



From Cane to Fuel The Practical Aspects of Assessing Bioethanol Project Feasibility

Sustainable Biofuel Development Research Workshop
04 February 2009

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Agenda

Feasibility Assessment

- The Objective
- The Elements
- The Process

Critical Elements in Assessing Bioethanol Projects

- Feed Stock
- Logistics
- Markets and Off-take Agreements

A brief Introduction to Poyry Bioenergy Capability

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Feasibility Assessment

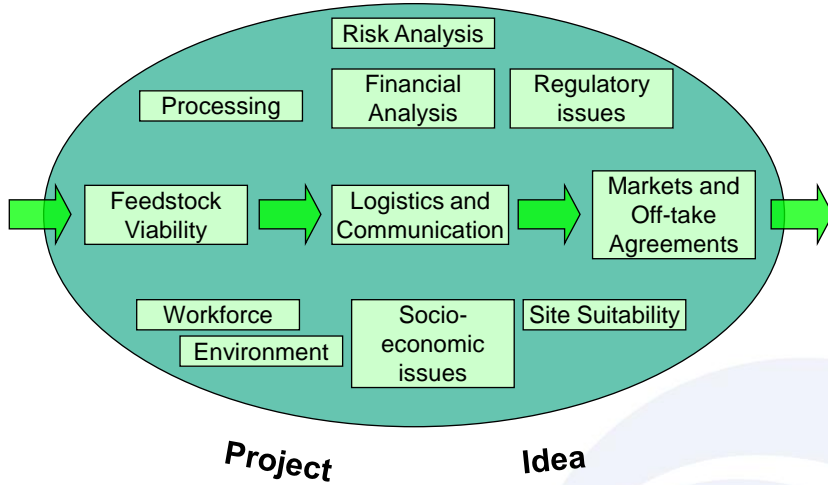
The Objective

Objective

“Should we Proceed with the Proposed Project Idea”

The Elements

Example from a Proposed Assessment of an Idea in Papua

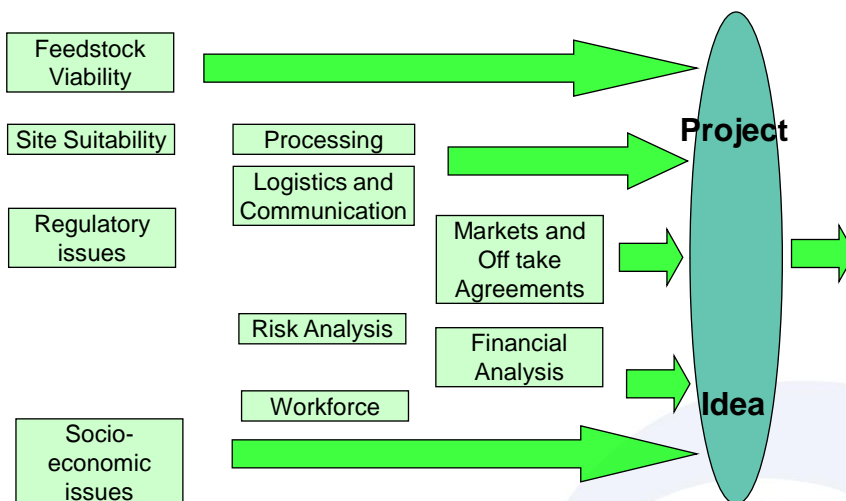


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The Process

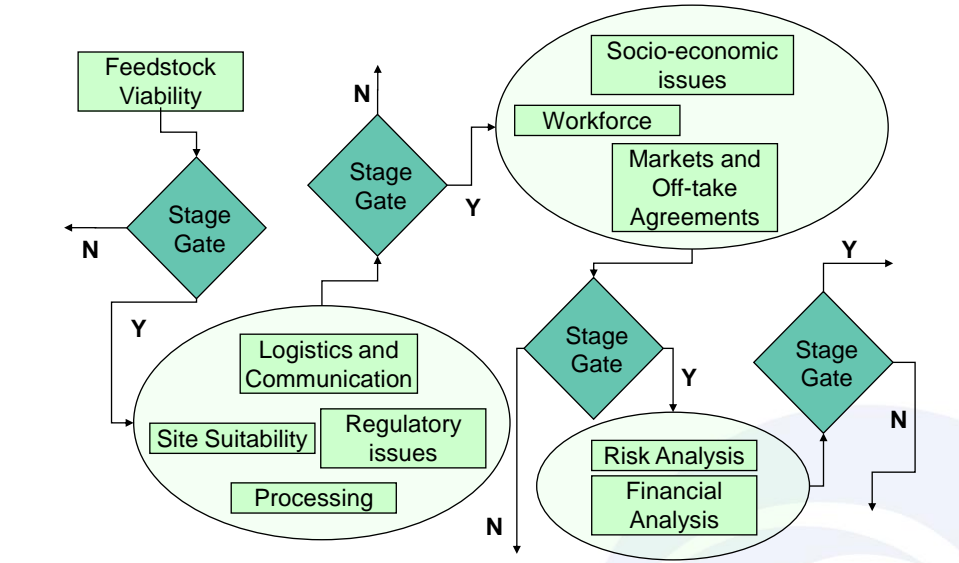
Example from a Proposed Assessment of an Idea in Papua



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The Process: Staged Approach



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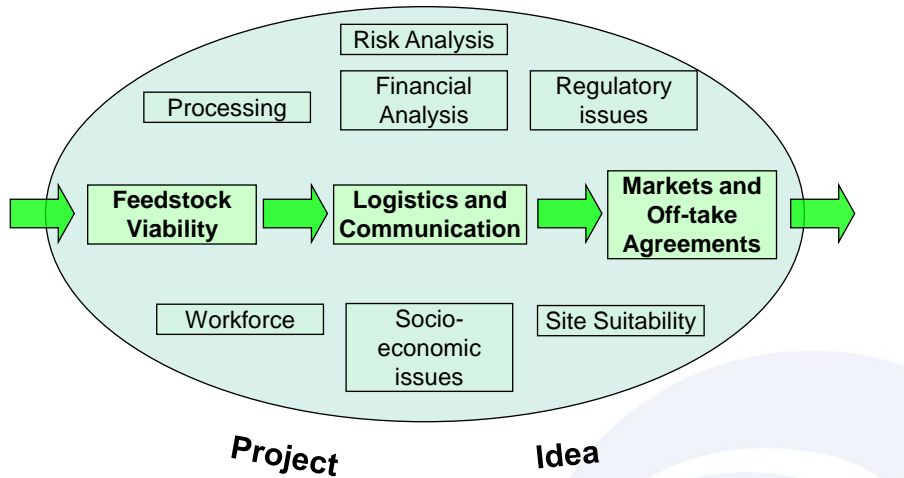


Critical Elements in Assessing Bioethanol Projects

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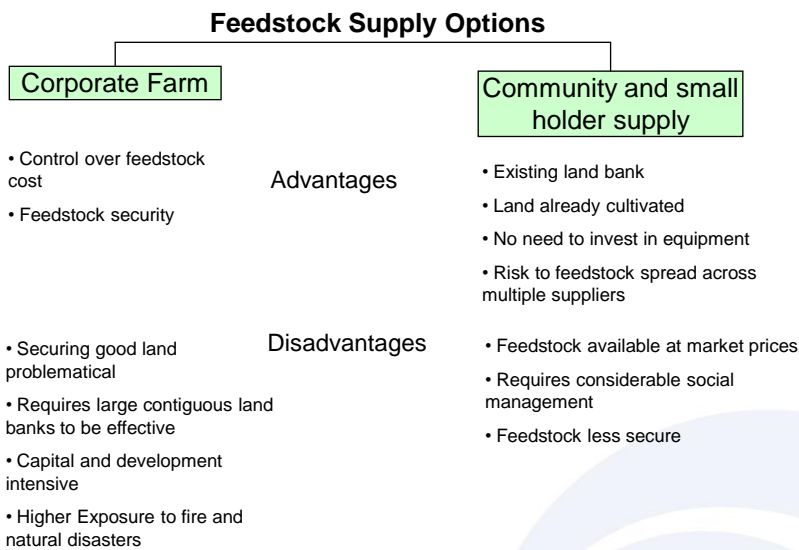
Bioethanol Feasibility Key Elements



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Feedstock: Supply Models



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Feedstock

Assessment Elements

- Existing land use and tenure status (ownership and existing land claims)
- Licences and permissions (land preparation, plantation and operation)
- Land suitability (topography, soil, rainfall, temperatures)
- Net available area (plantable)
- Capital and operating costs (equipment, materials and labour)
- Expected yields and total sugarcane production from the plantations
- Supply arrangements and agreements (Estate model versus third party supply)
- People and experience

Land Base in Indonesia

Land is the critical factor than most companies should be addressing now as this relates directly to the availability of feedstock

Factors to consider are:

- Land use zoning i.e. forestry or agriculture
- Licensing periods if government land
- Existing vegetation cover
- Possible conflicts with other land use e.g. mining, food crops
- Social claims
- Local community culture
- Governor / Bupati support for the project
- Soil type
- Topography and climate

Logistics

- Transportation of feedstock (Corporate farm/Community and Smallholders)
- Moving construction equipment and building materials to site
- Ethanol storage
- Ethanol transportation to market



Logistics (cont'd)

Assessment Elements

- Transport routes (road, rail, river, air: quality, capacity)
- Power networks (quality and capacity)
- Telecommunications (availability)
- Other infrastructure elements (bridges, harbour and storage facilities: quality and capacity)
- Feedstock delivery costs
- Ethanol transportation costs



Markets and Off-take

- Domestic needs
- Export opportunities
- Negotiating the selling price (agreement basis, competition and minimum prices)



Markets and Off-take (cont'd)

Assessment Elements (Global, Regional, Local Focus)

- Current market size
- Current market growth
- Trade (imports/exports)
- Drivers for demand
- Industry structure
- Competitive situation
- Market barriers to entry
- Future demand and supply development
- Likely price trend

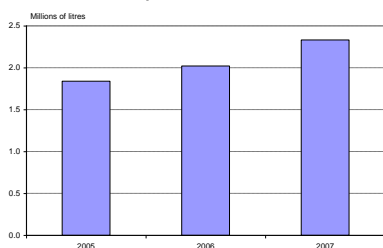


Markets and Off-take: Example- Philippines

Mandates do not mean guaranteed markets

- **Example: Philippines**
- **Current market size for fuel ethanol (bioethanol):** Small (2.33 million litres 2007)
 - Currently limited domestic production (San Carlos Bioenergy plant undergoing commissioning)
 - Philippines market is being satisfied with imports
 - The mandated period for blending is slated to start on February 2009, at a minimum of 5% blend.

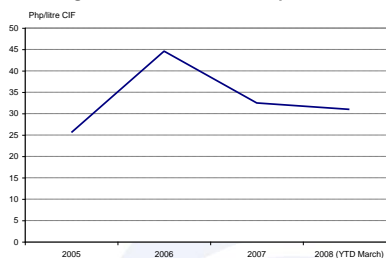
Fuel Ethanol Imports



Source: DOE

2006 prices represent supply from Australia and China. Supply from Brazil and SEA is typically at a lower price

Average Price of Fuel Ethanol Imports



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Markets and Off-take: Example- Philippines (cont'd)

Gasoline consumption for transport is a key driver for bioethanol.

Key **driver** for fuel ethanol consumption is **gasoline consumption**. Combined with mandates.

Philippines Biofuels act:

- Mandating of the blending of 5% ethanol into locally distributed gasoline by 2009
- Mandate to increase to 10% by 2011.

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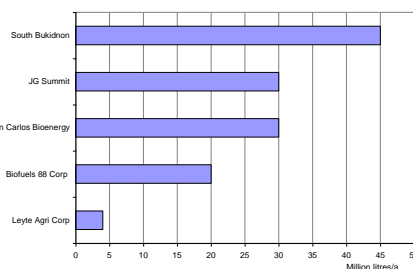


Markets and Off-take: Example- Philippines (cont'd)

San Carlos will be the first major bioethanol plant (based on sugar cane feedstock)

- At least 14 bioethanol projects being developed in the country at present
- Majority has initial registration with the DOE, or have had approval from the BOI.
- An additional two or three plants likely to be constructed in the coming three years
- When mandates come into force only about 30 million litre/a production capacity will be in-place

Bioethanol Projects with BOI Approval



Source: Merritt Partners & Pöyry

Markets and Off-take: Example- Philippines, Future Prospects

- Mandated supply suggests the future bioethanol market grow to just over 220 million litres in 2009, doubling to 460 million litres in 2011.
- Only two domestic projects (30 million litres/a) likely to be ready by 2009. This capacity is equal to 14% of 2009 mandated demand.
- Highly unlikely that domestic production capacity will meet mandated demand even by 2018
- Oil companies will still rely on imported ethanol to meet regulatory requirements.

Year	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Bioethanol demand (millions litres)	6(est)	221	224	456	463	471	478	486	493	500	508
Plant development scenario (capacity million litres/a) *	0	30	30	75	125	175	225	275	325	375	425
% of mandated demand	0%	14%	13%	16%	27%	37%	47%	57%	66%	75%	84%

* Assuming two plants of 25 million litres/a are commissioned every year from 2012 onwards

The Importance of Off-take Agreements

A contract between suppliers (ethanol manufacturer and buyer (eg. Petroleum company) to purchase ethanol normally at agreed volumes and at an agreed price typically linked to the price of oil.

The importance of having a negotiated off-take as early as possible cannot be understated:

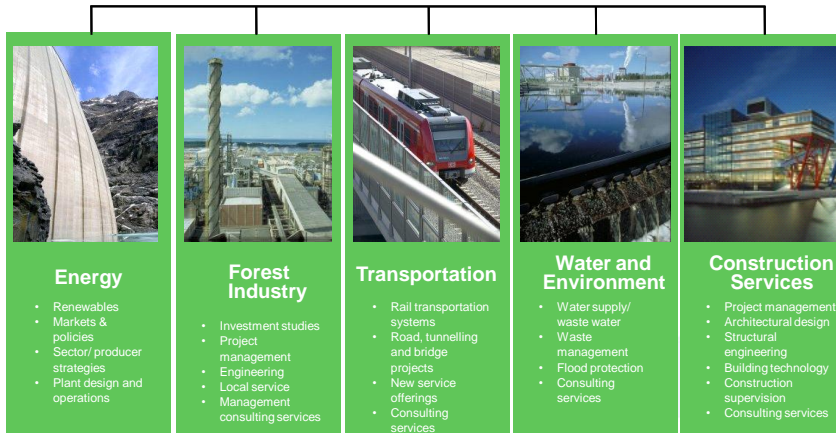
- Trade security
- Established pricing mechanism's for ethanol (linked to petrol prices, inclusive/ exclusive of delivery costs)
- Other by-products (electricity and CO₂)
- Investor confidence (Banks and private investors)

A brief Introduction to Poyry Bioenergy Capability

The Pöyry Group in 2009



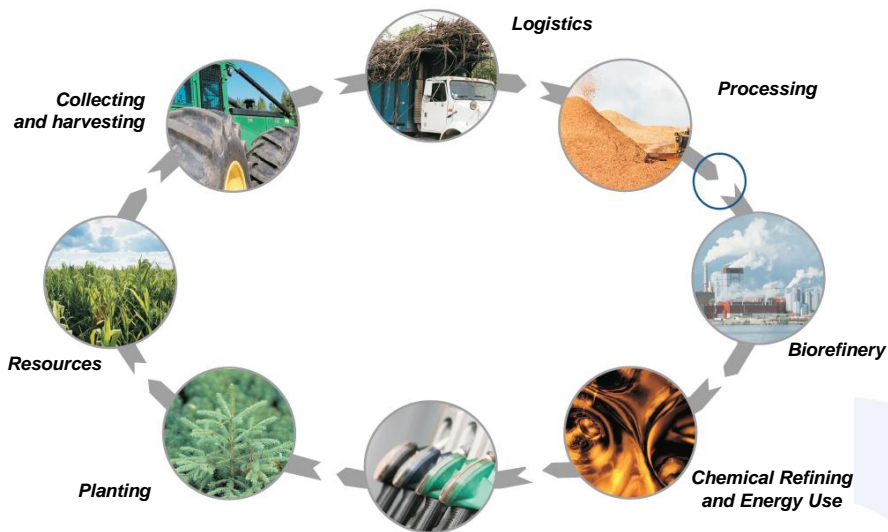
Net sales €780m, Personnel 8 000



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It takes Pöyry Know-how to Manage the Entire Value Chain



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Pöyry Services Cover the Entire Range of Biofuels Business

Areas	Services
<ul style="list-style-type: none"> • Agro-fuel resources <ul style="list-style-type: none"> - eg. sugarcane and jatropha • Forest resources • Logistics • Handling and processing technologies: <ul style="list-style-type: none"> - eg. pellets and woodchips • Refining: <ul style="list-style-type: none"> - ethanol, biodiesel, biorefining • Landfill gas and biogas • Flue gas treatment processes • Carbon footprint & CDM/JI 	<ul style="list-style-type: none"> • Business strategies • Assessment of bioenergy resources and potentials • Feedstock options and sourcing • Master plans and market studies • Feasibility studies • Due Diligence • Investor search • Environmental impact assessment and environmental permitting • Engineering from design to start up



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Processing Example : San Carlos Bioenergy, Philippines

Project description:

- Sugar cane-Bioethanol plant with a capacity of 125'000 lpd¹⁾, and the production of 8 MW electricity and process steam. Up to 4 MW is exported to the grid.

Services Pöyry :

- Project management of the Ethanol plant with 8 EPC packages (FIDIC: Plant and Design-Build)
- Turnkey supply of the Bioethanol plant including:
 - Detail design
 - Procurement
 - Delivery to site
 - Construction
 - Test and commissioning



Period of realisation:

Construction 2007 – 2008

¹⁾ Lpd = litres per day

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Selected Recent References (exclude carbon references)

YEAR	CLIENT	PROJECT AND SCOPE OF SERVICES
2008	Confidential	Assessment of business models for biomass sourcing
2008	Confidential	Mindanao bioethanol due diligence
2008	Confidential	Review of biodiesel business plan, Thailand
2008	Confidential	Ghana oil palm
2008	Confidential	Raw material and market analysis for biomass power plant
2008	Confidential	Bioenergy workshop-phase III Weitere Begleitung
2008	Confidential	Trends in biomass availability in global new Hampshire
2008	Confidential	Biomass raw material availability analysis-vegetable sources oil
2008	Confidential	Wood to energy
2008	Confidential	Biofuel strategy options

