



Bernard Ennis

and



Steven Wilmes

**Project Development Opportunities in the Chemical Industry -
an Individual Developer's Perspective**

CHEM SHOW – Consulting Tips, Case Histories and More

Association of Consulting Chemists and Chemical Engineers



**Javits Convention Center
New York City**

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Who We Are

Bernard Ennis, P.E. – President, EGT Enterprises, Inc.

- **Chemical Engineer – 20 years consulting to petroleum, chemical and electricity industries**
- **Inventor – Two series of patents**

Steve Wilmes – Manager, Process Group, Thielsch Engineering, Inc.

- **Chemical Engineer – 20 years consulting engineering and construction industries**
- **Industrial strength technical and construction capabilities in diverse markets**

EGT Patents

- **CONSERVED ENERGY REACTOR**– heated by combustion
- **ELECTRIC REACTOR**– heated by electric resistance
- Both are high temperature chemical reactors
 - Various hydrocarbon feedstocks
 - One, two or many chemical products

The Landscape

**Internal
Infrastructure**

**General
Guidance**

**Business
Plans**

Finance

Consultant

**Flexible
Day Job**

**Intellectual
Property**

Partnering


Competition

General Guidance to Consultants

- Do something you like
- Do something you are good at
- Do something somebody is willing to pay for
- Understand your exact products
- Understand your exact markets

Never Stop Selling!

Personal Considerations

- Are you ready for very long-term effort?
 - Do you have the enthusiasm, capability and commitment?
 - Do you have the personal financial resources?
- 
- Do the possible – keeping the ultimate in mind
 - Get ready for lots of rejection.

Can you handle all this?

Business Plan vs. Plan for Business

- Write a “BP” every year – then file it for a template to update as needed
- Annual objectives and specific work plans for tangible accomplishments are best
- SWOT Analysis is useful
 - Strengths Weaknesses Opportunities Threats
- SWOT insights keep you current as you work
- SWOT enables real-time tailoring of available information appropriate for planned initiatives and for spontaneous situations → “BP & PB”

Starting a Consulting Business

Problem – How to find first cash flow?

Action – Joined a team of established consultants and learned:

- **Expert witness legal services**
- **Insurance claim support**

Result – My “Flexible Day Job”

- **Find my own attorney and insurance clients**
- **Created sustaining income**

My “Flexible Day Job”

Legal and Insurance Consulting

- Ethylene Plant LSTK bid review – Rio de Janeiro
- Ethylene Plant performance – Houston litigation
- Chlor-alkali Plant – Rita business interruption
- Chlor-alkali Plant in India – Court-ordered review
- Refinery & Pumping Stations – Katrina damage
- Wax Plant in Canada – Explosion BI loss
- Tar Sands Plant in Alberta – Advise Litigators
- Grid Privatization in Brazil – Advise NYC investors

Finding Finance

Problem – How to fund my patent developments and commercialization costs?

Action – Evaluated mid-sized construction companies with relevant process expertise and market presence.

Result – 10+ year collaboration with EGT granting Thielsch certain exclusive business positions

- **EGT funded Thielsch for technical aspects of EGT's legal and insurance work**
- **EGT funded its patent development engineering and some feasibility studies**
- **Thielsch funded other EGT Project Proposals**

EGT Funded Projects at Thielsch

- **Rocket Reactor & Electric Reactor developments**
- **Partial Oxidation Reactor mechanical analysis and heat exchanger failure - insurance claim**
- **Enhanced Oil Recovery process design and economics - feasibility study for EOR operator**
- **Process, reforming furnace, mechanical, metallurgical and controls evaluations for Ammonia/urea plant - expert litigation support**

Thielsch Engineering Support

Couldn't be where I am without them

- **Rocket Reactor – Process design, mechanical design and thermal stress modeling**
- **Electric Reactor – Chemical kinetic model**
- **Computer Simulations for process flow sheet developments**
- **Piping, Control Systems and Electrical Designs**
- **Capital Cost Estimates and Economic Analyses**
- **Market Intelligence and General Support**

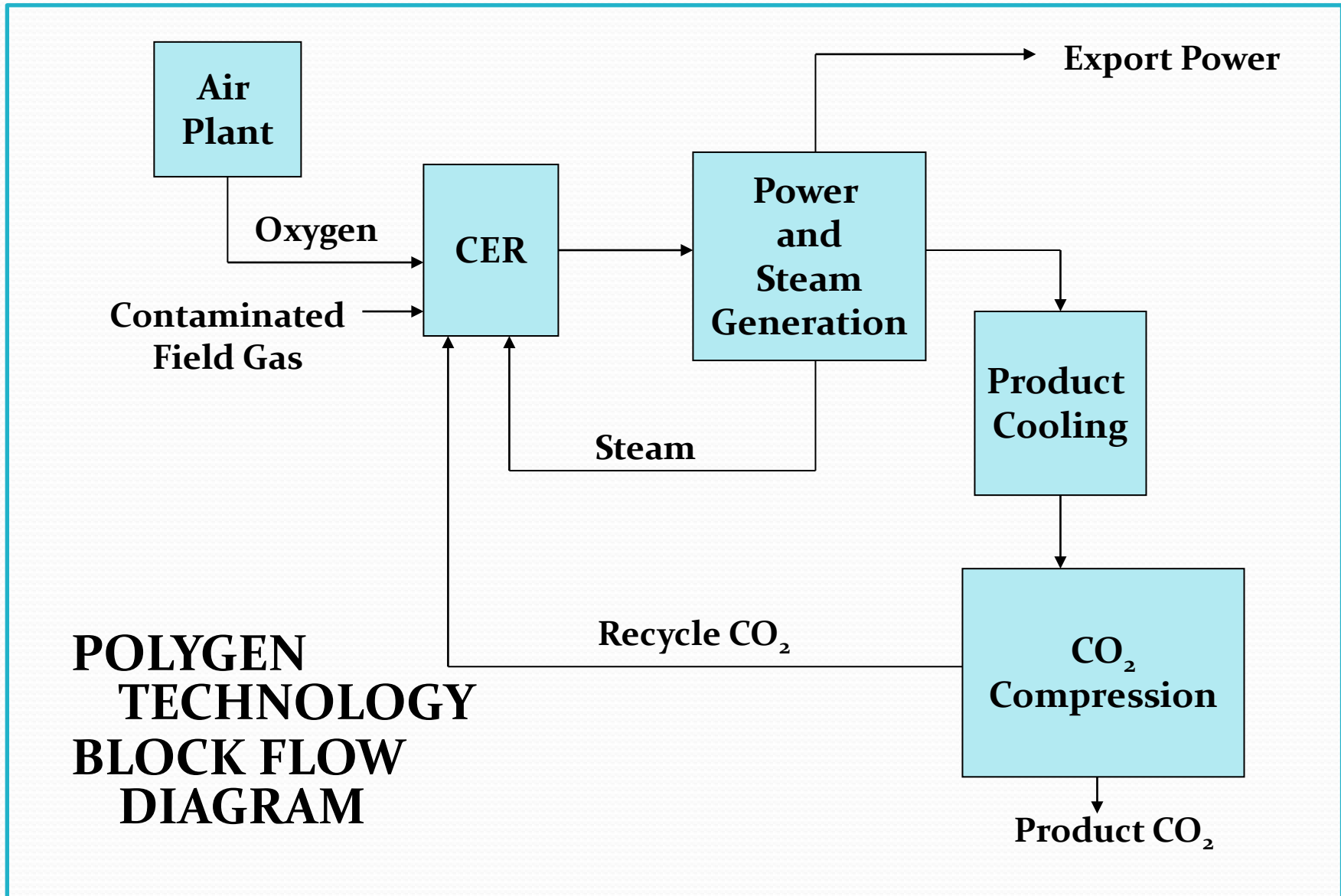
EGT Enterprises, Inc./
Thielsch Engineering, Inc.
Collaborations



Major U.S. Oil Producer

- Problem – Convert low calorific natural gas fields into high purity carbon dioxide (CO₂) that may be used for Enhanced Oil Recovery**
- Action – Evaluate EGT’s Conserved Energy Reactor Technology in polygen mode to co-produce CO₂ and electricity**
- Result – Heat and Material Balances, Process Flow Diagrams, Equipment Sizing and Specs for five case studies to develop Capex, Opex, IRR and sensitivity studies**

Client – Major U.S. Oil Producer



Client – English University

Problem – Engineering Study for small-scale Process Research System in coordination with English University

Action – Evaluate EGT's Electric Rector Technology to convert hydrocarbons to carbon black. Used engineering software to model the reaction kinetics (time, temperature, pressure aspects of the chemistry)

Result – Heat and Material Balances, Process Flow Diagrams, Equipment Sizing and Specs for five case set to develop Capex, Opex, IRR, sensitivity studies and project cash flows. ERT was optimized for 99 mol% hydrogen product and 1 megawatt of electric energy requirement.

Client – Indian Nations

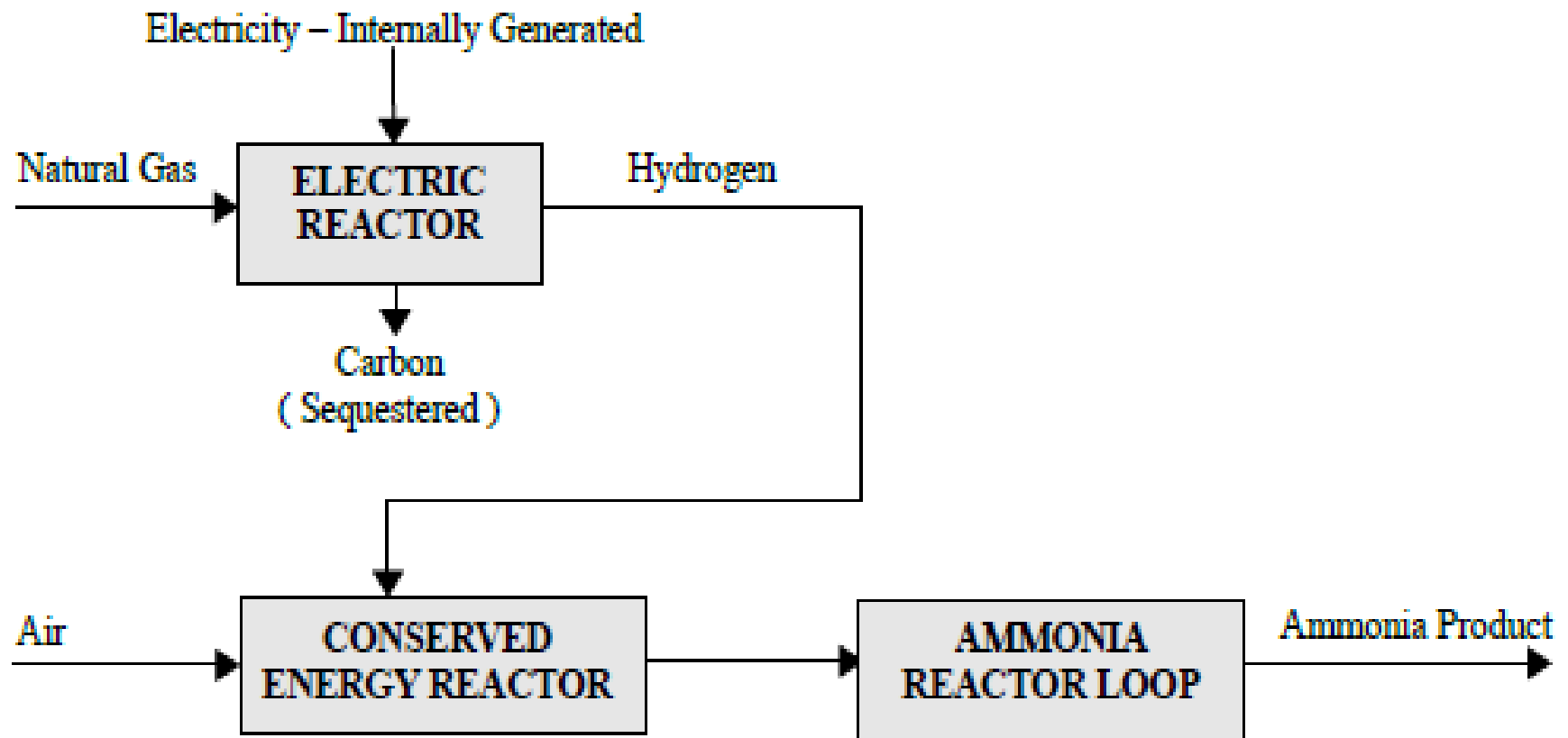
Problem – Engineering Study for Process Demonstration and Research Unit

Action – Evaluate Conserved Energy Reactor and Electric Reactor in combination to produce a hydrogen and nitrogen stream for Ammonia production.

Result – PDRU able to achieve 99.8 mol % ammonia purity with carbon produced from Electric Reactor being sequestered (Environmentally Friendly process). Heat and Material Balances, Process Flow Diagrams, Equipment Sizing and Specs to develop Capex, Opex, IRR, sensitivity studies and market studies for product sales (ammonia and carbon black)

Client – Indian Nations

PDRU Ammonia Plant – Basic Process Flow Diagram (PFD)



Client – Large Oil Refinery in New Jersey

Problem – Engineering Study for conversion of Olefins in Refinery Off-Gas via catalytic reaction

Action – Use a Catalyst Bed Reactor featuring a Clariant palladium hydrogenation catalyst. Natural Gas Diluent is added for temperature moderation as hydrogen in the off-gas converts olefins to alkanes at 350 F

Result – Removing olefins reduces fouling in plant equipment leading to lower maintenance costs and reducing hydrogen qualifies the off-gas as a high quality fuel. Heat and Material Balances, Process Flow Diagram of the Hydrogenation Process, preliminary equipment sizing and specifications, capital cost, preliminary economic analysis

In Conclusion – What You Need

Enthusiasm – Capability – Commitment

- **Work alone discipline**
- **Work with others**
- **Networking ability**
- **Perseverance**
- **Accept rejection**
- **Work outside your comfort zone**
 - **Ideas – People – Places**

Have fun building your business

– Your way

Author Profiles

BERNARD ENNIS

Bernard Ennis, P.E. is President at EGT Enterprises, Inc. of Cedar Grove, New Jersey. He has consulted to industry, attorneys and insurance companies regarding ammonia-urea, ethylene, chlor-alkali, and power generation since 1993. Prior he worked in executive management and technical positions at CB&I, Inc. and KBR, Inc. He earned his B.S. and M.S. in Chemical Engineering at Villanova University. He has authored over 25 chemical technology patents. Member American Institute of Chemical Engineers, Association of Consulting Chemists and Chemical Engineers, Sigma-Xi Research Society.

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Author Profiles

STEVEN WILMES

Steven Wilmes is Manager of the Process Group at Thielsch Engineering, Inc. of Cranston, Rhode Island. He is responsible for all aspects of the operations of this Division which is primarily concerned with process engineering, design engineering, and project management services regarding ammonia-urea, methanol, gasification, Fischer Tropsche and pharmaceutical processes. He earned his B.S. in Chemical Engineering at Rensselaer Polytechnic Institute. He has authored articles on methanol, ethanol and plant operations. Member American Institute of Chemical Engineers.

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