INEOS New Planet BioEnergy
Indian River BioEnergy Center

2015 DOE IBR Platform Peer Review

March 24, 2015

Kelly Russell
Regulatory and External Affairs

INEOS Bio

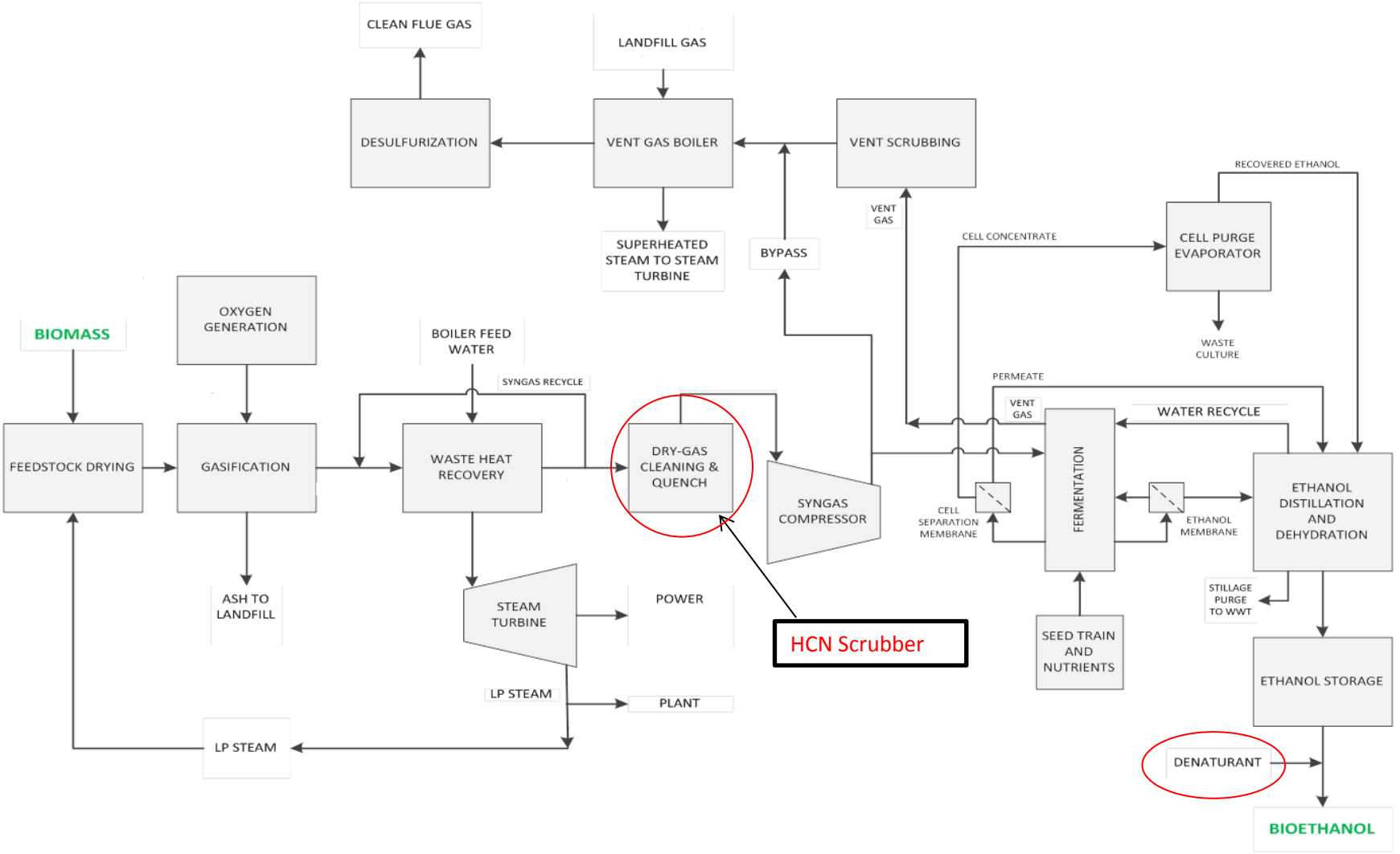
INEOS Bio/INPB
Indian River BioEnergy Center (July 2013)

INEOS Bio

INEOS New Planet BioEnergy
Commercial Demonstration Facility (May 2013)

INEOS Bio/INPB
Indian River BioEnergy Center (May 2013)

Process Overview



Goal Statement

- The completion of this project is a step further towards meeting the RFS2 goal of displacing fossil fuels with 16B gallons of cellulosic biofuels by 2022.

- The Indian River BioEnergy Center when at capacity will add 8 MMGPY of cellulosic ethanol production capacity in the US and renewable power.

- Broad deployment of the INEOS Bio technology in U.S. utilizing a variety of feedstocks

Quad Chart Overview

Timeline

- Project start date: 12/28/2009
- Project end date: 12/31/2014
- Percent complete: 100%

Budget

	Total Costs FY 10 –FY 12	FY 13 Costs	FY 14 Costs	Total Planned Funding (FY 15-Project End Date
DOE Funded	$45.2M	$2.1M	$2.8M	$188K
Owner Funded	$74.8M	$7.2M		

Barriers

- Barriers addressed
  - HCN, installed scrubber system
  - Power outages
  - Regulatory

Partners

- INEOS Bio
  - Technology license
  - Overall project management
  - Start-up and commissioning
  - Operations
- New Planet Energy
- USDA
- DOE
- State of Florida

*If there are multiple cost-share partners, separate rows should be used.

Project Description

Construct and operate a commercial demonstration scale bioenergy facility utilizing the INEOS Bio Bioenergy technology

Demonstrate at full commercial scale the economic conversion of a variety of different lignocellulosic waste biomass feedstocks to bioethanol and renewable electricity

Indian River BioEnergy Center
Project Overview

- **8mmgal/yr cellulosic ethanol**
- **6 MW gross power generated**
- **Vegetative & Yard Waste + MSW**
- **Strong US, State government partnership**
- **Ground broken in February 2011**
- **Mechanical Completion – June 2012**
- **EPA Registration RFSII – Aug 2012**
- **Renewable Power Generation – 3Q 2012**
- **Cellulosic Ethanol Production - 2013**
- **Installation of HCN scrubber system - 2014**

Project Management Approach

- This project has been managed using a five-stage capital project management process and is currently in the OPERATE stage

	APPRAISE	SELECT	DEFINE	EXECUTE	OPERATE
	Front End Loading				
Goal	Determine Project feasibility & business strategy alignment.	Select the preferred project option(s).	Finalize project scope, cost, schedule and fund project.	Implement project, consistent with scope, cost, schedule.	Evaluate project to ensure performance &ROI.
	• Utilized extensive integrated pilot plant data (40,000+ hours) to define comprehensive material and energy balances for each unit of operation	• Utilized focused pilot plant trials, some with vendor support, and EPC contractor expertise to select specific equipment	• Utilized site specific feedstock in pilot trials and extensive EPC contractor expertise to optimize the process design, plant layout and equipment vendor selection	• Detailed design & construction completed in 20 months	• Benchmarking study of project performance and objectives. • Compare project performance against project objectives, complete PTR

3 – Technical Accomplishments/ Progress/Results

Summary

Milestone	Date
Broke Ground	February 2011
DOE Final Award	August 2011
Construction Completed	June 2012
First Renewable Power Produced	September 2012
First Cellulosic Ethanol Produced	June 2013
Process shut down for HCN scrubber installation and debottlenecking	December 2014

3 – Technical Accomplishments/ Progress/Results

Milestones
All Federal, State & local permits received
EPA pathway approved under RFS II, RINS generated
Generation of Renewable Power demonstrated at 90% capacity and export of excess power to the FL grid
Worked with Florida Power and Light to resolve power issues
Catalyst poison investigated and identified to be HCN
Pilot Plant developed plan to explore different options to address HCN in syngas
Design, install and commission the solution to the cyanide issue at commercial scale

3 – Technical Accomplishments/ Progress/Results

Project Execution

Milestone
Project constructed on schedule and under budget
1,000,000 work hours on project – zero classified reportable injuries
OSHA Classified Rate for project of 0.201/100,000 hrs
Key Milestone achieved breaking ground and construction of core plant in 15 months – Feb 2011 – June 2012;
Performance Test scheduled for 2nd half of 2015

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Relevance - Carbon Neutral
Advanced Biofuel from Waste

Waste to bioethanol with INEOS Bio Technology	**GHG Saving vs. Gasoline**
Vegetative Waste	120%
Post-recycled Municipal Solid Waste	80 - 90%
Waste wood	125%
50:50 Garden & Food Waste	110%
Indian River Bioenergy Center expectation	**105%**

- GHG savings exceeds RFS2 threshold target of 60%
- One gallon saves ~5 pounds of CO_2 *vs.* gasoline

Relevance - Meeting Key Societal Challenges and Market Needs

World-scale biorefineries

Utilize INEOS BioEnergy Technology

- Low cost, carbon neutral advanced biofuel for use in today's cars
- Local waste to fuel & power for local use
- Robust, reliable & safe
- Market ready

Meet Society's Emerging Challenges

- Climate change
- Efficient use of waste
- Energy independence
- Energy diversity
- Job creation
- Wealth creation

Respond to Market Drivers

- Landfill diversion
- Recycling targets
- Energy demand
  - Cellulosic ethanol
  - Renewable power

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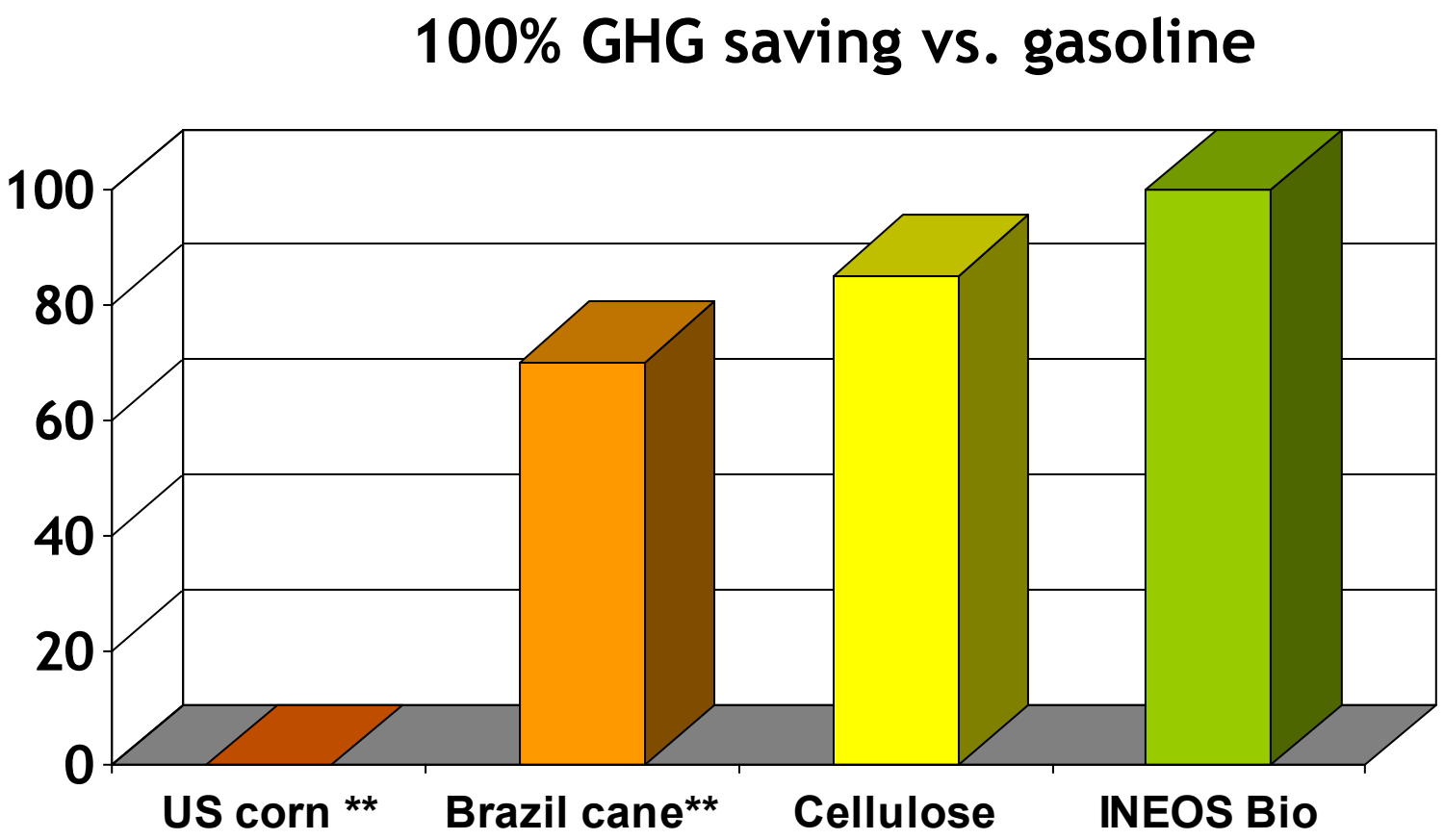
Life Cycle Analysis



Independent studies by Eunomia

Economic Benefits

- Total Jobs – over 400 created & retained
- 90% of equipment – U.S. Sourced
  - 10 States (NY, OH, TX, IL, AR, NC, GA, etc)
- Millions of Dollars into the U.S. Economy
  - Engineering, Equipment, Construction, etc.
  - Use of local subcontractors
- 63 Full time jobs (2/3 from local area)
- Waste Conversion Solution for Community
  - Helping Counties meet 3R's – Reduce, Reuse, Recycle
  - Local source for Agricultural waste solution
- Local Bioenergy (fuel + power) into economy

Indian River BioEnergy Center
Summary

- World-class technology built in record time, safely, and under budget;
- Use of Integrated Pilot Plant facility in design, optimization, and scale-up – including continued use in further plant optimization & gaining knowledge during commissioning;
- Mitigated risk through experienced team and well-known constructors and equipment providers;

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