



PROJECT SPRING-1

*AN INTEGRATED ENVIRONMENTALLY AND ECONOMICALLY SUSTAINABLE PROJECT:
BIOGAS-TO-ENERGY AND BIOCOMPOST FACILITY IN A BIOFUEL PLANT*

(enAgi)

NAKHONSAWAN, THAILAND

By:

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June 2009



CTI Clean Energy Financing Award

WINNER'S CERTIFICATE

The Business Plan submitted by

SPRING-1


was presented in the Business Plan Competition at the Asia Forum for Clean Energy Financing on 4 March 2009 in Singapore. This Business Plan was deemed to be one of the most promising clean energy investment opportunities in the ASEAN region and was selected as the **Winner** in the Competition.


Elmer Holt
Chair
Climate
Technology
Initiative


Koshin Kura
Executive Director
International Center for
Environmental
Technology Transfer


Peter Storey
Director
Pan Pet Limited


Mike Allen
Chairman
ReEx Capital
Asia


Alexander C.
Melchers
Vice Chairman
Sustainable Energy
Association of Singapore


Peter du Pont
Chief of Party
USAID ECO-Asia
CDCP

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The Business

Business

- ◆ Integrated biogas-to-energy and biocompost facility aimed to process the wastes coming from a molasse-based bioethanol plant and an adjacent sugar mill in Central Thailand
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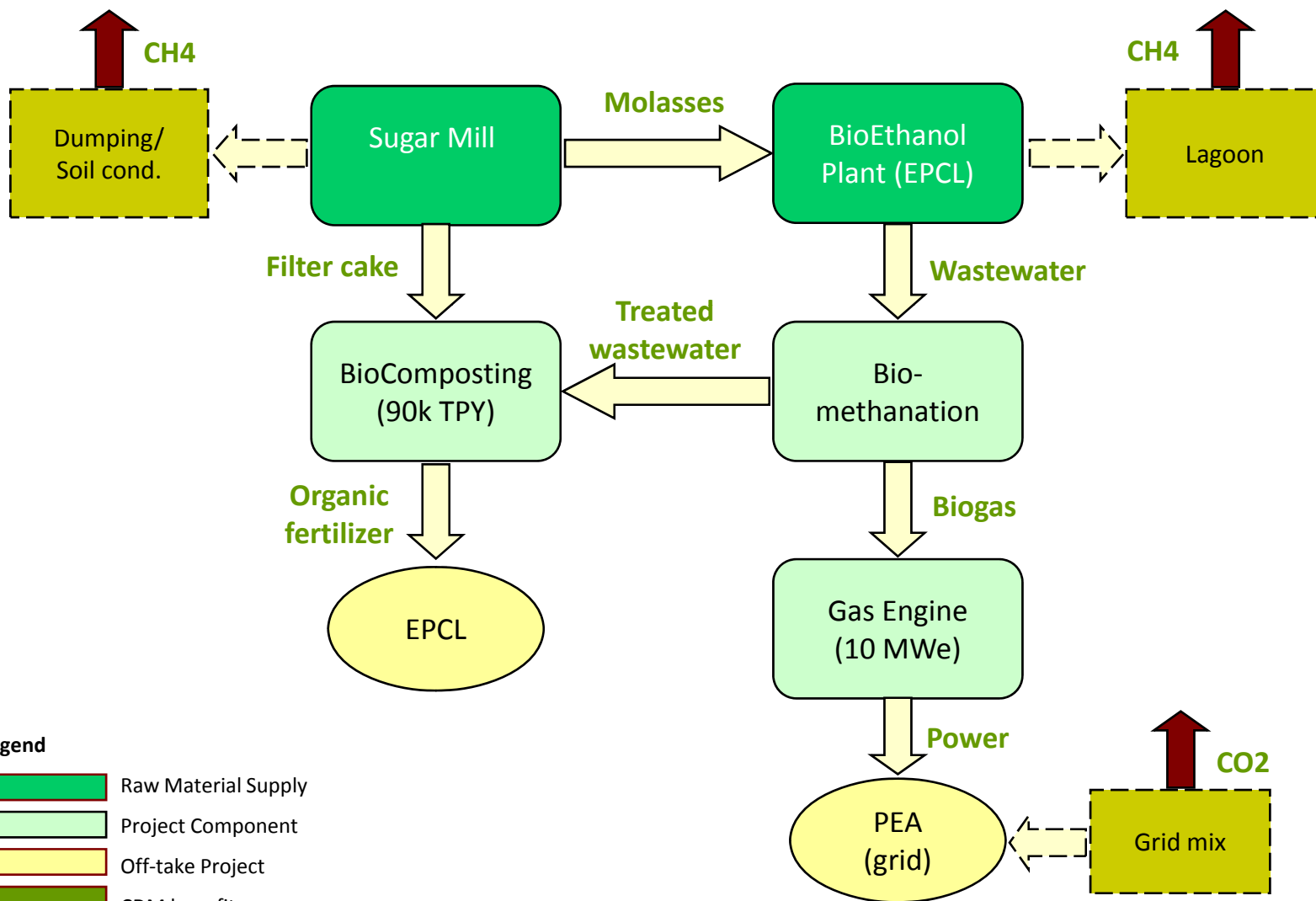
Project Capacity

- ◆ Biogas-to-energy plant - Installed capacity of 10 MWe
- ◆ Biocompost facility - 90,000 tonnes/year of organic fertilizer

Additional Benefits

- ◆ Carbon credits - create Greenhouse Gas (GHG) emission reductions of more than 300,000 tonnes of carbon dioxide equivalent (tCO₂e) per year
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Business and Process Overview



Project Sponsors & Partners

Ekarat Pattana Co., Ltd. (EPCL)

- Owner of ethanol plant and subsidiary of sugar mill
- Provision of 105 acres of land for the biomethanation & biocompost facilities
- Supply of wastewater to the project
- Supply of filter cake as raw material for organic fertilizer
- Purchase of 100% of organic fertilizer from the project

Full Advantage Co., Ltd.

- Project developer and advisory group
- Project development, implementation activities and provision of project development expenses
- Technology evaluation and selection
- Owners' representative during construction and operation
- Carbon asset development and management

Silverdale Consortium

- Investor-Developer
- Business and financial structuring
- Investment (up to US\$ 5.0 million)
- Funding arrangement

Raw Material Supply & Product Off-take

Long-term supply contracts secured to ensure uninterrupted supply

- ◆ ~528,000 m³/year of wastewater, supplied by EPCL for free
- ◆ 200,000 TPY of filter cake, supplied by EPCL at a pre-agreed price
- ◆ Quantities of raw material proven through historical data

Off-take commitments secured for the entire plant capacity

- ◆ PPA with the Provincial Electricity Authority (PEA)
- ◆ Very Small Power Producer (VSPP) scheme:
 - 'Adder' of THB 0.30/kWh (US\$ 0.009/kWh)
- ◆ 100% off-take of organic fertilizer by EPCL at a pre-agreed price
- ◆ Carbon credits: >300,000 tCO₂e (CERs) per year

Products & Revenue Streams

Electricity

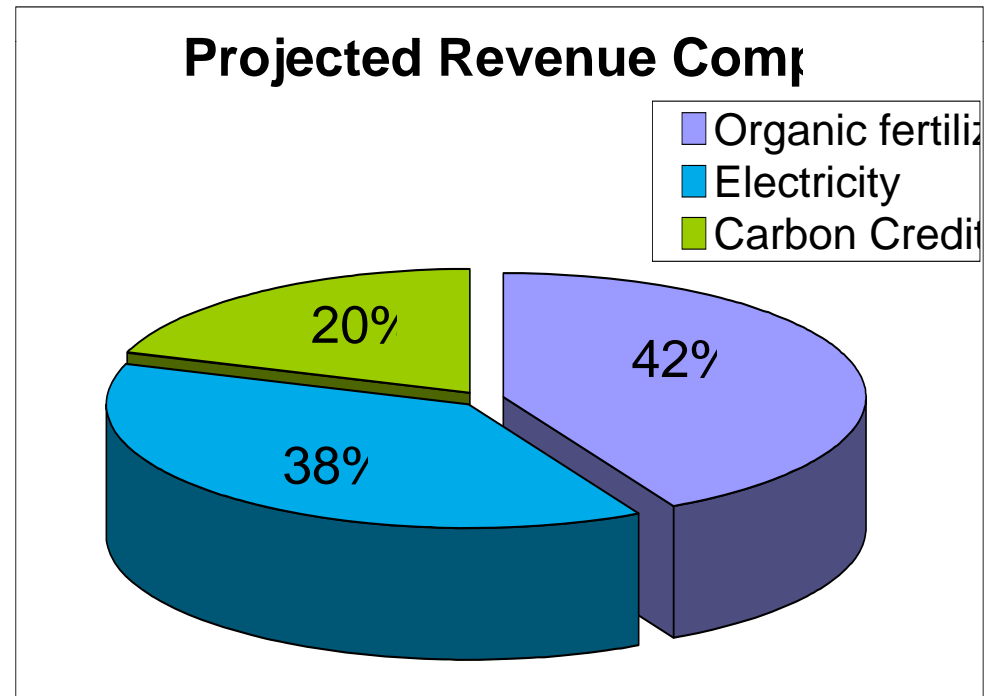
- ◆ Biogas-to-energy plant: 64,944 MWh of electricity per year from 10.0 MW of generating capacity

Organic Fertilizer

- ◆ Composting facility: 90,000 tons of organic fertilizer per year

Carbon Credits

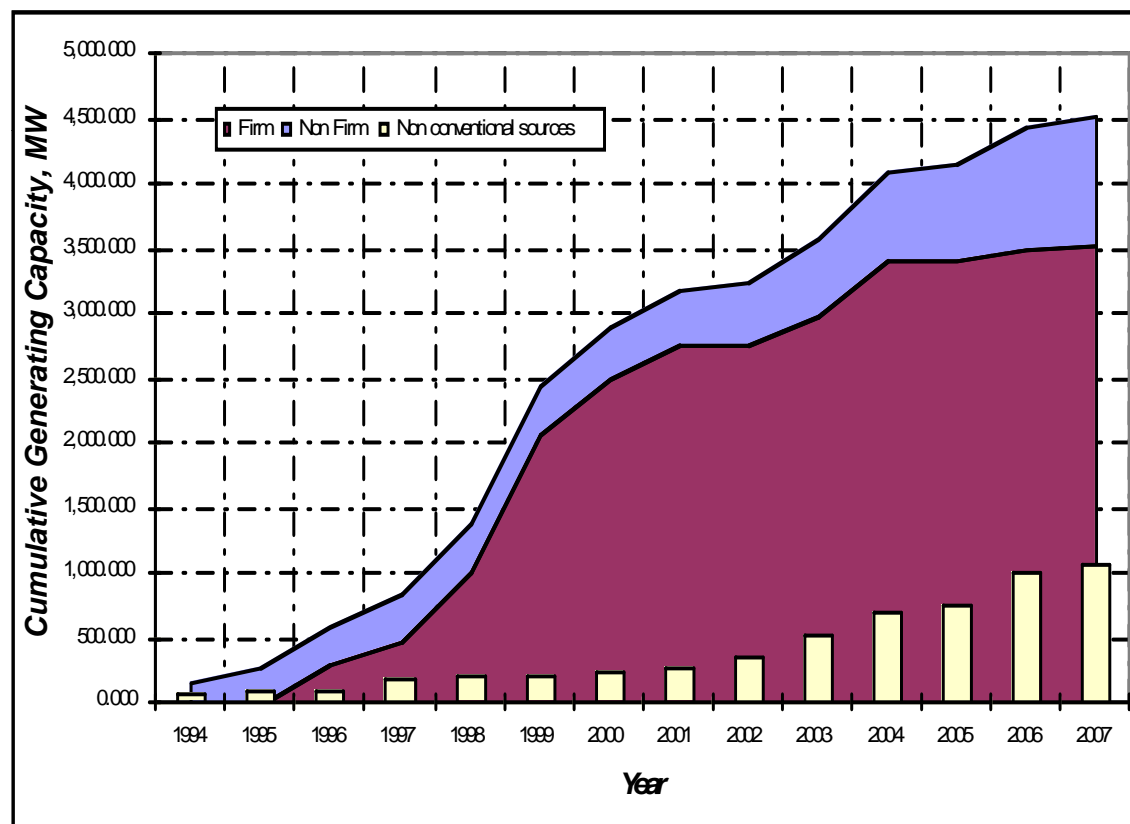
- ◆ Create emission reductions of more than 300,000 tCO₂e per year



Industry Analysis

Electricity

- ◆ Government of Thailand's target: implement 3,251 MW of renewable power by end of 2011 from existing 1,833 MW.
- ◆ VSPP scheme allows export of power from renewable energy on a net metering basis and streamlined approval process.
- ◆ Board of Investment (BOI) privileges for priority projects, including alternative energy sector.

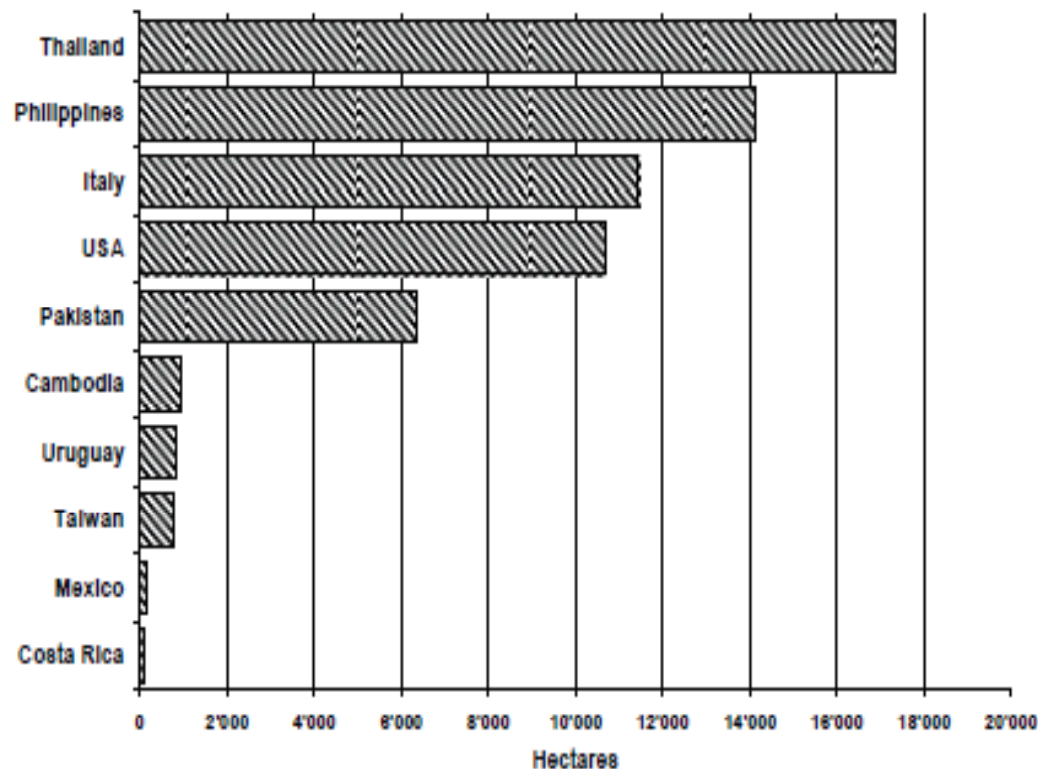


Source: Processed from www.eppo.go.th

Industry Analysis

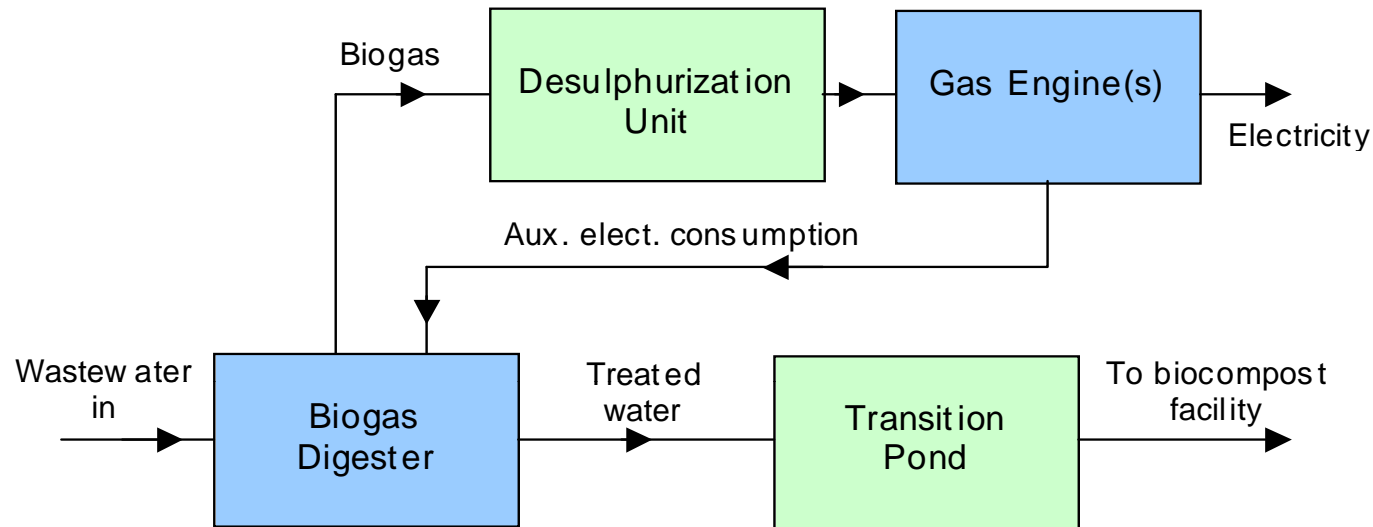
Organic Fertilizer

- ◆ Project is effectively insulated from direct competition due to secured off-take of organic fertilizer by EPCL.
- ◆ Growth of organic fertilizer market quite rapid:
 - Land area used for organic farming worldwide has grown during the period 2000-2006.
 - Thailand leads the world in rice organic farming.
 - World fertilizer prices surged by >200% in 2007.



Source: SOEL-FIBL survey 2007

Production Process/Technology (biogas-to-energy)



- ◆ Proven biogas-to-energy process/technology
 - ◆ Biogas production = 5,210 Nm³/h at 24 hrs/day for 330 days p.a.
 - ◆ Power generation = 64,944 MWh p.a.
- ◆ Selection of suppliers through a Competitive Tender using Technology Specialists as Consultants.
- ◆ Turnkey lumpsum contract (FIDIC)

◆ biogas digester, desulphurization unit, gas engines

Management Team

**DR. PRASAN
SIRINNONT**

Chief Executive Officer and President

- Ph.D. in Industrial Systems Engineering, University of Texas
- Managing Director, Silverdale Services Thailand where he is responsible for Thailand, Indonesia and Philippine offices
- Over 25 years of management experience in energy, petrochemical, renewable energy investment sectors

**ALAN DALE
GONZALES**

Commercial Director

- Masters of Engineering and MBA degrees from the Asian Institute of Technology
- Executive Director, Full Advantage Co., Ltd.
- 20 years experience in project development, financing and implementation of energy and environment projects in South-East Asia and beyond

**VAZZAN
TIRANGKURA**

Technical Director

- Mechanical Engineer with MBA Degree from Chulalongkorn University
- Technical Director, Full Advantage Co., Ltd.
- More than 10 years working experience in the engineering, O&M of power generation and renewable energy projects

Upside Potential

- ◆ High replication potential: sugar mills, ethanol plants, starch, oil palm and food industries in Thailand and other countries of South-East Asia.
- ◆ Potential sales of excess biogas to the ethanol plant.
- ◆ Recovery of waste heat to expand the electricity generating capacity, with corresponding increase in carbon credits.
- ◆ Possibility of extension of carbon credits for 14 more years (2 x 7 years).
- ◆ Upside benefits from carbon credits if market grows more favorably.

Conclusions

SPRING-1 offers... Well-structured investment -- Attractive returns

- ◆ Reliable and experienced sponsors;
- ◆ Proven technological solutions;
- ◆ Sound project structure having secure raw material supply and off-take arrangements;
- ◆ Commercially sustainable project with attractive returns to investors;
- ◆ Highly positive environmental, social and sustainable development impacts.

Thank You

www.full-advantage.com

PROJECT TEAM

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|------------------------|---------------------------------|--|-------------------|
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