



The CMM Market and Project Options: *The Prelude to Project Finance*

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Workshop on New Trends in Coal Mine Methane
Recovery and Utilisation

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Overview



- ◆ The CMM Markets
 - Energy
 - Carbon Credits
- ◆ Project Options
- ◆ Players and Stakeholders



Markets and Good Project Design: Prerequisites to Finance

- ◆ Understanding of market means secure greatest value for project: maximize profit
- ◆ Project design is critical for identifying most profitable technical option
- ◆ Knowing the players and stakeholders is important for project integration and business planning
- ◆ Together and in a coherent plan, financiers can see that all aspects thought through



CMM Markets



◆ Energy

- Local variations in power/heat/gas prices and ability to sell
- May influence project option

◆ Carbon Credits

- Global
- Influenced by policy
- Future unclear



Considerations: Market



- ◆ Customer
 - Access: (Monopolies? Grid/pipeline access?)
 - Reputation/ability to pay?
- ◆ Price
 - Meets discounted cash flow requirements?
- ◆ Contract
 - Long term versus short term
 - Responsibility and Risk allocation
 - Sales/guarantees
 - Operations and maintenance
 - Power/energy sales/purchase agreements
- ◆ Finance: Who invests? Credit rating? Debt:Equity?



Carbon Credits



- ◆ For most of Eastern Europe/CIS, “Joint Implementation” “Emission Reduction Units” (ERUs) are the type of credit
- ◆ Demand comes from countries/companies with caps on emissions
- ◆ Credit revenue stream critical for many otherwise marginal/loss making projects
 - Could be over ½ of revenues

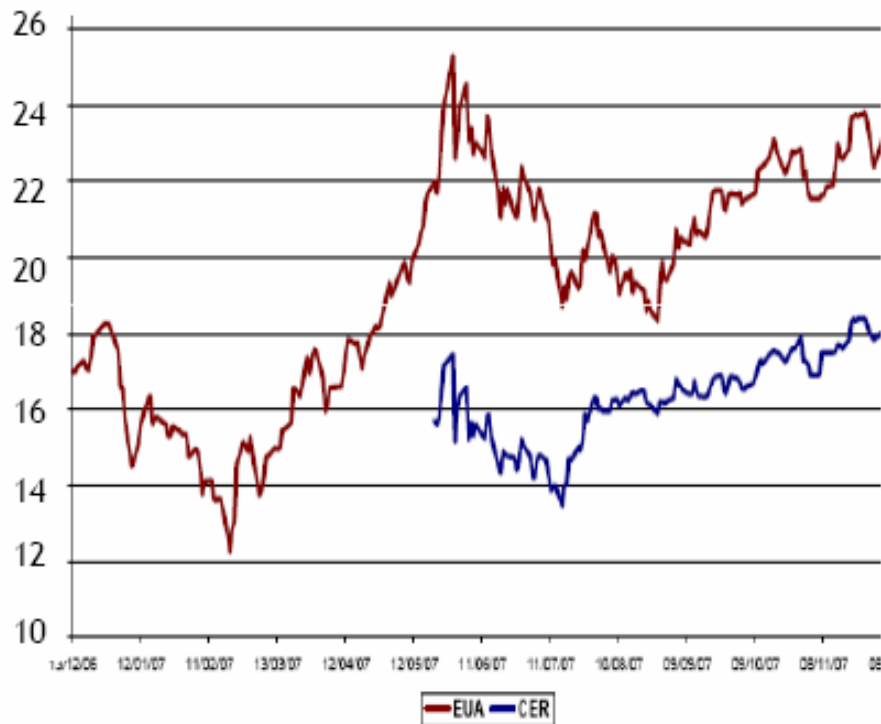


How to create a credit?

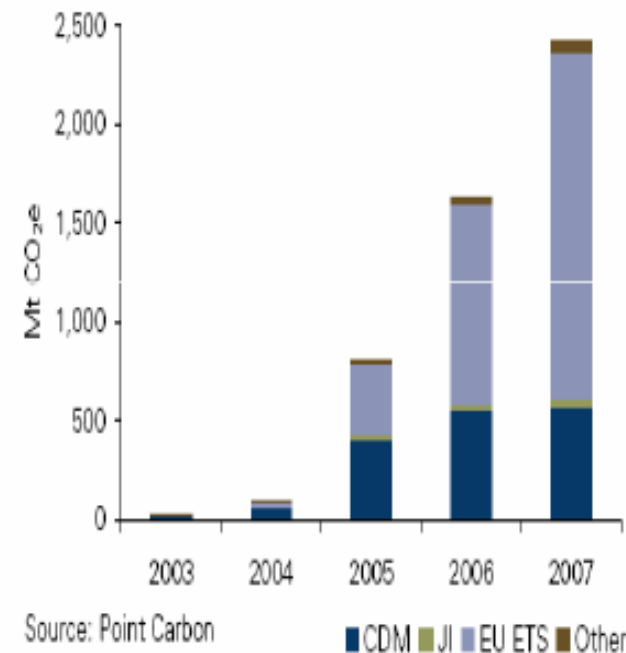


- ◆ Project design document
 - Demonstrate project is beyond business as usual: wouldn't do project without the credits
 - Clear idea of baseline, design and process for measuring emission reductions
- ◆ Validation by third party
 - Approved by the United Nations
- ◆ Country approval
 - Each country has different requirements
- ◆ United Nations approval
- ◆ Monitoring report
- ◆ Third party verification of emission reductions
- ◆ Credit issuance/transfer

Credit Prices and Volumes



Prices (€) of EUAs and CERs
2005 -2007



Source: Point Carbon

■ CDM ■ JI ■ EU ETS ■ Other

Volumes (million t):
EU ETS, CERs, ERUs and Other



Market for CMM ERUs

Good, far from perfect

- ◆ CMM attractive project type
- ◆ JI projects start in 2008
- ◆ ERUs command good prices (5 – 15 euros/credit)
 - depends on how advanced project is and perceived risks
- ◆ Host country approval issues



Credit Market Uncertainties



- Uncertainty regarding credits after 2012 (end of Kyoto period)
 - No international framework in place
 - ERUs are not given crediting approval post-2012
 - Therefore few parties willing to buy credits/value credit streams from 2013
 - Secondary concern is a “gap” if treaty decision comes too late (took a decade to prepare for Kyoto)
 - Thus, payback needs to be quick (prohibits starting some good projects)

Progress post-Kyoto



- ◆ UN Conference in Bali (December 2007) set timetable
 - Goal to formalize agreement in 2009
 - U.S. is “in”: important for creating deeper market demand
- ◆ EU: increasing stringency post-2012 in their trading scheme, but uncertainty regarding potential for ERUs to enter market

Carbon Sales Get Attention But Do Not Discount Power Sales!

Plant Configuration

Size of plant: 10 MWel

Choose modules of 1.0-1.5 MWel for flexibility

Mine power demand exceeds this (12 MWel base load)

Operating hours: 7000/year*

Waste heat captured

Approximately 75,000,000 kWhTh produced

Mine heat demand exceeds this

* While engines under perfect conditions may operate in excess of 8000 hours/year, field experience indicates significantly lower system availability.

Key Capital Cost Elements:

CHP Plant:	€ 6 million
Transformers/elec.	€ 500,000
Monitoring:	€ 300,000
Development Costs:	€ 1.3 million
TOTAL	€8.1 million

Annual Operating Costs:

CHP O&M	€ 1.1 million
Monitoring:	€100,000
Administration:	€100,000
<i>Credit Reg/mgmt. (3 yr):</i>	<i>€100,000</i>
TOTAL:	€1.4 million

Bottom Line

Costs/Sales/Production Rates

Costs/Price

Avoided power costs = €0.04 /kWhel

Avoided heat costs = €0.003/kWhth

Credit sales

(much delivery risk

borne by project) = €10/t

Production

Power: 65 million kWhel

Heat: 75 million kWhth

CO2 credits: 250,000 t/year

Annual Revenue Streams

Revenues/year

Power: € 2.6 million

Heat: € 0.3 million

Credits: € 2.5 million

TOTAL: € 5.4 million

Financial Results

(Assume 12% Discount Rate, after tax)

NPV = €4 million

IRR = 20%

Different credit prices; IRR:

€0 = 1%

€5 = 11%

€10 = 20%

€15 = 28%

*Example based on actual case-study



General Considerations: Technical feasibility

- ◆ Integration with mining:
 - Gas Supply
 - Energy Demand
- ◆ Hardware choice:
 - Local or international (cost versus reliability)
 - Operations and servicing skills/availability
 - Spare parts
- ◆ Who will manage project?
 - Mine – are skills available?
 - Contractor – availability, quality and cost?
 - Developer – may want significant equity % to manage

Technical Options:

- ◆ Ventilation air methane: limited options, flow reversal reactors most advanced
- ◆ 30+%: power generation, local and mine uses
- ◆ > 90%: pipeline injection, chemicals, plus all other options viable

Power production most common for new projects



Partners and Stakeholders



- ◆ Mine and Coal Holding Company
- ◆ Markets:
 - energy consumers
 - carbon credit purchasers
- ◆ Authorities
- ◆ Equipment Suppliers
- ◆ Investors
- ◆ Plant design, procurement and construction
- ◆ Plant operations and maintenance



Mine and Coal Company

- ◆ Coal Company:
 - Core business mining coal
 - Relationship motivated by:
 - Taking problem (methane) off hands, and,
 - Providing additional revenues without inordinate risks
- ◆ Coal Mine:
 - Coal production core motive and skills
 - Relationship motivated by:
 - Minimizing distractions from coal production
 - Providing energy to mine coal



Markets: Energy Consumers

- ◆ Motivated by:
 - energy costs
 - security of supply
 - CMM projects (even if mine is consumer) face challenge if availability of energy supply is in question
 - Therefore, can usually compete only if
 - energy cost is better than current supplier
 - and project can demonstrate high availabilities



Markets: Carbon Credit Buyers

- ◆ Motivated to lock-in lowest credit price agreements from mines
 - Project Based Credits 7 – 14 Euros/t discounted (at least partially) because of delivery risk
 - The further the project is along, the higher the price
 - But if seller is not seen as reliable or creditworthy, then suffers steep discounts
- ◆ Most buyers do not understand CMM technical options, need to rely on others:
 - Technical Consultants? Mines? Project developers?



Equipment Suppliers

- ◆ Equipment Suppliers = Equipment Sales
 - Shorter term focus
 - Some do offer certain guarantees, servicing, and financing, but focus on off-taking equipment, market share and realizing highest margins
 - Cost is only one factor in project profitability
 - Keeping project running is more important



Investors

- ◆ Varies, but largely motivated by:
 - Low risk/high return on investment, or,
 - Market share, or,
 - Carbon credits, or,
 - Maximizing equity in projects
- ◆ Capabilities vary, depending on:
 - Knowledge of local markets,
 - Access to additional capital
 - Technical know-how



You Have a Project What Are Your Next Steps?

- ◆ Package your project
 - Project idea note
 - Feasibility study
 - Business plan
- ◆ Define your risk profile within defined business model
- ◆ Assess finance options to balance risk
- ◆ Seek firm or indicative offer of funding
 - What is the difference
- ◆ What follows
 - Funding
 - Question/Answer
 - More formal study



Conclusions



- ◆ CMM markets in Eastern Europe/CIS are stronger than ever
- ◆ A well thought-out and comprehensive design (technical/financial/partnerships and their integration) is important in securing finance

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