Developing Landfill Gas to Energy Projects in the US and Asia

Presented by:
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Who We Are

- Sindicatum Carbon Capital (SCC) is a global end-to-end developer of climate change and renewable energy projects
  - a. Project origination
  - b. Project planning
  - c. Project management and execution
  - d. Climate change expertise
  - e. Funding
- SCC operates globally with offices in Houston, London, Beijing, Singapore, Jakarta, New Delhi, Thailand & Bahrain
- SCC Americas is a wholly owned subsidiary of SCC
SCC’s Portfolio

• 9 landfill gas projects

• 4 coal mine methane projects

• 5 agricultural projects

• 1 hydro project

• 1 energy efficiency project
Bangkok Landfills, East and West

**Project Features**

- Bangkok based team
- SCC serves as PM
- Project divided into 2 sectors
- Phase 1: installation of GCCS

- Phase 2: installation of flare & LFG pre-treatment
- Phase 3: installation of engines
- 14 MW to grid
- Excess gas to on-site flare
- Power sold to Local Provincial Electricity Authority
Basic project structure in Thailand and the US

Project Development and Value Proposition Largely the Same

- Project identification and diligence
- Contracting with partners
- Power and environmental attributes off-taker agreements
- Construction
- Operations
- Revenue!
Important distinctions - Project drivers and advantages in the US

• Increasing interest in local and domestically produced renewable energy
  a. Municipalities are interested
  b. Incentives and favorable rates for locally sourced renewable power

• Perceived long-term upside
  a. Future clean energy standards (both state- and federal level)
  b. Carbon market

• Robust legal system lowers project risk
  a. Permitting, while lengthy, is predictable
  b. Contracts enforceable

• LF operations highly regulated
  a. Increases certainty of reliable gas production
Important distinctions – Project drivers and advantages in Thailand

• Established and robust market for carbon credits
  a. Credits developed through UN’s CDM program
  b. Sold into EU ETS, the largest compliance market for credits

• Capital expenditure is lower
  a. Materials and labor are cheaper

• Tax breaks for Renewable Energy Projects

• Premiums for renewable power
Risks for the US

- Power prices currently at historic lows
- Clean energy standards are not constant
- LFIs in US more numerous but smaller in size
  a. High development costs
  b. Legal structuring requirements
  c. High interconnection costs
- LF ownership structure
  a. Many run by private entities with LFG E initiatives in place
  b. Implications for revenue and project structuring
Risks for Thailand

• LF operations and physical layout
  a. Deposition strategies often do not maximize production
  b. Due to high % food waste, higher temperatures and waste moisture the waste decay is much faster. Requires rapid installation of GCCS

• Enforceability of contracts

• Weather, rainy season, generating high quantities of leachate

• Political landscape
  a. 2010 Bangkok riots
How the Thailand Project was Implemented

- Potential gas production was analyzed using LandGEM model
- SCC serves as project manager
  - A team was established in Bangkok to develop and run the project
  - Local subcontractors were used to construct the various aspects of the project
- Project was divided into two; Bangkok East and Bangkok West
- Phase one consisted of installation of gas collection wells
  - Well design was based on an Asian biodegradation model
- Phase two consisted of installation of flares and pre-treatment
- Phase three consisted of installation of combustion units
- Power is being sold to Local Provincial Electricity Authority
Obstacles Encountered at Thailand Project

- **Obstacle**: Provision of local HDPE pipework and EF fittings
  a. Solution: Imported from UK, China and middle east

- **Obstacle**: No in country experience in LFG pipe & well installation
  a. Solution: SCC project managed with a team from China

- **Obstacle**: No in country LFG flare supplier
  a. Solution: Imported from China

- **Obstacle**: No LFG project operational experience
  a. Solution: SCC employed UK expat and trained local team over several months

- **Obstacle**: No local engine operator with full O&M experience in
  a. Solution: SCC employed own maintenance team to undertake all O&M
Notable Differences Between Asian and US Landfills

• Higher degradable content in Asian waste

• Most waste degradable content is food, giving a higher k value and quicker LFG generation

• Greater leachate generation due to rainy season

• Tipping practices differ, not cellular tipping plans

• Little compaction as bulldozers used instead of compactors
SCC’s Optimum Biogas Collection “OBC™” Technology

- Major difficulty and expense in sourcing gravel locally
- Difficult to install gravel/stone around horizontal gas well, especially in rainy season, causing H&S concerns
- Review of other options to provide additional void around the pipe
- SCC developed and are patenting Optimum Biogas Collection (OBC™)
- Reduced material and installation costs with no specialist plant being required
- Increased gas collection efficiency from wells by maximizing waste to void contact area
THANK YOU

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