded in 1987, Biothermica's **mission** is to develop, finance, build and operate projects which capture and valorize methane emitted by **landfill sites** and **underground coal mines**, and monetize the associated carbon credits, thermal energy and/or electricity on the national and international markets

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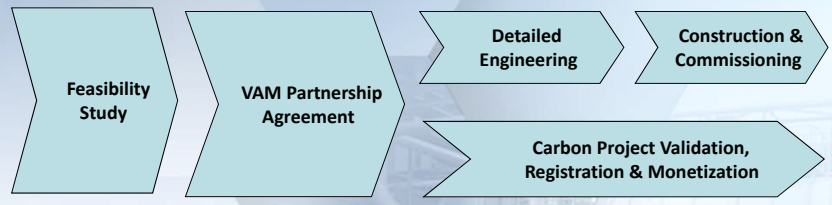
Integrated Development

Full project cycle is covered by Biothermica internal resources (technical, legal & financial)



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First VAM project in North America with JWR, Alabama, USA

Based on Biothermica's proprietary **VAMOX®** technology

VAMOX® unit at JWR mine No.4, Alabama

Mine Ventilation shaft, JWR mine No.4

OPPORTUNITY: CARBON REVENUES FROM VAM DESTRUCTION

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Ventilation Air Methane (VAM)

VAM is **methane** emitted by underground coal mine ventilation systems worldwide

VAM represents **more than 50%** of underground coal mine methane emissions

Mine Ventilation Shaft (USA)

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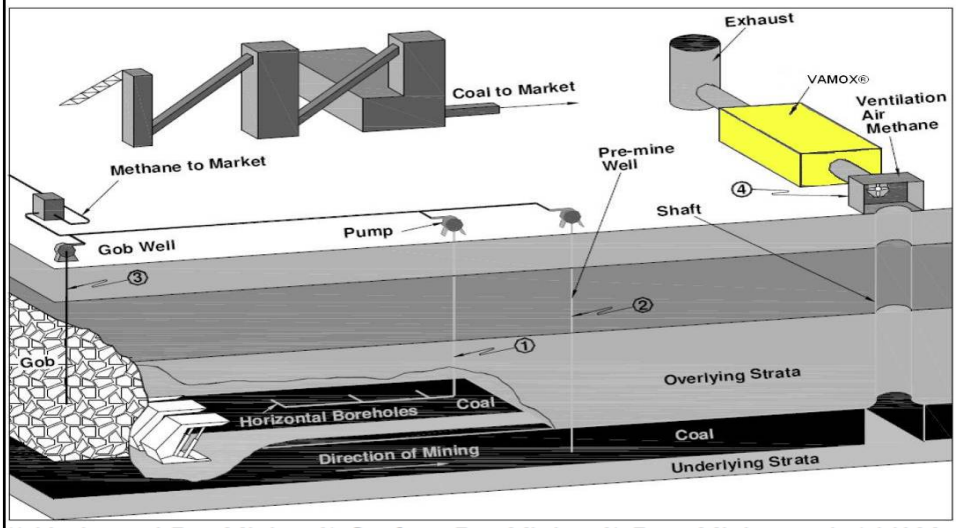
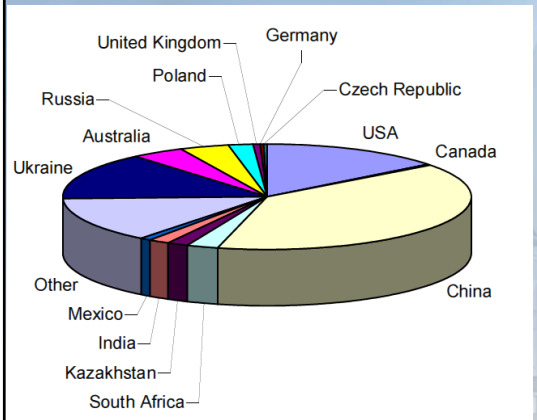
Schematic overview
Coal Mine Methane Extraction



1) Horizontal Pre-Mining 2) Surface Pre-Mining 3) Post-Mining and 4) VAM

VAM emissions worldwide (2010)



Country	VAM emissions (MMtCO2e)
China	111
Ukraine	41
USA	41
Australia	12
Russia	11
South Africa	7
Kazakhstan	5
India	5
Poland	5
Mexico	2
United Kingdom	2
Canada	1
Germany	1
Czech Republic	1
Other	39
World	283

THE VAMOX® TECHNOLOGY

HOW IT WORKS

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History and Origins
From BIOTOX® to VAMOX® (1991-2010)

- Biothermica has developed the VAMOX® System based on its expertise with the internally developed BIOTOX® RTO Technology (**20+ Yr of R&D**)
- BIOTOX® RTO **Patented Technology** is an **International Award Winner** from A&WMA (1999)
- The VAMOX® Technology Patent is underway…

Air & Waste Management Association

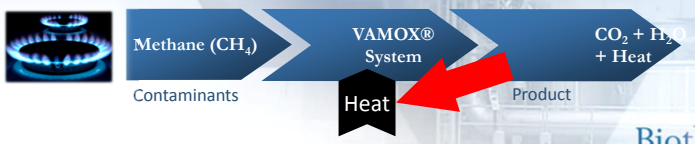
Highly efficient **Regenerative Thermal Oxidizer** (RTO)

Inspired by **BIOTOX®** air pollution control technology

Principles of Operation
Chemical Process

- Regenerative Thermal Oxidation (RTO) principle is to break down contaminants with high temperature
  - BIOTOX ® process is to abate VOC, PAH & other pollutants…

  - VAMOX® process is simply to abate methane…



- VAMOX® minimizes energy consumption

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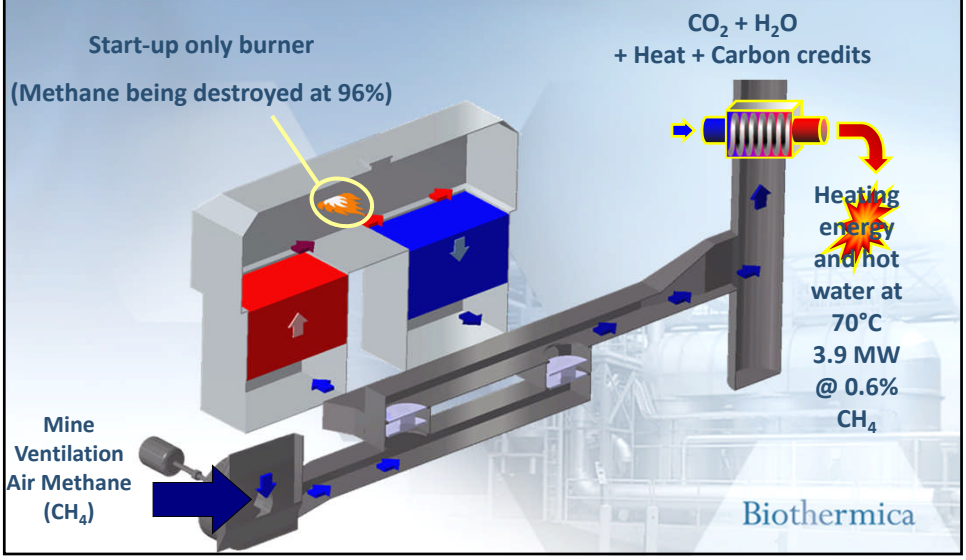
Principles of Operation
Dynamic Overview



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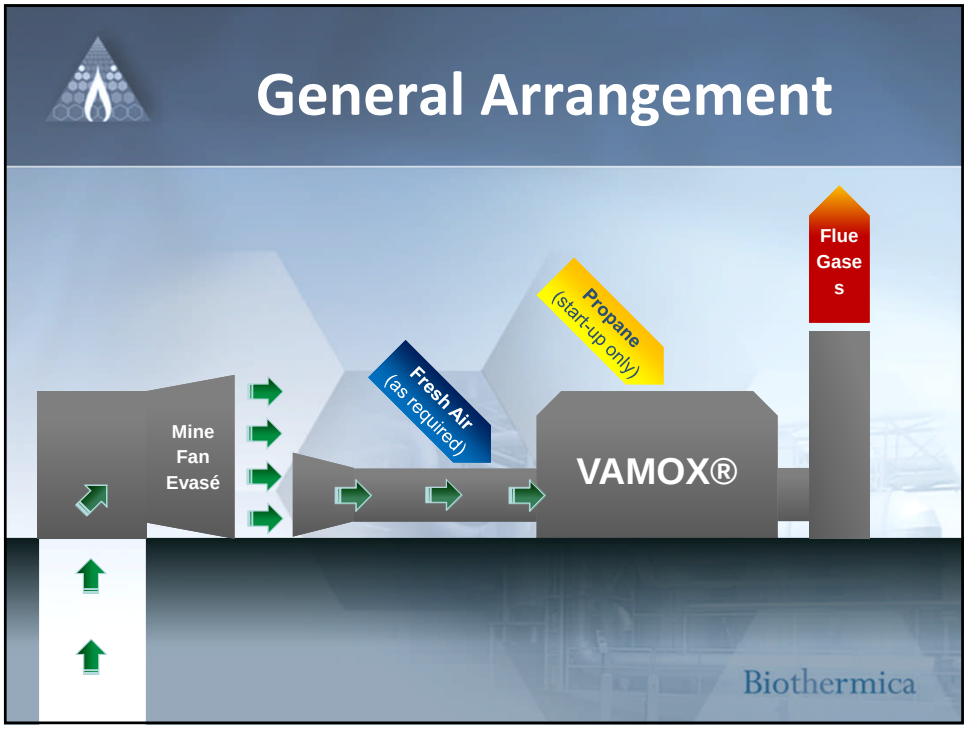
General Arrangement
Flue Gases
Propane (start-up only)
Fresh Air (as required)
Mine Fan Evasé
VAMOX®
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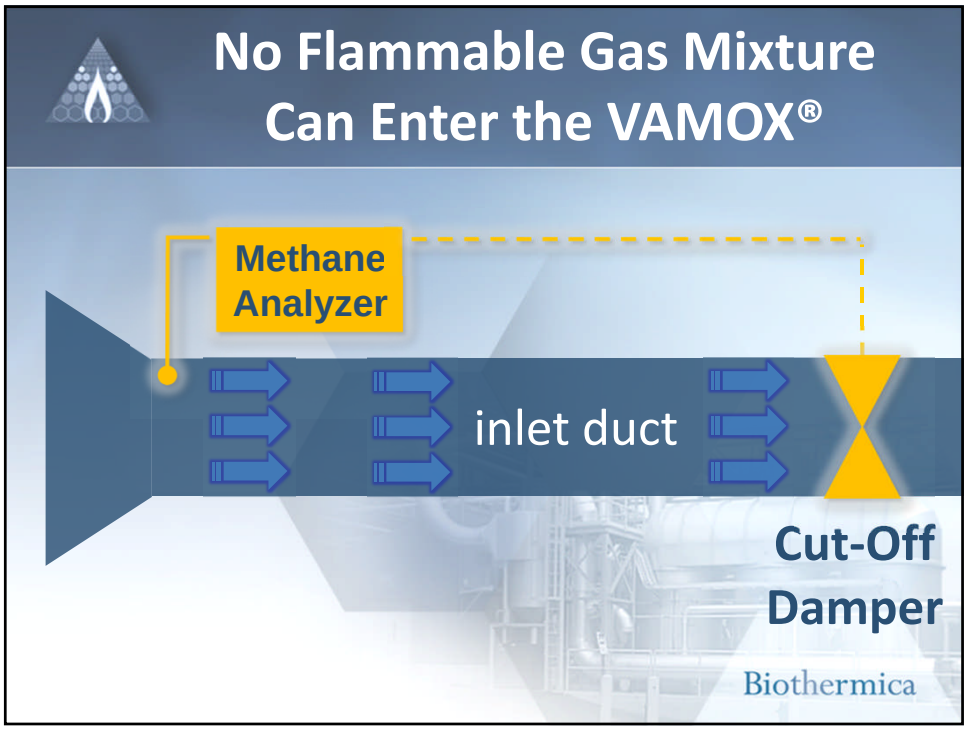
No Flammable Gas Mixture Can Enter the VAMOX®
Methane Analyzer
inlet duct
Cut-Off Damper
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Highlights

- **No impact** on mine fan
- From **0.2% to 1.2%+ CH_4**
- Fully **automated** operation
- **Remotely** monitored/controlled
- No **catalyst**
- **Possibility of heating energy**

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Biothermica – JWR Demonstration Project in Alabama, USA

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Achievement
1st VAM Project in North-America

- Partnership with Jim Walter resources, inc. BLUE CREEK COAL - BROOKWOOD, ALABAMA
- **1st & Only** VAM Project in America - commissioned on January 26th,2009
- **Approved** by U.S. Mine Safety & Health Administration
- Project **Registered** in June 2010 with the Climate Action Reserve

System Characteristics

- **850 m³/min** capacity
  (10% of available VAM flow)
- 13 m x 8 m footprint
- **93 kW** dedicated fan
- Up to **98% destruction**
- **0.8% CH_4** average at fan

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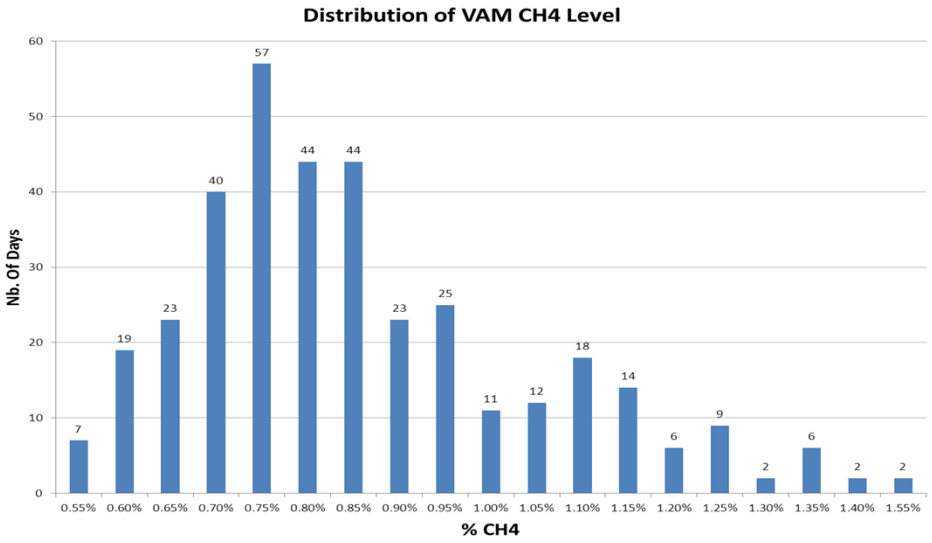
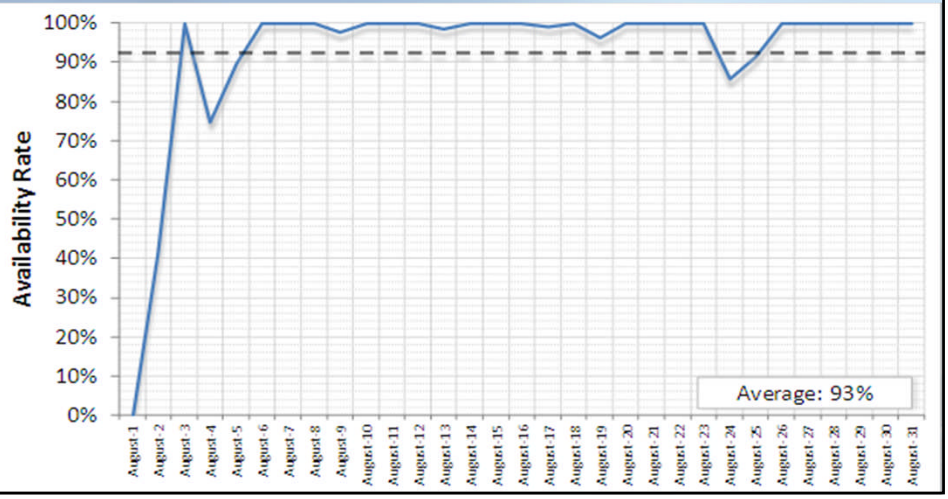
Mine Fan CH_4 Distribution (Year 2: March 2010-March 11)



VAMOX® Project at JWR 93% Uptime in August 2011



Achievements (As of August 31, 2011)

- Commissioned March 6, 2009
- **66,000 tCO_2e** since start of project
- 54,153 credits **verified by third-party**
- **88% availability**
- **17 344 hours**

- **Registered** with California's CLIMATE ACTION RESERVE

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Future Systems

- **3,120 m³/min** capacity
- **Multiple units** in parallel
- Capture **>75 % + of mine fan airflow**
- ≈ 36 m x 13 m footprint
- ≈ 520 kW dedicated fan
- Thermal energy generation

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VAM PROJECT FEASIBILITY STUDY AT 3 UKRAINIAN COAL MINES

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Project 1 - Close up on VAM shaft

Project 1 - Technical details

Shaft Details

- Air Flow : average of 7,000 m3/min
- CH_4 concentration : 0.8 % (with CMM enrichment)

The VAM Project

- Install two (2) VAMOX® with total VAM capacity of 6 200 m3/min (85 % of total flow)
- Special considerations for dust
- Production of hot water for mine needs (80 °C)
- Total ERUs to be generated : up to 270 000 /Yr

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Study Financial Results

Key Results

- The ERU price should be greater than € 9 for the project to be profitable
- Post Kyoto framework should be defined for price stability
- VAM CH_4 concentration and unit availability rate (up-time) are the most important factors for achieving predicted profitability

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Framework for carbon credit generation in Ukraine

- Ukraine is eligible to generate carbon credits (ERUs) under Kyoto protocol JI mechanism **until 2012**

UNFCCC

- Current price of ERUs: **€ 8-9/tCO_2e (Bluenext)**
- Potential post 2012 scenarios
  - Continuation of Kyoto Protocol JI mechanism post 2012
  - Recognition by EU ETS 2013-2020 of credits generated in Ukraine post 2012
  - No recognition of carbon credits generated in Ukraine post 2012

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Biothermica Business Approach in Ukraine

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Business Models

Shared Risks & Investment

- Biothermica **and mine** finance the project
- **Profits are shared** between the parties

No Risks For Mine

- Biothermica finances the project
- Biothermica pays a **royalty to mine**

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Thank You !
Spassibo !
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