# Financing Biomass Gasification Technology in Rural Cambodia

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Presentation by
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SME Renewable Energy Ltd

# OUTLINE

- Introduction
  Who we are and what we do
- Project Example
- Project Financing
- Current Achievements and Future Goals

# Why Renewable Energy?

- Cambodia rate of electrification <20%
- Electrification rate rural areas: ~7%
- Electricity tariff in rural areas: $0.50 - $1.25 /kWh
- All fossil fuel imported and taxed
- Dependence of rural SMEs on diesel fuel (currently $1.30 per liter)
- Costs of energy are a major obstacle to business investment and local economic growth

Cambodian NGO
(1999)

US-based not-for-profit
Energy Investment Company (1994)



66%

34%


Cambodian
RE Company (2005)

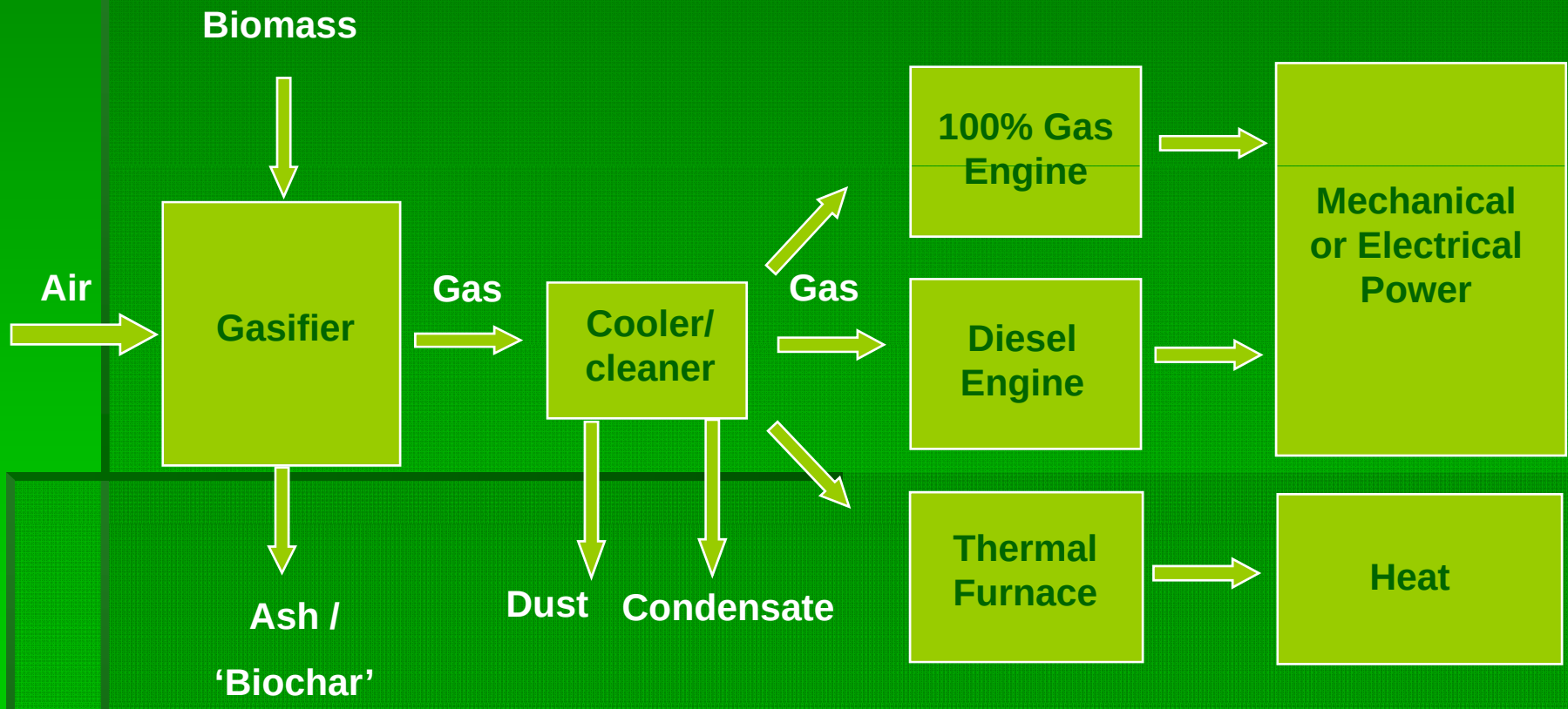
# SME Renewable Energy Ltd.

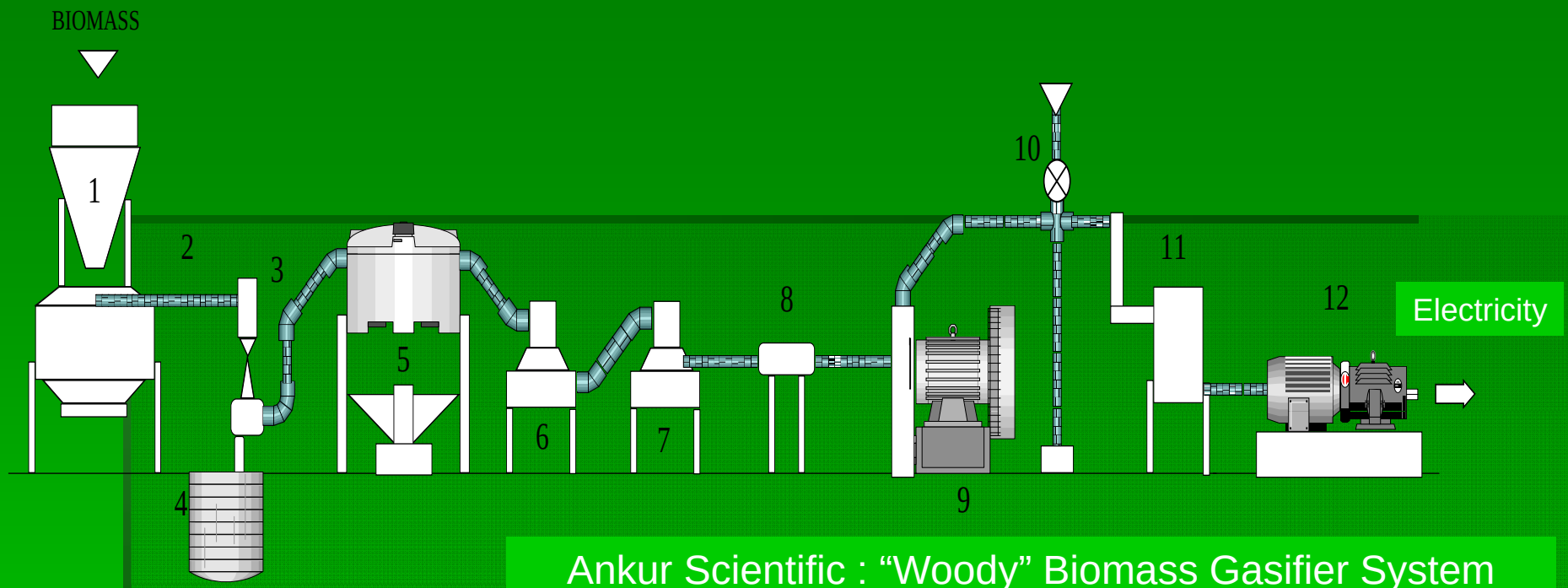
- Cambodian Ltd. Company (2005)
- Implementing Renewable Energy projects with Rural SMEs
  - Project FS and Design
  - Project Development
  - Turn-key Project Implementation
  - Project Financing
  - After Sales Service
- Current focus on Biomass Gasification
- Exclusive marketing rights for ‘Ankur’ gasifiers in Cambodia, Laos and Vietnam

# Why Biomass Gasification?

- Biomass is a locally, widely available resource
- Agricultural residues (wastes) include: rice husks, corn cobs, cashew nut shells, peanut shells etc.
- Wood (rubber, cashew or energy crop plantations)
- Cheap: 1 kg of diesel (valued $1.40) equals 4 kg of wood (valued $0.10) or 6 kg of rice husk (valued $0.00 - $0.05)

# What is Biomass Gasification?






## Ankur Scientific : “Woody” Biomass Gasifier System

| | | | |
|---|---|---|---|
| 1 | Biomass Hopper / Gasifier reactor chamber | 7 | Fine Woody Material Filter |
| 2 | Hot Gas Line | 8 | Fine Cloth Filter |
| 3 | Gas Scrubber / Cooler | 9 | Gas Blower/Fan |
| 4 | Recycled Water Cooler | 10 | Gas Flare Unit |
| 5 | Course Woody Material Gas Filter | 11 | Engine |
| 6 | Fine Woody Material Gas Filter | 12 | Dynamo |

# Potential Applications of Biomass Gasification Technology in Cambodia

- All rural SMEs with access to a secure and sustainable biomass supply that currently use large quantities of diesel fuel.
  - Rice Mills
  - Saw mills
  - Ice making plants
  - Brick and tile factories
  - Rural Electricity Enterprises
  - Garment factories
  - …

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# Rice husk gasifier in a Battambang rice mill

- The project: ‘Turn-key’ installation of a dual fuel rice husk gasifier for a 2 ton/hour rice mill that replaces 70%-80% of diesel fuel normally consumed by the mill

Converting Into

# Project Facts & Figures

- Gasifier capacity: 200 kW (dual fuel mode)
- Commissioned: Sept. 2006
- Project Investment: US$ 70.000,-
  (excl. $10.000 civil works)
- Project Financing: US$ 49.000,-


SAFE
FILTE

# Project Results

| | |
|---|---|
| Original diesel consumption: | 26 l/hr<br>8400 l/month |
| Diesel consumption in dual fuel mode: | 6 l/hr<br>1900 l/month |
| Fuel replacement: | 77% |
| Fuel savings: | 6500 l/month<br>eqvl >$8000/month |
| Payback period: | <2 years |

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# Project Financing

- Project financing provided by E+Co Inc. through SME-Renewable Energy Ltd.
- Loan amount: 80% of turn-key project cost excluding civil works
- Loan period: 5 years
- Grace period: 6 months (on principal only)
- Interest rate: 13% /year (declining balance)
- Collateral : 100% of loan value, including gasification equipment plus additional fixed or non-fixed assets

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# List of Project References

Systems installed and in operation:

| Year of Installation | Biomass Gasifier Capacity | Biomass Source | Enterprise Type | Location | Project Financing |
|---|---|---|---|---|---|
| 2006 | 200 kW | Rice husk | Rice mill | Battambang | $ 49,000 |
| 2007 | 200 kW | Rice husk | Brick plant | Banteay Meanchey | $ 50,000 |
| 2007 | 200 kW | Rice husk | Rice mill | Battambang | $ 50,000 |
| 2007 | 200 kW | Rice husk | Ice plant | Banteay Meanchey | $ 57,000 |
| 2007 | 150 kW | Rice husk | Ice plant | Siem Reap | $ 46,000 |
| 2008 | 200 kW | Wood | REE | Kampong Cham | $ 61,000 |
| 2008 | 200 kW | Rice husk | Rice mill | Battambang | $ 60,000 |
| 2008 | 200 kW | Rice husk | Rice mill | Banteay Meanchey | $ 58,000 |
| 2008 | 200 kW | Rice husk | Rice mill | Banteay Meanchey | $ 60,000 |
| 2008 | 200 kW | Rice husk | Rice mill | Battambang | $ 60,000 |

# List of Project References

Systems currently under construction:

| Year of Installation | Biomass Gasifier Capacity | Biomass Source | Enterprise Type | Location | Project Financing |
|---|---|---|---|---|---|
| 2008 | 200 kW | Rice husk | Rice mill | Banteay Meanchey | $ 60,000 |
| 2008 | 200 kW | Rice husk | Rice mill | Banteay Meanchey | $ 59,000 |
| 2008 | 200 kW | Rice husk | REE | Battambang | $ 62,000 |
| 2008 | 150 kW | Rice husk | Rice mill | Pursat | $ 50,000 |
| 2008 | 120 kW | Rice husk | Rice mill | Banteay Meanchey | $ 45,000 |
| 2008 | 250 kW | Rice husk | Rice mill | Siem Reap | $ 63,000 |
| 2008 | 200 kW | Rice husk | Rice mill | Battambang | $ 60,000 |
| 2008 | 250 kW | Rice husk | Brick plant | Kampong Chhnang | $ 72,000 |
| 2008 | 300 kW | Rice husk | Garment | Kandal | $ 85,000 |
| 2008 | 200 kW | Rice husk | Rice mill | Battambang | $ 60,000 |
| 2008 | 150 kW | Rice husk | Rice mill | Siem Reap | $ 50,000 |
| 2008 | 200 kW | Rice husk | Rice mill | Battambang | $ 60,000 |

# List of Project References

- Additionally, in various stages of order/financing approval:
  - 7 Rice mills
  - 1 REE
- System financing to September 2008 > $1,250,000

# Our Target

- Systems installed in 100 rice mills and 50 other SMEs over the next 4 years,
- Fuel expenses saved by SMEs: > $ 9,000,000 per year
- Diesel volumes saved by SMEs: > 7,500,000 l. per year
- Financing total : > US$ 5.0 million

# Thank You

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