



Pronounced “ENERGY”

RENEWABLE ENERGY

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Founder and Chief Executive Officer

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Introduction

- **ENRQI** intends to be the number one biotechnology company in the energy from lipids sector
- To achieve this **ENRQI** envisages at least 2 biology projects and underpinning chemistry projects
- Our products will be biodiesel, aviation fuels and higher value niche oils and chemicals

Going up Greenhouse gas emissions and the price of oil (maybe !!!)

The Solution

- Photosynthesis
- Light converts CO₂ to stable, energy containing molecules
- **Photosynthesis has not yet been tailored for today's industrial needs until now !!!**

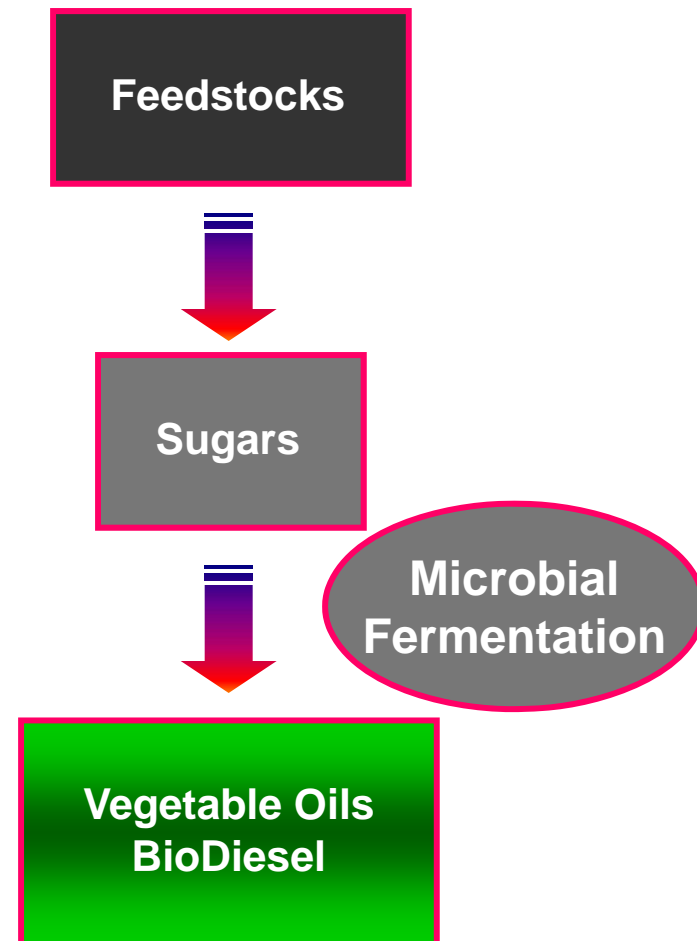
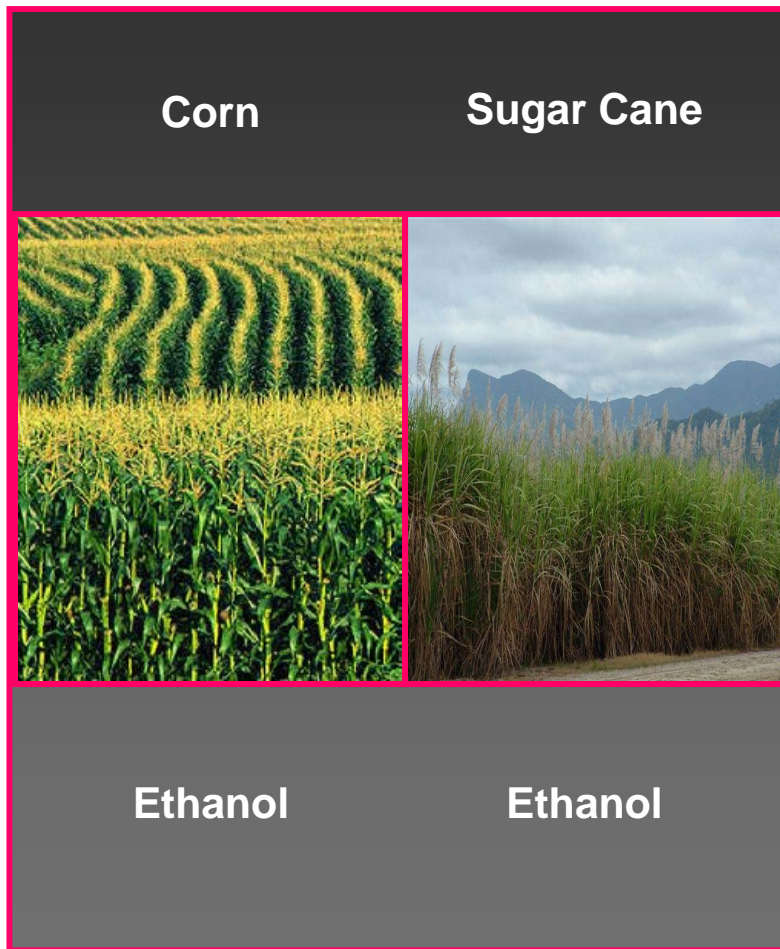
Photosynthesis Technology Packages

- **Light sensitive 7-TM spanning proteins**
 - 36 issued patents – term sheet signed
- **Anti-apoptotic (anti-cell death) factors**
 - 29 issued patents, patent applications and related “know how” – term sheet signed
- **Transformation technologies**
 - Genetic modifications of difficult to transform cells/species – late stage negotiations
- **Oleagenous yeasts**
 - Complete fermentation project to produce vegetable oils directly from sugar feedstocks – term sheet signed
- **Metabolic pathway engineering**
 - Negotiations underway

Application Matrix

Project	7-TMs	Anti-cell death	Trans-techs	Lipids yeast	Metab. Eng.
Lipids from Yeast		✓	✓	✓	✓
“Green” Chemistry	✓	✓	✓	✓	✓
Lipids from Algae	✓	✓	✓		✓

Microbial fermentation using oleagenous yeasts



Industrial cell culture comparisons

Source	Product yield in gms/litre
Ethanol (yeast)	150
Chemicals (E. coli)	100
Peptides (E. coli)	40-80
Proteins (E. coli)	20-50
Proteins (Mcells)	20-40
mAbs (Mcells)	10-20
Oils (Microalgae)	0.100 (1500 fold LESS than BIC)

Oleagenous yeasts

- **ENRQI** collaborators have screened ~ 50,000 model yeast strains and mutants
- ~ 20 are high oil producers (50% oil, dry weight)
- Genetically tractable
- Non-pathogenic
- Suitable for industrial use
- Not previously exploited for biofuels applications (intellectual property opportunities)

Status: Proof of concept

<u>Experiment</u>	<u>Achieved ?</u>
Rapid growth	yes
Glucose to oil	yes
Oil accumulation quantified	yes
Sugar cane juice to oil	yes
Bagasse extract to oil	yes
Oil composition defined	yes
Optimal culture conditions defined	yes

Glycerol as a feedstock (bi-product from all biodiesel processes) Status: Proof of concept

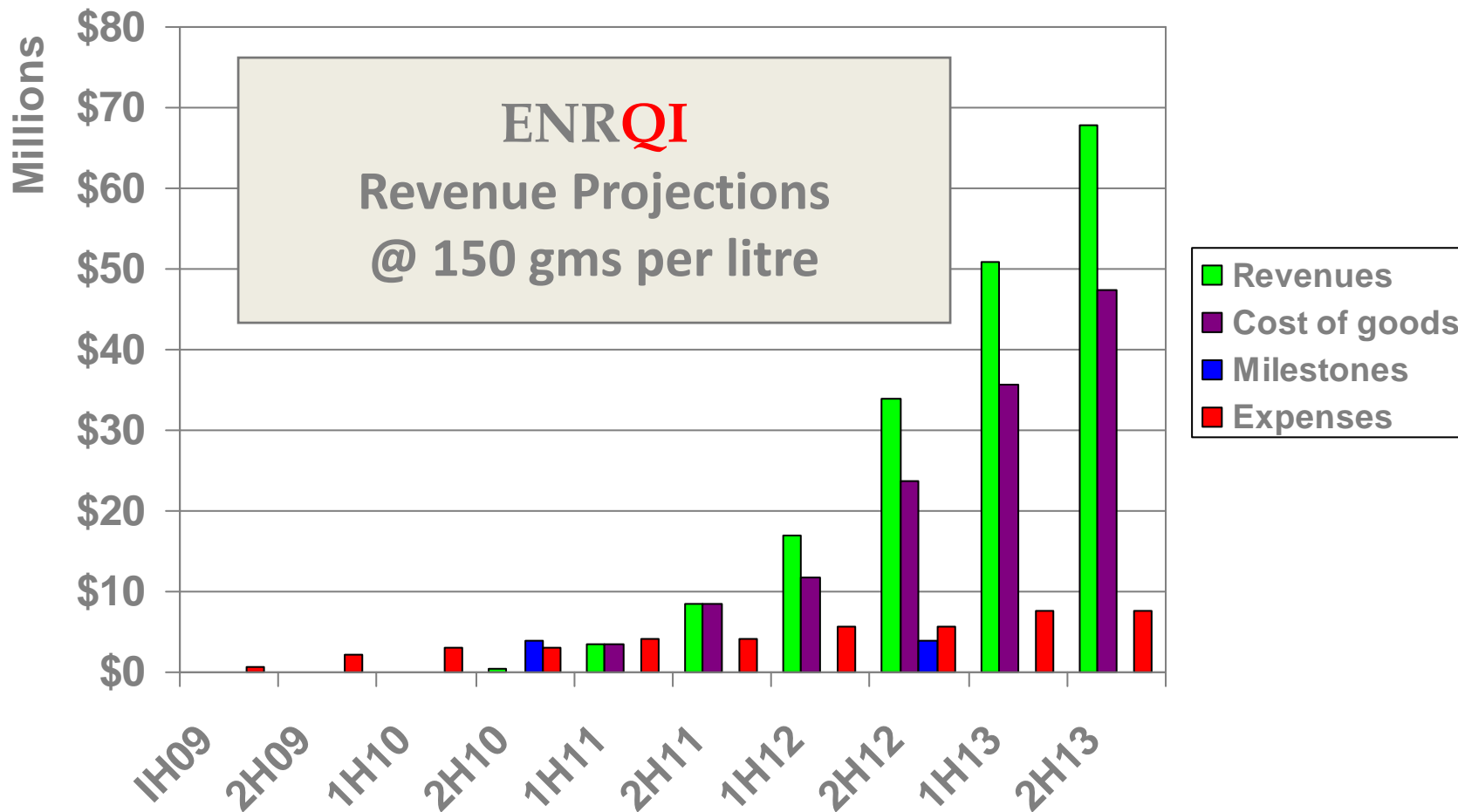
<u>Experiment</u>	<u>Achieved ?</u>
Rapid growth	yes
Glycerol to oil	yes
Oil quantification	yes
Oil composition	yes
Optimal growth conditions	yes

Competition – oleagenous yeasts




- Our biodiesel costs expected to be \$1-50 per gallon or less
- Current vegetable oil feedstocks
 - Real costs not competitive, low efficiency, use of arable farm lands
- Microbial based technologies
 - Amyris ... *E. coli* based fermentation
 - LS9 ... *E. coli* based fermentation
 - Each expected to have higher costs, lower yields, greater capital expenditures
- Microalgae
 - Sapphire Energy ... green oil project ... algal yields nowhere near competitive with fermentation as yet
- Longer term
 - Synthetic Genomics ... highly ambitious, synthetic cell technologies applied to energy sector ... 10 years away from commercialization

Business objectives – oleagenous yeasts




- Some development required then ready for scale-up
- Establish feedstock partnerships (possibly a sugar producer)
- Establish production partnerships – existing fermentation capacity (probably wine industry)
- Establish strategic partnership for distribution (probably an oil company)
- Shared revenue model – not royalties



Project status - 2010

Project	Research	Process Development	Large Scale Production
Lipids from Yeast	Complete	Complete	
"Green" Chemistry	Complete		
Lipids from Algae			

Project status - 2012

Project	Research	Process Development	Large Scale Production
Lipids from Yeast	Complete	Complete	Complete 
"Green" Chemistry	Complete	Complete	Complete 
Lipids from Algae	Complete		

Scientific Advisors

- **John C. Reed, M.D., Ph.D.**
President and CEO
Professor and Donald Bren Presidential Chair
Burnham Institute for Medical Research, San Diego, California, USA
- **Martin B. Dickman, Ph.D.**
Christine Richardson Professor, Department of Plant Pathology and Microbiology
Director, Institute for Plant Genomics and Biotechnology
Texas A&M University, Texas, USA.
- **Paul de Figueiredo, Ph.D.**
Faculty of Genetics, Program in Biotechnology,
Faculty of Molecular and Environmental Plant Sciences,
Department of Veterinary Pathobiology & Department of Plant Pathology and Microbiology
Texas A&M University, Texas, USA
- **Emmanuel A. Theodorakis, Ph.D.**
Professor of Chemistry
Department of Chemistry & Biochemistry UCSD, San Diego, California, USA
- **Richard M. Fine, Ph.D.**
CEO, BioPredict, New Jersey, USA

Management Team

- **Nigel R. A. Beeley, Ph.D.** --- *Founder and CEO*
BioDuro, Senomyx, Arena, Amylin, Celltech, Synthelabo, ETH Zurich, Switzerland, U. of Manchester, UK.
- **AAAQI** --- *Automation Technologies and Informatics*
Chemical Engineer with 15 years Biotech experience
- **BBBQI** --- *Biology*
Neuroscience/Molecular Biology Ph.D. with 10 years Biotech experience
- **CCCQI** --- *Chemistry*
Chemistry Ph.D. with 15 years Biotech experience
- **DDDQI** --- *Business Development*
Chemistry Ph.D. with 10 years experience, 8 in business development
- **EEEQI** --- *Finance*
Business and Economics major with 5 years experience
- **FFFQI** --- *Head of China Operations - TBD*

Funding requirements

- **Prior funding**
 - Founders efforts, costs and expenses, programs from academia, elsewhere
- **Funding commitment**
 - \$2M from Masood Tayebi (Founder and Chairman of BioDuro)
- **Current funding round**
 - Seeking \$8M to \$10M series A round
 - Pre-money valuation \$6M, post-money valuation \$16M to \$18M
- **Use of funds**
 - Progress oleagenous yeast project to commercial viability
 - Establish higher value “green” chemicals programs
 - Use technology packages to achieve industrial cell-culture yields for algae
 - US/China business model gives cost advantages
- **Exit strategy**
 - IPO or acquisition in 2H 2012, based on products and profitability



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