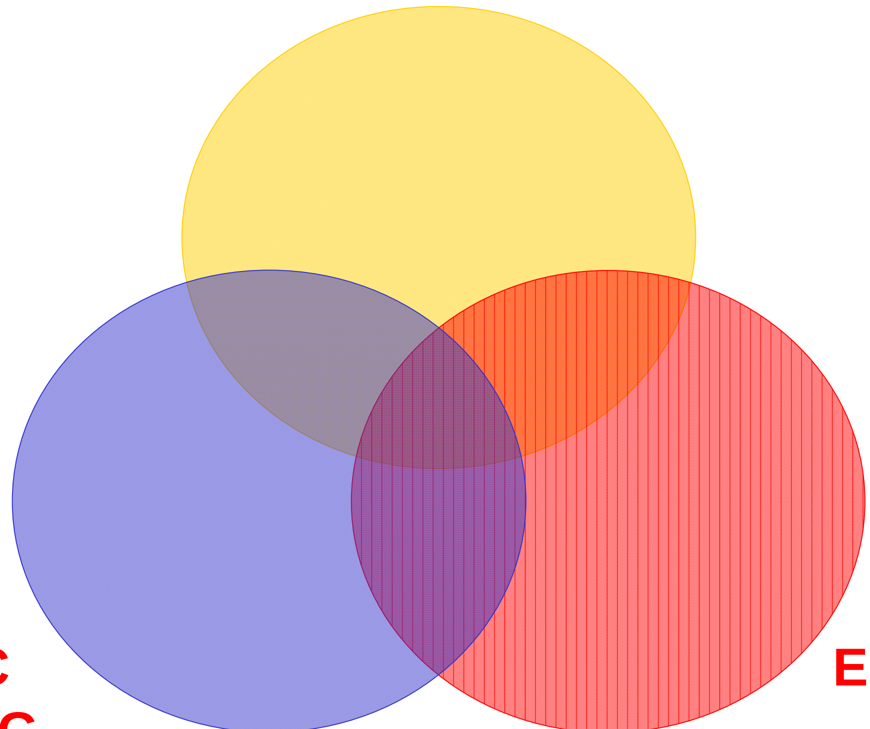
The Case for Biofuels in America

David Fleischaker
Oklahoma Secretary of Energy

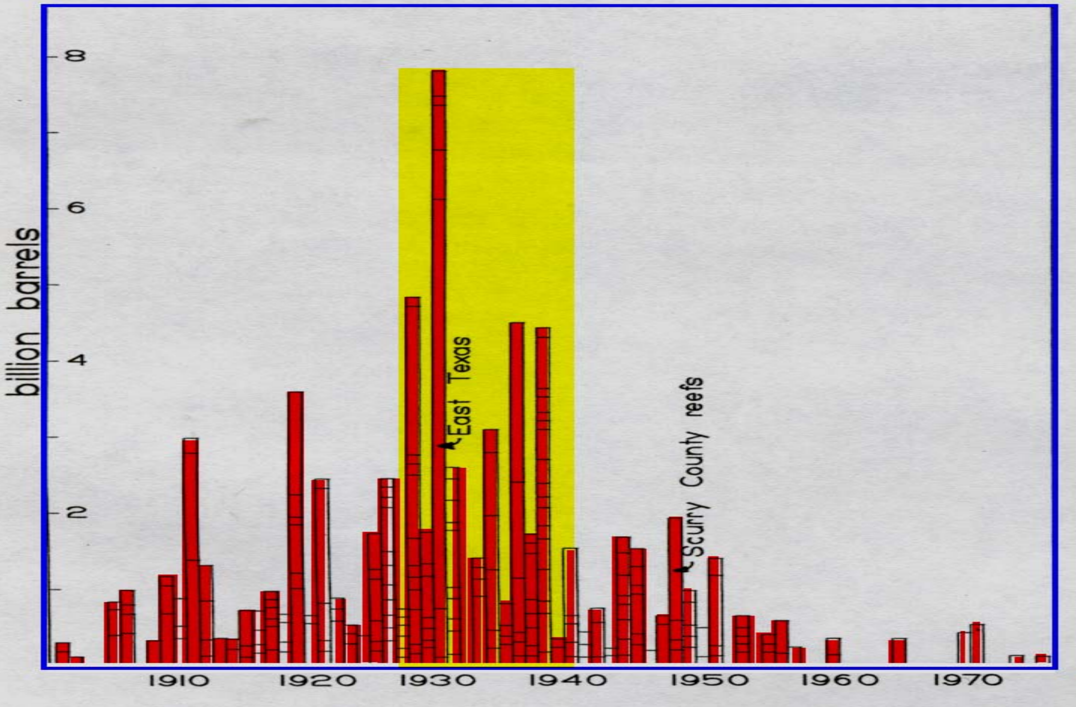
NATIONAL SECURITY



ECONOMIC WELL BEING

ENVIRONMENTAL PROTECTION

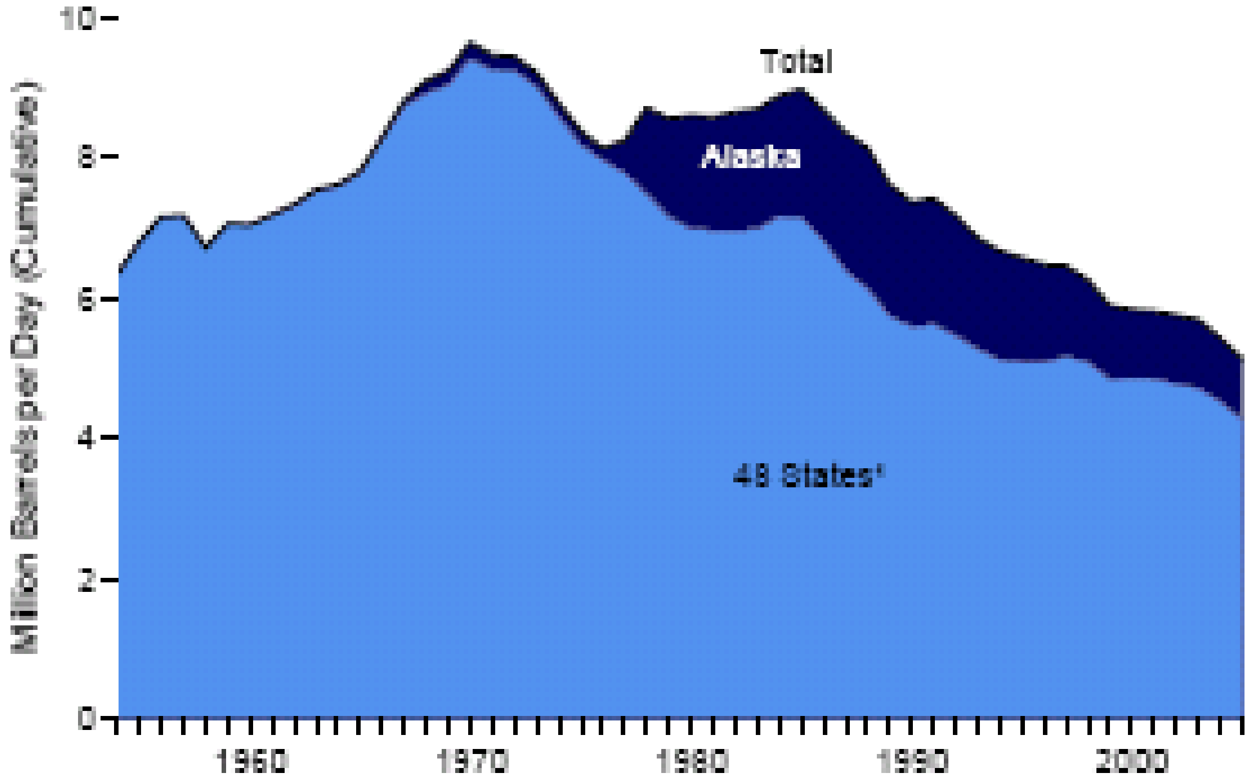
Major U.S. Oil Field Discoveries (100+Million Barrel Fields)



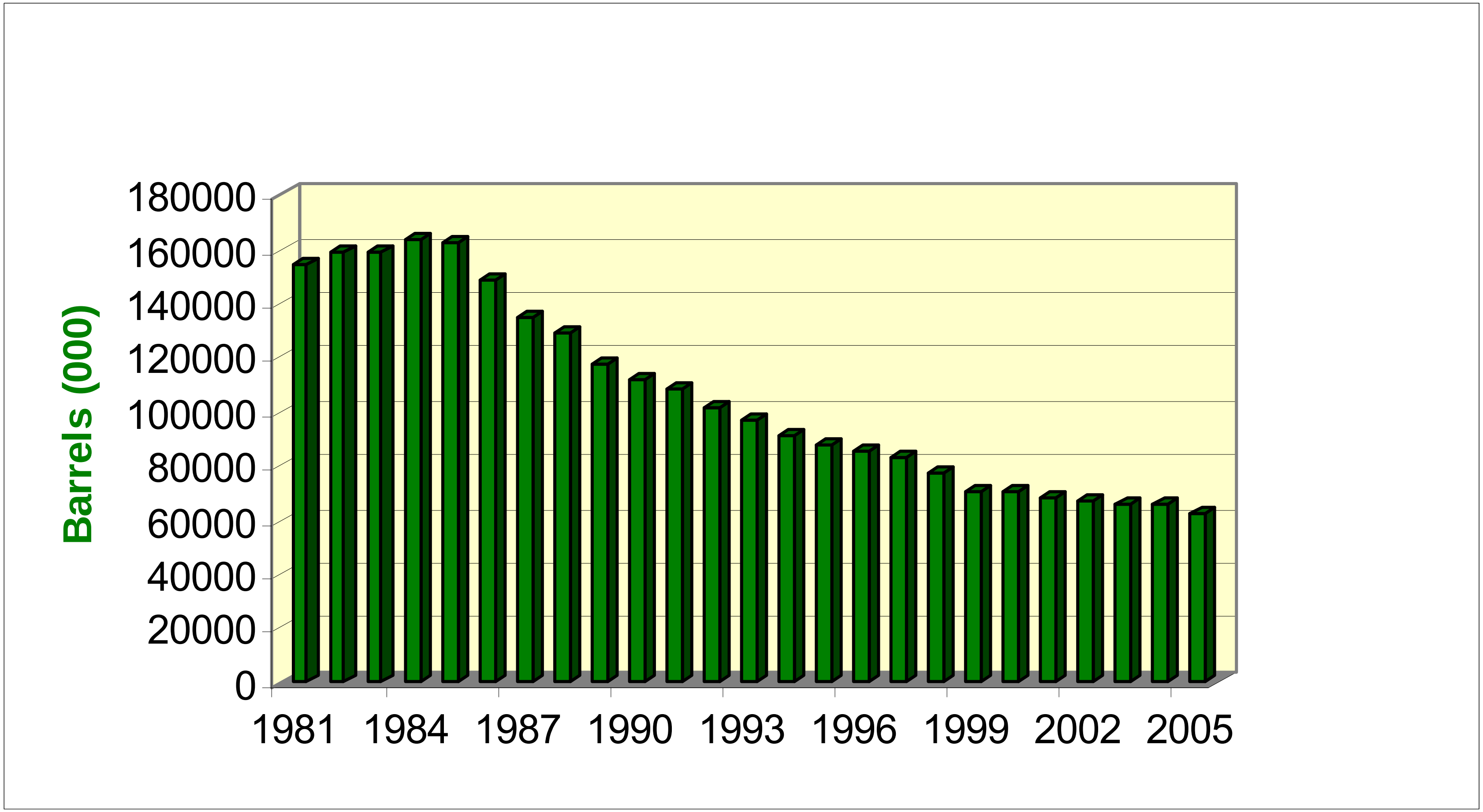
Discovery dates of U.S. oil fields exhibit a scattered but bell-shaped distribution. All oil fields larger than 100 million barrels on land in the lower 48 states are plotted against the year of the first successful well in the field. Despite the Great Depression, more oil was found in the decade from 1930 to 1940 than in any decade before or since. Notable large fields are East Texas (1930) and the Scurry County reefs (1948).

Source: "Hubbert's Peak," Deffeyes

U.S. Oil Production 1950 - 2005

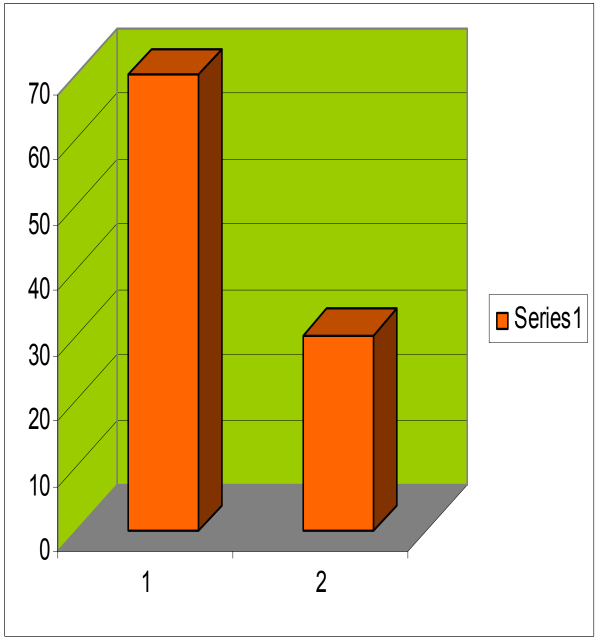


Oklahoma Oil Production 1981 - 2005



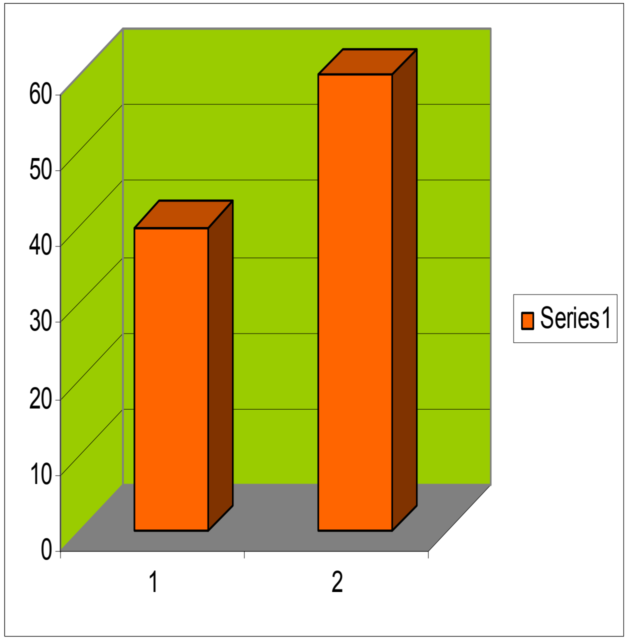
Annual Supply
(Foreign vs. Domestic Sources)

Domestic Imports



1970
(70%/30%)

Domestic Imports



2006
(40%/60%)

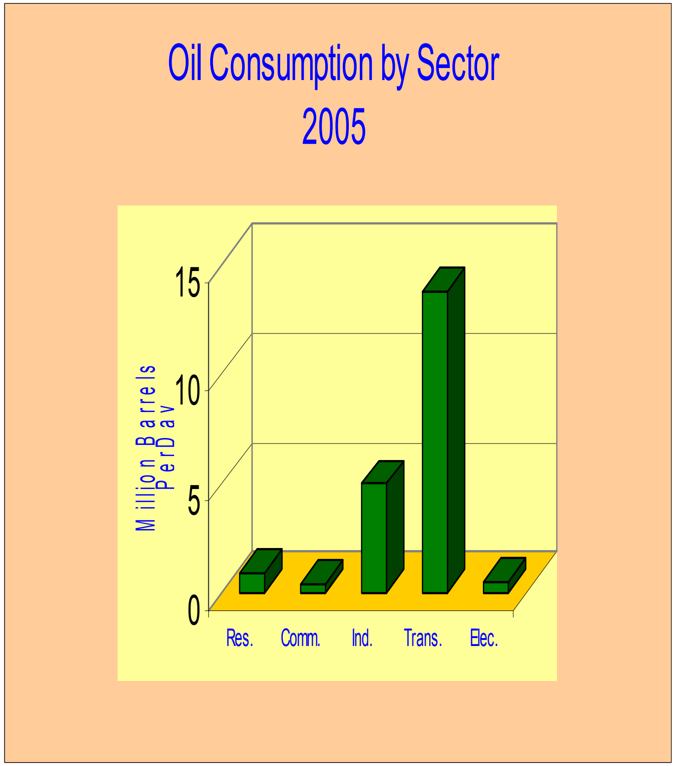
Est. Annual Expenditure for Imported Crude Oil, 2008

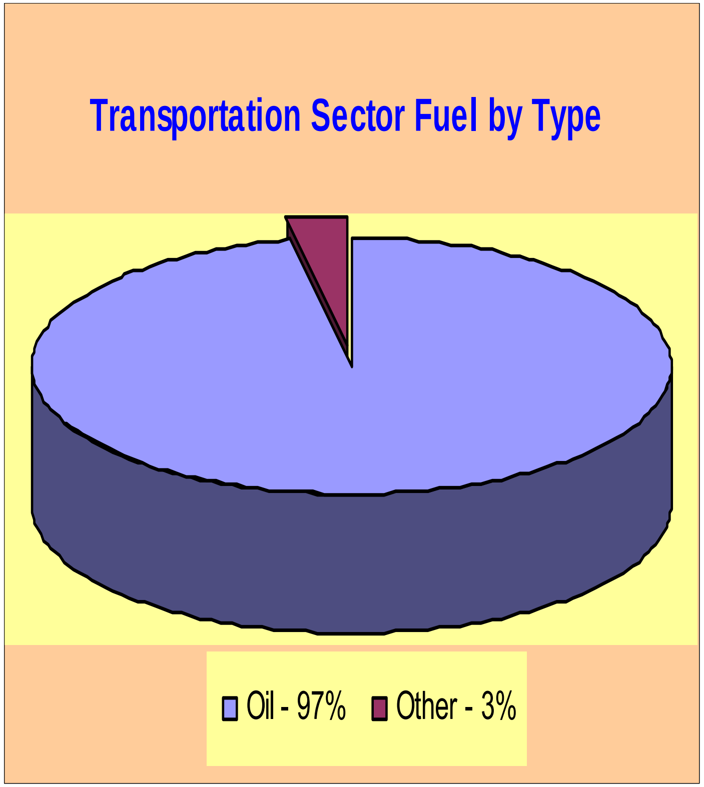
$ 500± Billion*

(Oil Price $110/barrel)

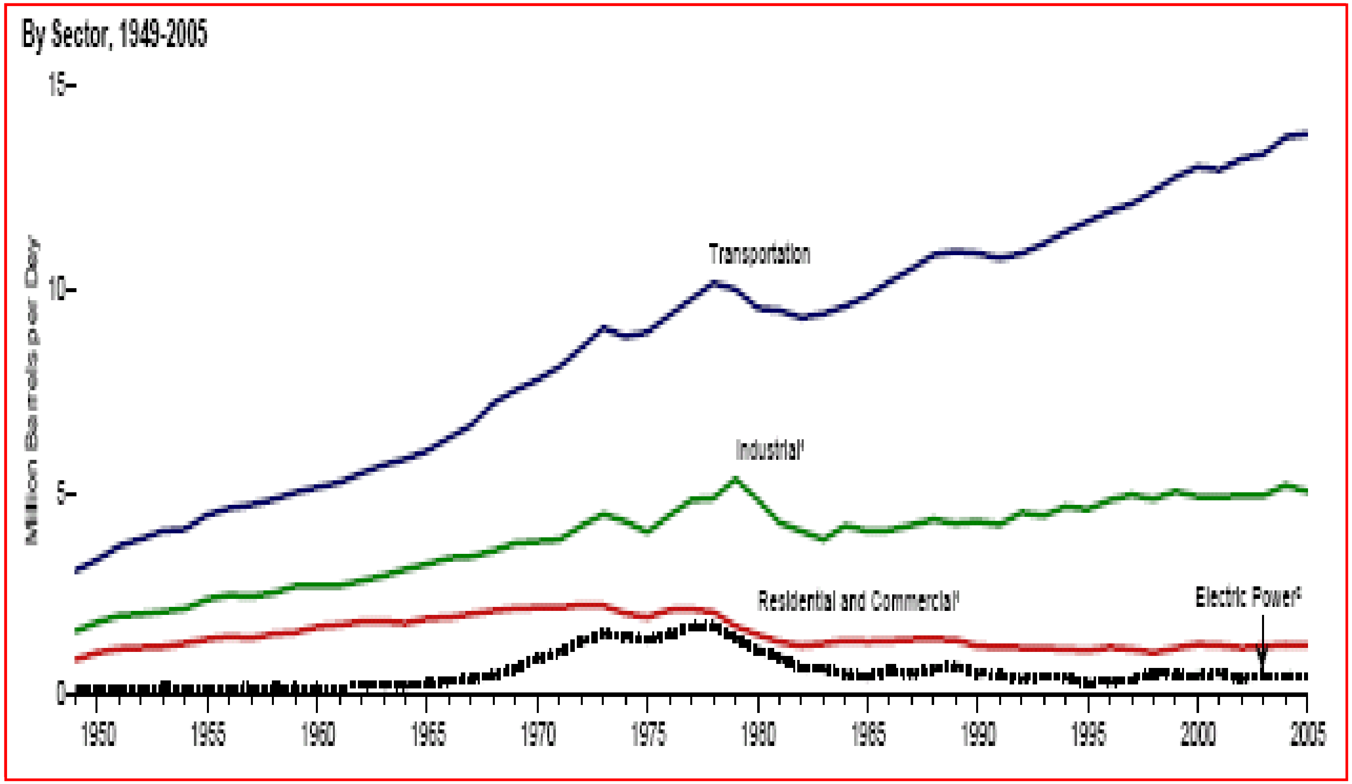
* $1.34 Billion/ Day or $57 Million/Hour

Oil Fuels the Transportation





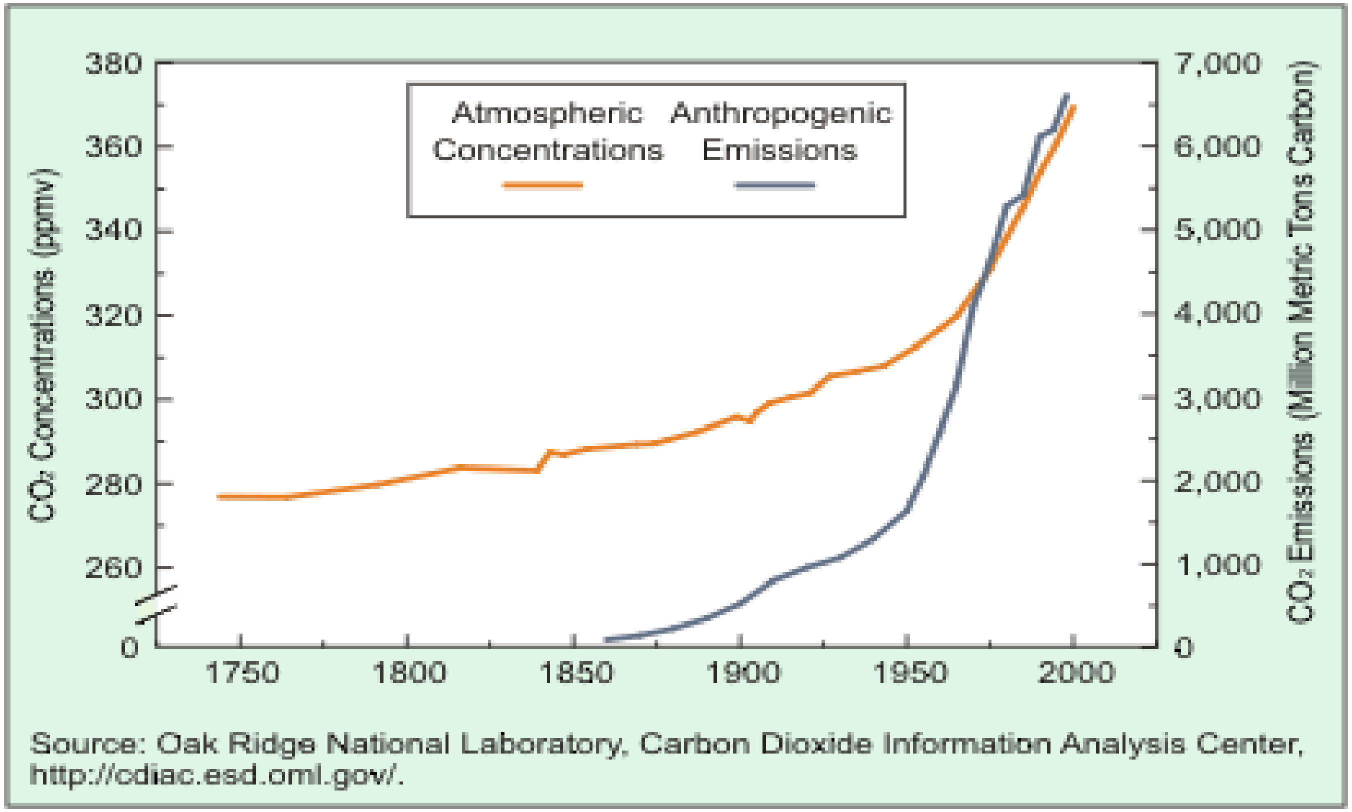
U.S. Crude Consumption Trends



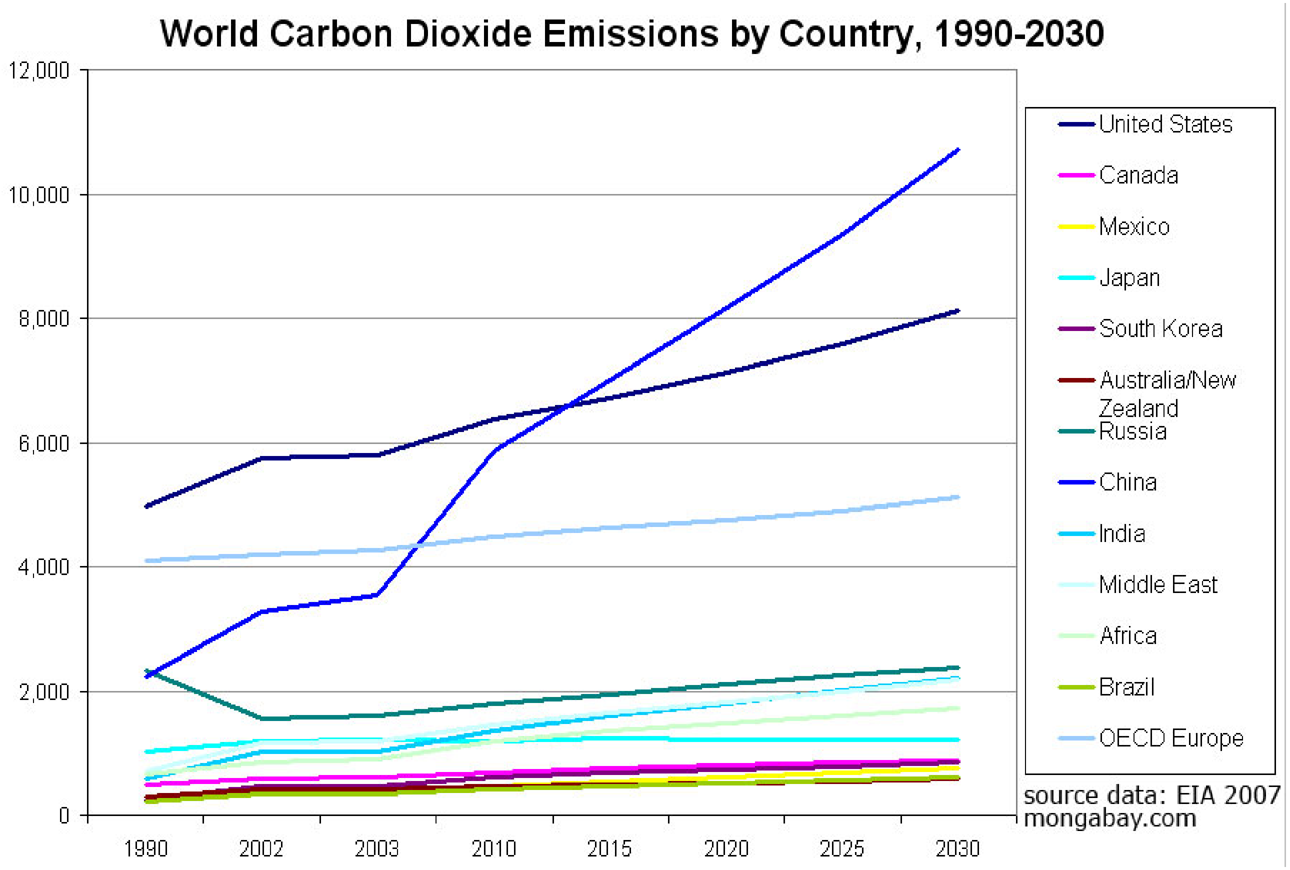
Global Demand Crude China and India

- China and India contain 33% of the world's population and had economic growth rates of 10%+/- per year over the last 3 years
- Expected economic growth to 2025 = 5.9% per year.
- Oil Demand in China is 3X since 1980, turning from self-sufficiency to net importer
- Rapidly developing countries will account for 85%+/- of the growth in energy usage between now and 2020, China counts for 33% of that.
- 30,000 new auto per month in Beijing

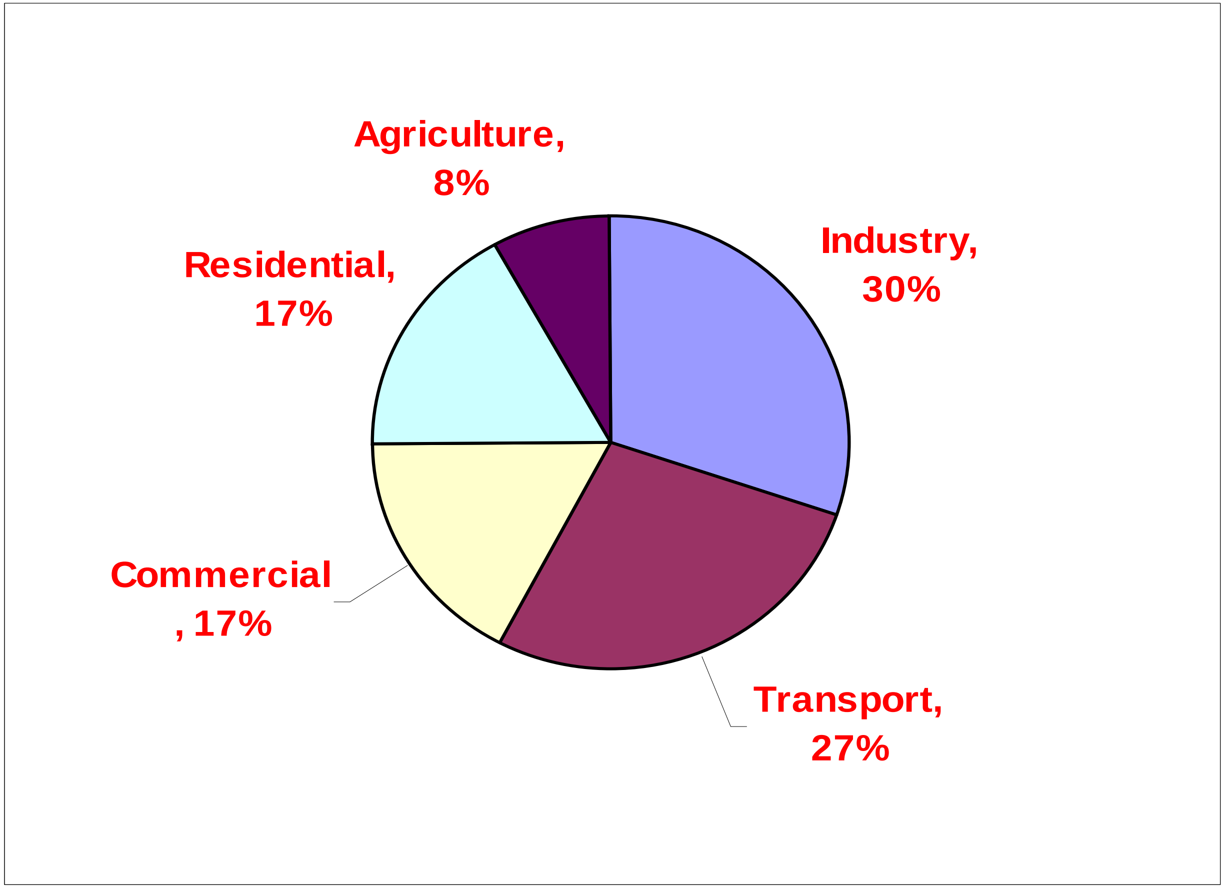
Growth in CO_2 Emissions



Growth in CO2 Emissions by Country



The Transportation Sector's Contribution to GHG



Source: Pew Center on Global Climate Change

- *"Year after year the worriers and fretters would come to me with awful predictions of the outbreak of war. I denied it each time. I was only wrong twice."*

- Senior British intelligence official, retiring in 1950 after 47 years of service

Biofuels – Part of the Solution

- Reduce our dependence on unstable and often hostile governments
- Reduce our funding of international terrorists organizations
- Revitalize Rural Economies
- Enhance Environmental Protection

Biofuels - Playing to America's Strength

Countries with Top Ten Oil Reserves

Country	% Total Reserves*
Saudi Arabia	22.9%
Iran	11.4%
Iraq	10.0%
UAE	8.5%
Kuwait	8.4%
Venezuela	6.8%
Russia	6.0%
Libya	3.1%
Nigeria	3.0%
U.S.	2.7%

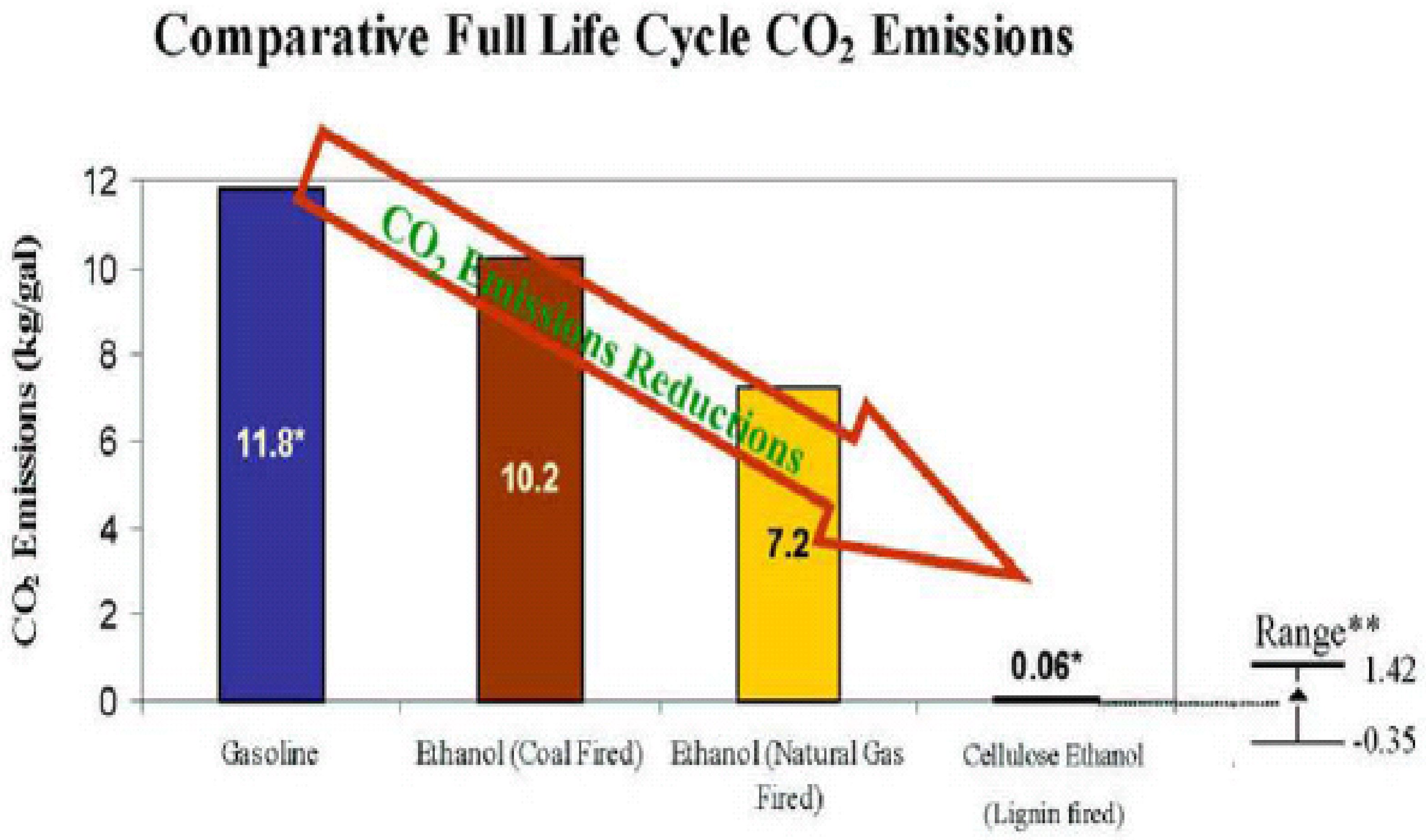
Top Ten Potential Biomass Producers

Country	Total Acreage** (M acres)	Per Capita (acres)
U.S.	1018	3.5
China	1369	1.1
Australia	1105	56.5
Brazil	651	3.7
Russia	535	3.7
Argentina	437	11.5
South Africa	246	5.6
Mexico	265	2.6
Ukraine	102	2.1
Turkey	103	1.5

Biofuels – Fortifying National Security

- Reduce our dependence on unstable and often hostile governments
- Reduce our funding of international terrorists organizations

Biofuels – Enhance Environmental Protection



Oklahoma Bioenergy Center

An Initiative to Advance the
Biofuels Industry and Bioenergy Research
in Oklahoma

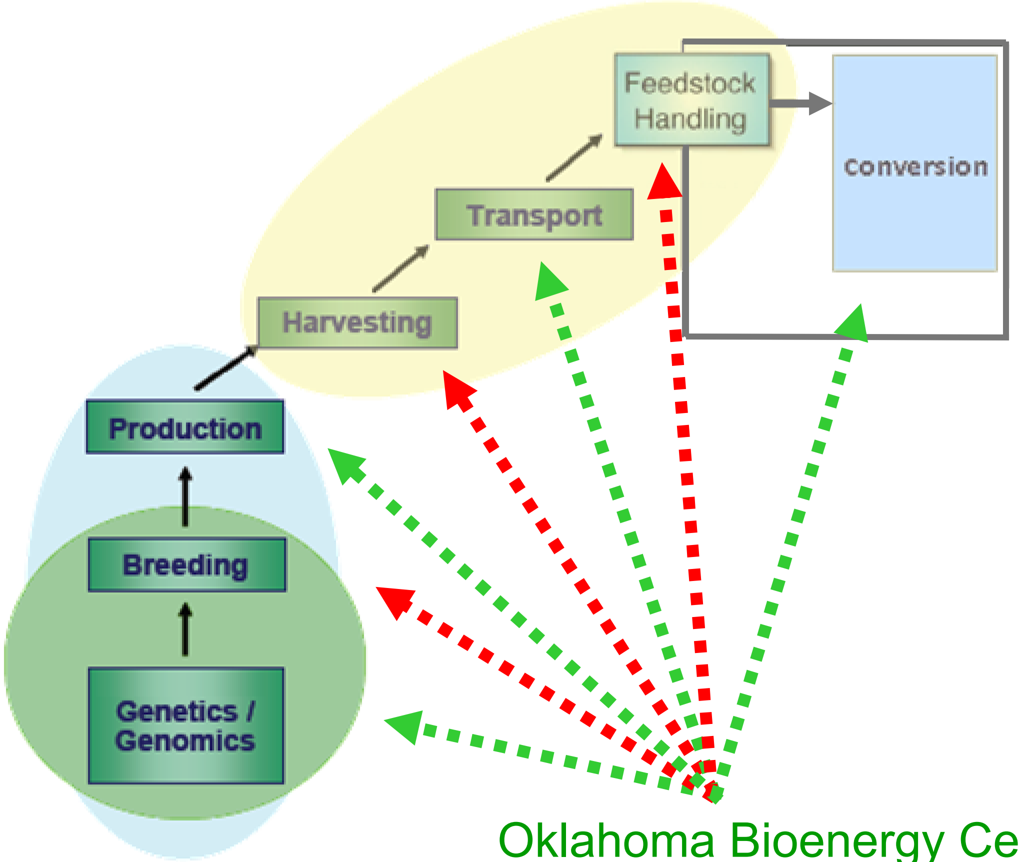
Oklahoma Bioenergy Center Act

- $40 million for 4 years

- Founding member institutions:
  - University of Oklahoma
  - Oklahoma State University
  - The Samuel Roberts Noble Foundation

- Purpose: Conduct the research and establish the outreach programs to foster the development of a biofuels industry in Oklahoma

Research Programs



Oklahoma Bioenergy Center

Oklahoma State University

University of Oklahoma

The Noble Foundation

Title	PI	PI Institution	Funding Requested
FEEDSTOCK DEVELOPMENT			
Improving the performance of transgenic plants with improved efficiency for bioethanol processing	Richard Dixon	Noble	$517,050
Increasing lignin content for production of biomass better suited to gasification	Fang Chen	Noble	$164,350
Development and application of genomic tools for drought tolerance enhancement in alfalfa (Medicago sativa L.)	Michael Udvardi	Noble	$199,850
Characterization of specific peroxidases and laccases involved in lignin biosynthesis	Lloyd Sumner	Noble	$0
Improving biomass yield and seed quality in switchgrass	Yanqi Wu	OSU	$450,000
Development of delayed or never flowering grasses for sustainable feedsock of biofuels and forage	Liuling Yan	OSU	$160,000

FEEDSTOCK PRODUCTION

Public testing of switchgrass varieties	Joe Bouton	Noble	$30,000
Utilization and value of switchgrass in a dual purpose stocker cattle and bioenergy system	Billy Cook	Noble	$292,750
Biomass production and nitrogen responses of perennial grasses for bioenergy under dryland and irrigated conditions	John Guretzky	Noble	$117,100
NSF-EPSCoR/OSU research start-up package for new faculty positions in biofuel feedstock production and improvement	David Porter	OSU	$150,000
Making the bioenergy boom accessible using current small grains production technologies	Jeff Edwards	OSU	$50,000
**Linking community structure to functions: Metagenomic analysis of Feedstock-Related Microbial Communities using GeoChip and Pyrosequencing	Liyou Wu	OU	$761,982

FEEDSTOCK COLLECTION AND TRANSPORTATION

Critical Processing Issues for On-Farm Production of Ethanol from Sweet Sorghum	Dani Bellmer	OSU	$350,000
Harvesting and Handling Equipment to Meet the Demands of Oklahoma Lignocellulosic Biomass under Indigenous Growing Conditions	Carol Jones	OSU	$160,000
From the Field to the Refinery – A Systems Approach to Modeling the Logistics Value Chain for Switchgrass and Economics of Alternative Strategies for the Oklahoma Cellulosic Biomass Industry	Carol Jones	OSU	$160,000

CONVERSION

Improvement of Ethanol Production from CO, CO_2 and H_2 by the Autotrophic Species C. carboxidivorans P7 and P11 using Oklahoma Biomass	Mark R. Wilkins	OSU	$325,000
Design, fabrication and evaluation of 8 million BTUs per hour (12 tons biomass per day) unique down draft gasifier system for decentralized energy and power applications	Krushna N. Patil	OSU	$273,000
Simultaneous Saccharification and Fermentation of Switchgrass by Thermotolerant Yeast to Produce Ethanol	Mark R. Wilkins	OSU	$92,000
Enhancing the Enzymatic Conversion of Oklahoma Energy Crops into Fermentable Sugars	Andrew Mort	OSU	$325,000
Catalytic gasification of lignocellulosic biomass	Daniel Resasco	OU	$94,925
Catalytic conversion of glycerol and small oxygenated molecules	Richard Mallinson	OU	$103,804
Catalytic conversion of natural oils and FAMEs	Lance Lobban	OU	$128,804

DEMONSTRATION FIELD(S)

1,200-acres of dedicated energy crops	Billy Cook	Noble	$1,709,64
Establishment of a highly visible large scale demonstration field to study the initiation, PLANTING, development of crop economics, production costs, soil nutrition, sustainability, and cro management of high-tonnage sorghum.	R. Brent Westerman	OSU	$400,000
Demonstration of switchgrass development and production	John Caddel	OSU	$50,000
Methods to establish switchgrass as a cellulosic ethanol source	Mark S. Gregory	OSU	$5,000


JOHN DEERE

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