



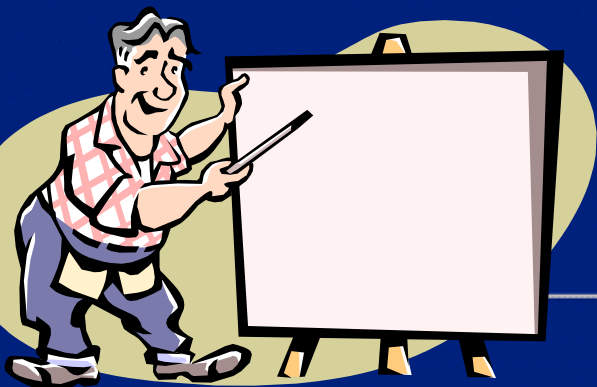
Biofuels & Bioenergy

How Successful Projects Are Put Together

Jeff Ranney, PhD.

Harris Group Inc.

Harvesting Clean Energy



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Pasco, WA



Key Messages

Project Success

- Assembles Team
- Involves Team Early

Project Execution

- Design Perspective
 - Proven Processes
 - Developing Technology
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Technology Types

Proven

Crop Ethanol

- corn, wheat, potatoes...



Landfill Gas to Energy

Wind to Energy

Developing

Biomass Ethanol

- agricultural residue , municipal solid waste

Biodiesel

Biomass Digestion/Combustion





Technology Affiliates

Ethanol Developers

The Gaylor Alliance of Companies

North Central Construction

New Technology Developers

NREL

TVA

MASADA



Successful Project Team

Harris Group Inc.

*Developer/Owner

*Engineering

*Finance

*Construction

*O&M

*Insurance

*Community

*Permitting Agencies/Experts



Project Execution Overview

- Define Project
 - Determine Feasibility
 - Design & Cost Estimates
 - Financing
 - Detail Design & Construction
 - Operations and Maintenance
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Engineering Steps

- Feasibility Study
 - Define Process Parameters
- Engineering
 - Process Flow Diagrams
 - Equipment Specifications & Quotations
 - Preliminary Design & Material Take-off
 - Capital Cost Estimate
 - Schedule
- Permitting & Financing
- Detail Design & Construction





Developing Technologies

- Technology Selection
 - Process Testing
 - Bench
 - Pilot
 - Development Engineering
 - Evaluation
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Project Finance

- Performance Guarantees
 - Capital Cost
 - Operating & Maintenance Contract
 - EPC Contract
 - Due Diligence
 - Legal
 - Source of Funding
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Conclusions

- Team Approach Equals Project Success
 - Market is Ripe
 - Being done
 - Resources Available
 - Government funding
 - Industry experts/consultants
 - Advocacy groups
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