Reclaiming Resources From Waste

PYROLYSIS PROJECTS

Background for Pyrolysis Projects in Cambodia  |  April 2016
OVERVIEW

The Problem
The Proposal
The Solution
Next Steps
THE PROBLEM: ENERGY SUPPLY IN CAMBODIA

Cambodia faces the highest electricity prices in the region and rolling blackouts are common. The lack of reliable, cheap power is a major constraint to industry in Cambodia, and has become an important political, social and economic issue.

Government has made open calls for private sector participation to resolve the situation.

Recent newspaper headlines:

POWER CUT IN VIETNAM CAUSES BLACKOUT ACROSS CAMBODIA

ITS ELECTRICITY DWINDLING, CAMBODIA IS GETTING VERY DARK AND VERY, VERY HOT

PRESIDENTS LEFT IN DARK AGAIN

AFTER BLACKOUT HUNSEN GOES ON DEFENSIVE

THAI POWER TO SIEM REAP CUT
THE PROBLEM: WASTE IN CAMBODIA

Waste management has also become a growing concern. **109m tonnes p.a** of waste was generated in Cambodia in 2014, **up 10%** on the previous year. Waste stockpiles are building to untenable levels and imposing health and environmental challenges to Government, industry and the public.

DIOXIN FLAG RAISED

Japanese researchers have discovered dangerous levels of carcinogenic dioxins in hairs and breast-milk samples taken from residents near Phnom Penh’s Stung Meanchey garbage dump.
The pyrolysis process recovers valuable resources from waste, by converting waste to energy through thermal breakdown.

*Thermal breakdown of waste materials under intense heat without oxygen*
THE SOLUTION: OVERVIEW OF PYROSYLIS

The process and technology to convert waste to energy has been developed and refined by Global Green International over the past 15 years. This process maximises heat retention and efficiency.
THE SOLUTION: SCALABLE AND FLEXIBLE PLANT DESIGNS

The pyrolysis process is applied through flexible plant designs. Plants are designed for maximum heat and power efficiency, and are scalable to meet requirements.

- Each Plant line process **50 metric tons of wet** municipal solid waste (equivalent to **25 tons dry** waste).
- Requires **1000 sq. meter**.
- Modular design enables more lines to be added as waste stream increases.
Our pyrolysis plants are operating now in South Korea and are being constructed in the Philippines, Thailand, Samoa and Anguilla.

**KEY INFORMATION**

- Prefabricated in South Korea and Japan and shipped to Cambodia.
- Simple, safe process and continuous operation.
- Alternative configurations available:
  - 2MW electricity generation capacity and 12,000L bio diesel per day.
  - 4MW all-electricity generation capacity.
THE SOLUTION: A STRONG CASE FOR PYROLYSIS

PYROLYSIS IS HIGHLY COMPETITIVE IN RELATION TO OTHER FORMS OF ENERGY SUPPLY:

1. Highly efficient  
2. Continuous  
3. Low community impacts or safety risks  
4. Zero greenhouse gas emissions  
5. Cost-competitive  
6. Relatively small capital expenditure

PYROLYSIS is a proven technology that can make major inroads to Cambodia’s waste management and energy supply issues. PYROLYSIS can reclaim valuable resources from waste-stream and deliver strong economic returns for investors.
THE SOLUTION: BENEFITS FOR ALL

PYROLYSIS offers benefits for all stakeholders: **INVESTORS, THE COMMUNITY AND GOVERNMENTS.**

- **INVESTMENT**
  - INVESTMENT RETURNS

- **SUSTAINABLE LONG-TERM WASTE MANAGEMENT SOLUTION**
  - EMPLOYMENT: SKILLED & UNSKILLED

- **MINIMIZE NEED FOR ADDITIONAL LANDFILL SITES**
  - SCALABLE TO ADDRESS POPULATION GROWTH & INCREASE IN MSW

- **OUTPUTS ARE ‘GREEN’ CLEAN RENEWABLE ENERGY**
  - RECLAIM LAND RESOURCES
THE SOLUTION
TRUSTED PARTNERS

GEI Mekong is a partnership between Global Green International and SMCS Energy. The partnership is responsible for advancing pyrolysis technology in Cambodia and in the region.

GEI MEKONG IS REPRESENTED BY

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THE PROPOSAL:

There is political commitment and a ready market for the resources reclaimed through pyrolysis. There are ample opportunities for pyrolysis projects across Cambodia.

**GEI Mekong** is now seeking partners to support the development of pyrolysis projects in Cambodia, through debt or equity participation.

The typical investment requirement is **US$15m** for each pyrolysis project, but may be split between multiple partners.
THE PROPOSAL: ADVANCED DEVELOPMENT AT SIEM REAP

The proposal for a five-plant project located in Siem Riep has reached an advanced stage of preparation.

- A **60 hectare** has been selected and secured.
- Supply of waste-stream has been secured for the staged implementation of all **five pyrolysis plants**.
- Agreements for sale of **bio-diesel** and **electricity** have also been reached.
- Supply to rural communities has been planned and allocated for villages in the local area.
- This site has substantial opportunity for further waste to energy facilities or other synergistic industries.

Inset - Site Specifics
Siem Reap is an ideal project site, due to its importance to the national economy. This proposal has the support to be fast-tracked by Government, and is suitable for an investor seeking rapid commencement.

The Siem Reap project will be implemented in two stages: an initial pyrolysis plant, and the remaining four pyrolysis plants.

Total investment required over the two stages is US$75m for the construction and commissioning of five pyrolysis plants.

GEI Mekong has also prepared a site at Pailin.
GEI Mekong is seeking commitment of US$15m for Stage 1 of the multi-plant Siem Reap project, with the option to then fund the US$60m required for Stage 2.

GEI Mekong’s preference is for an equity partner for the first stage, but encourages discussion on all options with a suitable investor.

This proposal can be advanced with the provision of an indicative term sheet and initial project development costs.

The Siem Reap project would then proceed to project development, including:

- Agreement for permits and licenses
- Conclusion of PPA and off-take agreements
- Negotiation for tax concessions

We anticipate the first pyrolysis plant at Siem Reap could be operational within 9 months of final investment decision.