Integrating Biofuels into the Energy Industry
Biofuels and the Energy Industry

- Global Perspectives
- Biofuel Drivers
- Biofuel Success Factors
- Chevron’s Actions
Global Energy Perspectives

- Grow energy demand globally, especially in China, India and Latin America
- Increase competition and investments for resources
- Develop cleaner fuels and technologies
- Improve energy efficiency
- Diversifying supply & integrating sustainable resources
- Increasing expectations surrounding climate change
Worldwide Energy Consumption

All energy sources grow – but the mix stays constant.
Worldwide Consumption, Million Barrels of Oil-Equivalent per Day

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Source: U.S. DOE/EIA Energy Annual 2006
Renewables Will Double in 25 Years

And we will still need fossil fuels to satisfy 85% of consumption

Biofuels grow 600%, and will supply 1% of the total energy mix.

Million Barrels of Oil-Equivalent per Day

Source: U.S. DOE/EIA Energy Annual 2006

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Biofuels Success Factors

- **Industrial-scale infrastructure**
- **2nd generation production technology**
- **Large, concentrated supplies of feedstock**

..plus, sustainable business models
Conversion Technology Pathways

- Biotechnology Routes
- Catalytic Routes
- Thermochemical Routes
- Transportation Fuels

Biomass

Refiner’s competencies
The Fuel Supply System

- Capital intensive
- Technology intensive
- Highly-integrated systems
- Very long-lived assets
- Infrastructure characteristics
- Intersects global economics and politics
Deployment of New Fuel Technology at Scale

Illustrative example
Biofuels Objectives

- Build a biofuels business of scale for Chevron as part of a strategic portfolio of diversification of feedstock and fuel supply
- Improve the performance of first-generation biofuels product supply:
  - Quality assurance at the level of current fuel standards
  - “Industrial-scale” infrastructure
- Develop next-generation processing technology to significantly expand the scale and choice of feedstock
Finding and Encouraging the Best Options...Enabling the Winners

- There is no single solution
  - Issues of dependency, reliability of supply, environmental footprint and cost apply to all fuels to some degree
- All economic fuels, plus conservation, will be needed to meet future demand
  - Consumers have the means to conserve and are beginning to respond
  - Market-based competition among technologies and fuels should not be inhibited
- Allow time for technology to advance
  - New technologies must offer tangible benefits to consumers and real-world well-to-wheels benefits to the environment
  - Discussions like this are a good way to make progress