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# **Biodiesel Program Costs and Savings**

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<http://www.engr.uga.edu/service/outreach>



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# Petroleum vs. Soybean Oil 2007-2008



**Petroleum Price 2X**

**Soybean Oil Price 3X**



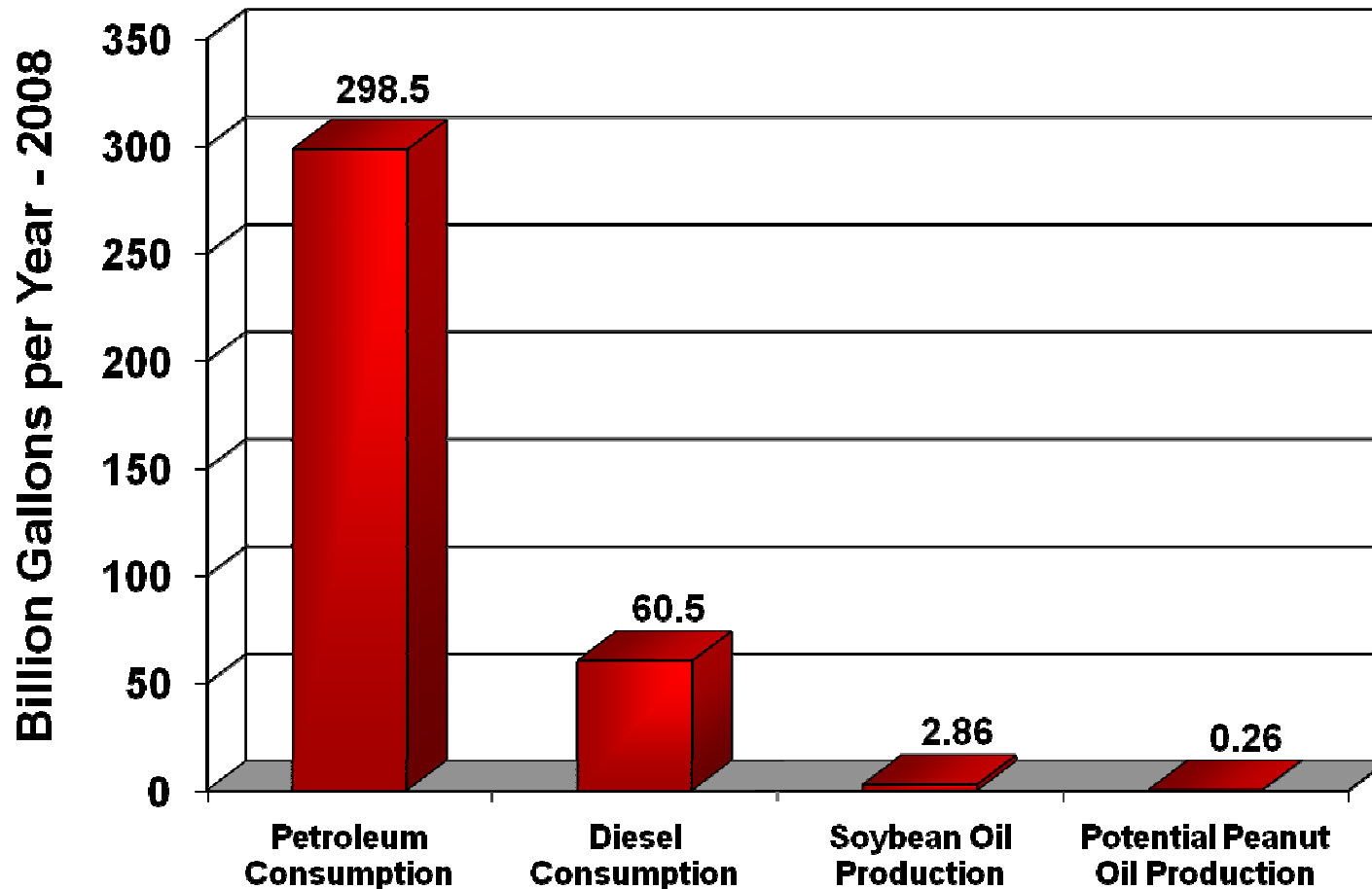
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## US Petroleum Consumption vs. Possible Oilseed Oil Production



Data from: USDA (<http://usda.mannlib.cornell.edu/usda/nass/CropProdSu//2000s/2009/CropProdSu-01-12-2009.pdf>)  
DOE - Energy Information Administration (<http://www.eia.doe.gov>)  
[http://www.soystats.com/2008/page\\_21.htm](http://www.soystats.com/2008/page_21.htm)



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# Feedstock Supply and Price Volatility

- Limited supply of Biodiesel feedstocks in the US. Most oils are used in foods and have associated high price
- Fats and Oils as well as fuels are commodities and thus have volatile prices.



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# Tax Incentives

- US Federal Tax Credit of \$1.00/gal for virgin oils: soy, poultry fat, etc.
- This is a tax credit on the fuel tax given to the **blender**
- Fuel must be blended with petroleum
- MUST PRODUCE SPEC FUEL TO COLLECT



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## European Market Loss

- In recent years majority of US produced Biodiesel was shipped to European markets
  - Europe = Mandated Use/Expensive Petroleum
  - US = Inexpensive Fuel/Cheap Biodiesel
- European markets have closed their ports to subsidized US .



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# Biodiesel – Production and Availability

- 75 million gallons (2005)
- 250 million gallons (2006)
- 400 million gallons (2007)
- 650 million gallons (2008)
- Currently available at 300+ stations (<http://www.biodiesel.org>).



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# Bottom Line on Industrial Production

- Most of US production capacity is idle.
- 2009 US Production will likely see a decrease for the first time.
- Feedstock is the key = 75-85% of cost when using commodity based fresh edible/industrial oils □



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# Opportunity

- Free or Cheap Feedstock could reduce Biodiesel cost by up to 85%
  - Yellow Grease
  - Agricultural Waste Products
  - Municipal Waste Products
  - Alternative low-input crops with additional benefits



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# Chemical Costs

- Methanol
  - Commodity pricing.
  - [www.methanex.com](http://www.methanex.com)
  - .20 gallons for each gallon of fuel
  - Current price \$.95/gal
  - Cost per gallon: \$.19



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# Chemical Costs

- Catalyst
  - Potassium Hydroxide
    - Chemical Suppliers
    - Fixed Prices at low volume
    - Current Price ~\$2/lb
  - ~.1lb/gal = \$.20/gal



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# Chemical Costs

- Total Chemical Costs
- $\$.19(\text{Methanol}) + \$.20(\text{KOH}) = \$.39/\text{gal}$

Costs will vary with Methanol pricing,  
catalyst selection and quality of oil.  
This model assumes 0% FFA



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# Equipment

- Off the Shelf Technology
  - Multiple suppliers cost from \$10-\$200/gallon/year for small scale
  - Buyer beware: Bad stuff in = bad stuff out.
  - There is no “silver bullet” technology for production. All processes require user expertise/experience



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# Equipment

- Do It Yourself
  - Can be much cheaper to build yourself
  - Basic design uses cone bottom settling tanks, pumps and heaters
  - Requires mechanical expertise/understanding of process.

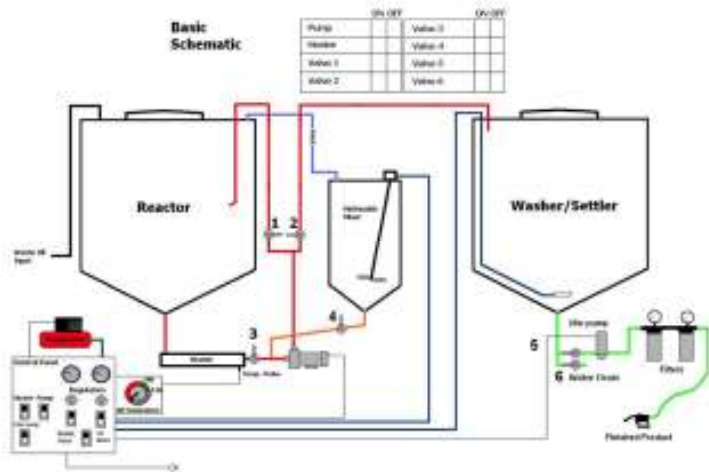


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# Equipment

- Do It Yourself
  - <http://ucobiodiesel.com/>



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# Labor

- Trained technical staff
- Batch requires attention
  - ① when reaction is running
  - ② when transferring materials
- Approximately 5-8 man hours needed per batch when things run smooth!!!
- Cost = labor cost/gallons per batch



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# Unforeseen Expenses

- This can be major factor when things don't go smooth
  - Feedstock Cleanup
  - Waste disposal (tipping fees)\*
  - Reprocessing



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