

The Name of the Game: Smarter Transportation Fuels Use

Conservation, Higher Fuel Economy
Vehicles, and Alternative Fuels



August 13, 2008

Tennessee Climate Change Dialogue



Jonathan Overly, Executive Director
East Tennessee Clean Fuels Coalition



Today's Agenda

1. The Basics - AF 101 & Carbon Scene
2. Oil Price Trends
3. Current Energy, Oil & Oil Systems Picture
4. Energy In vs. Energy Out – The FER
5. ETCFC – What, How, Who
6. Success Stories
7. Where East TN stands with public biofuel stations
8. Moving forward



The ETCFC's 2008 Founding Partners:





AF101 - What percentages of these alt fuels are domestically produced?

Biodiesel - 95%

Electricity - 100%

Ethanol - 95%

Natural gas - 90%

Propane - 95%

VS.

Gasoline

+ Diesel

= 40%

In 1945, we were 0% dependent on foreign countries for oil; now we are 60+% dependent.
~60 years = 0→60% reliance on others for oil~



The Carbon Basics



- CO2 is the transportation sector's primary global warming gas; thus, total GHG emissions will be slightly greater than the CO2 emissions totals
- CO2 emissions are proportional to fuel consumption:
19.4 pounds CO2/gal gas; 22.2 pounds CO2/gal diesel
- CO2 emissions are inversely proportional to fuel economy
 - ◆ Each 1% decrease in fuel consumption results in a corresponding 1% decrease in CO2 emissions
- *Therefore, the #1 tool in your CO2-reducing toolkit is reducing your total petroleum consumption; find regular or innovative ways to do so!*



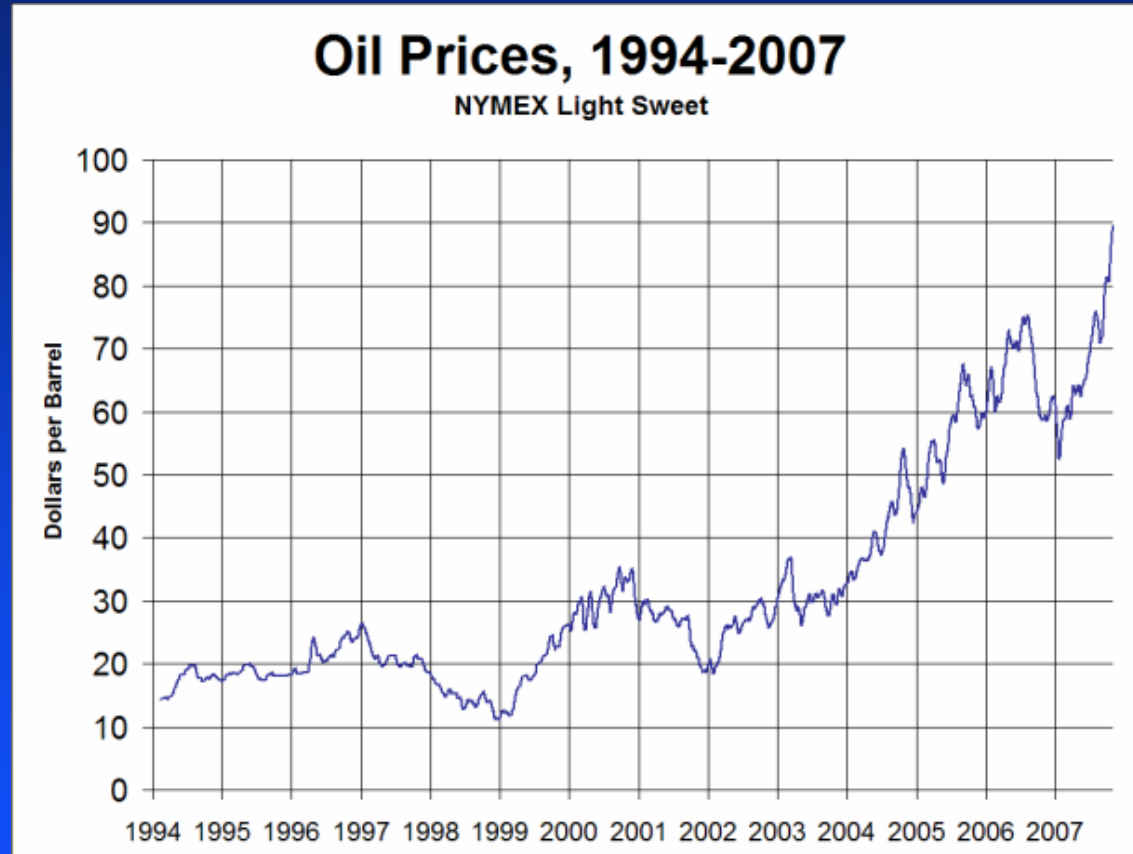
The Life-cycle Carbon Numbers: Petro-fuels and Alternatives

Want to
make
petroleum
last longer
and be
cheaper?
Use
alternative
fuels.

Fuel	GHGs (gms/mi)		Petroleum (MJ/mi)	
	Emissions	% reduction	Use	% reduction
Gasoline (RFG)	473	---	5.52	---
E85-midwest corn	402	15%	1.59	71%
E85-switchgrass	195	59%	1.44	74%
E85-forest residue	132	72%	1.49	73%
CNG	331	30%	0.02	100%
LPG (from oil proc.)	389	18%	5.23	5%
Electricity (NG)	124	74%	0.01	100%
HEV	353	25%	4.09	26%
Plug-in HEV	224	53%	2.01	64%
Diesel	375	---	4.47	---
B20-midwest soy	331	12%	3.76	16%

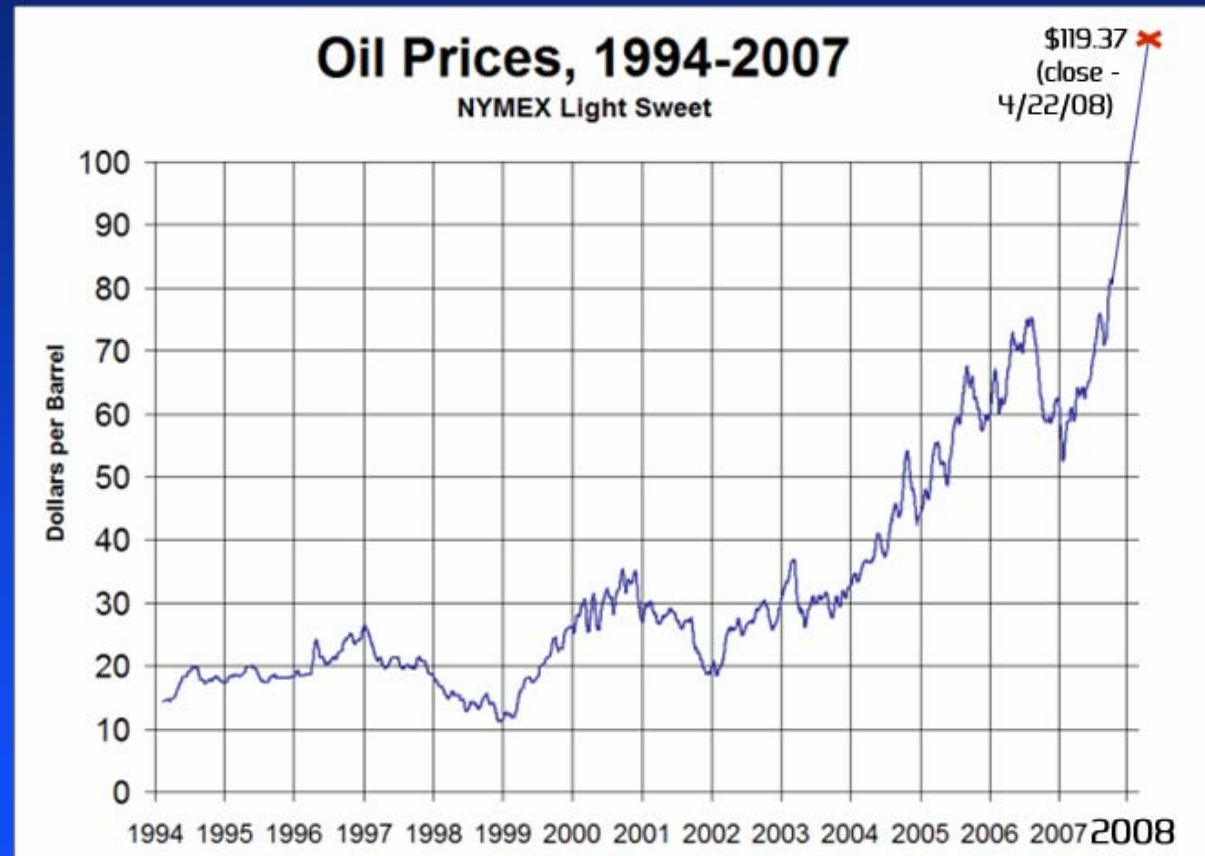
Data from California Energy Commission (2007). *Fuel Cycle Assessment: Well-to-Wheels Energy Inputs, Emissions, and Water Impacts*. Part of the state plan to increase the use of non-petroleum transportation fuels. Appendix A. Available at www.energy.ca.gov/2007publications/CEC-600-2007-004/CEC-600-2007-004-REV.PDF.

A recent snapshot of oil prices...





...now add the start of 2008!

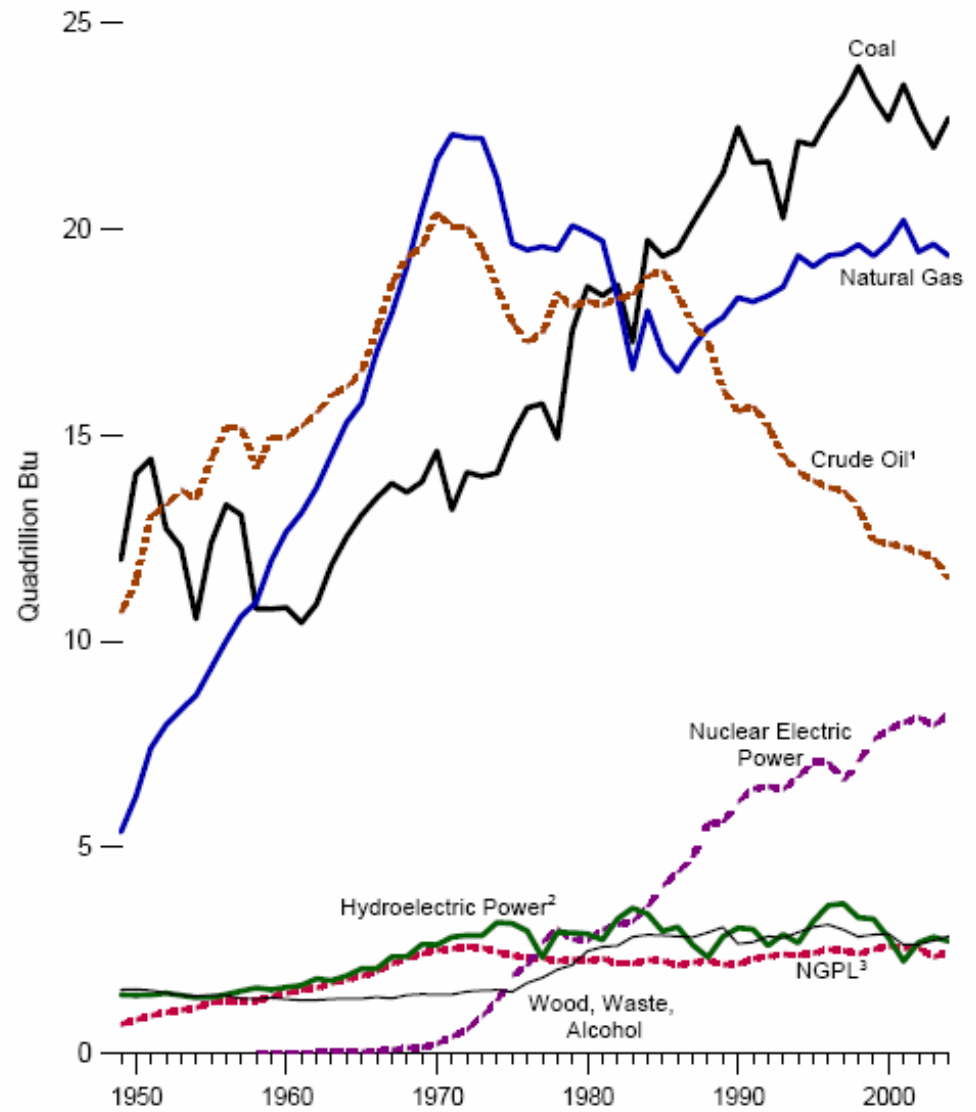




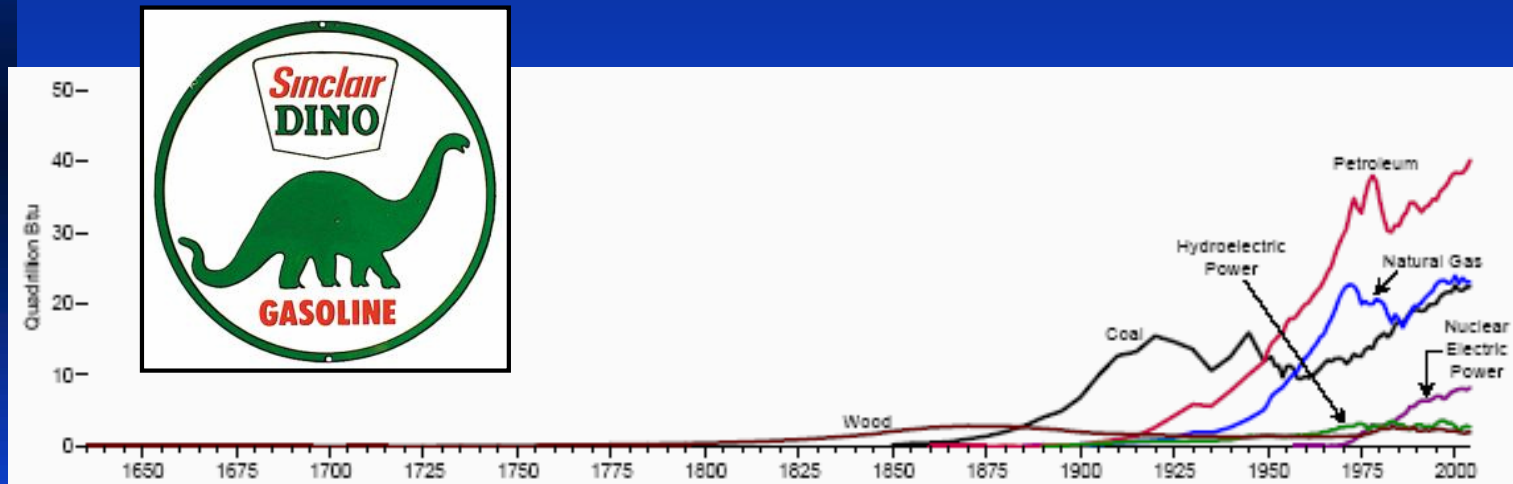
Long-term U.S. Energy Data - Production

Energy Production by Source

By Major Source, 1949-2004



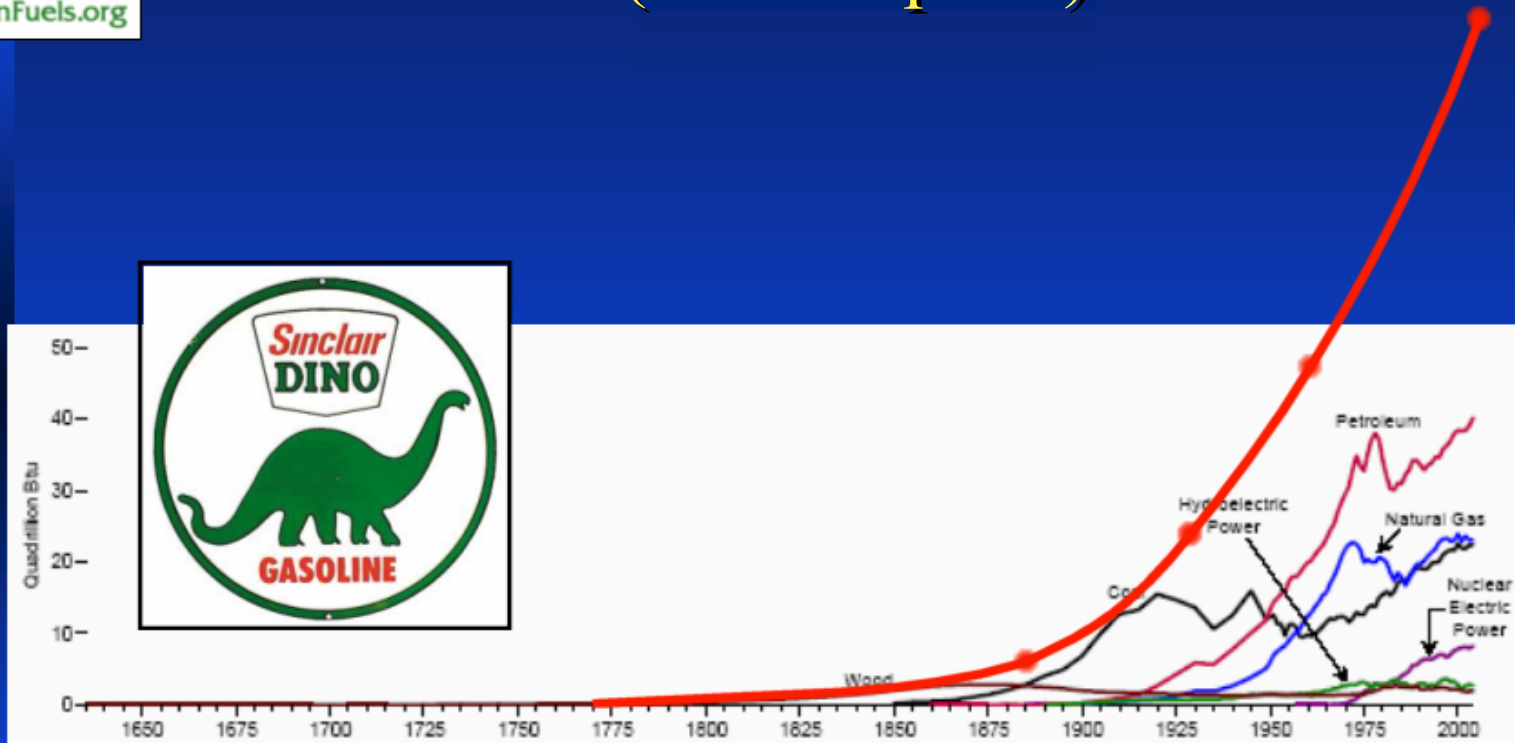
Really Long-term U.S. Energy Data (Consumption)



What does this growth curve look like if add up all these different forms of energy we are consuming?



Really Long-term U.S. Energy Data (Consumption)



Over the long haul, we are going to have to learn to do things differently,
or we will be forced to.



When Peaking? No one knows for certain

<u>Forecast</u>	<u>Source</u>
December 2005	Deffeyes (U.S.)
2006-2007	Bakhitari (Iran)
2007-2009	Simmons (U.S.)
After 2007	Skrebowski (U.K.)
2010	Campbell (Ireland)
Before 2010	Goodstein (U.S.)
After 2010	World Energy Council
2012	Weng (China)
2016	Doug-Westwood (U.K.)
After 2020	CERA (U.S.)
2030 or later	EIA (U.S.) / Exxon Mobil

5 years

5-15 years

> 20 years

From Robert Hirsch's presentation "Peaking of World Oil Production" at the National Clean Cities Congress & Expo ~ May 8, 2006



Forget the oil peak for a minute: who do you want to give your money to today?





Who are we giving our fuel money to? 2007 Net Imports by Country & Totals

Units are **Thousand Barrels per Day**

From the U.S. Energy Information Administration -- Petroleum Navigator / Imports/Exports & Movements
http://tonto.eia.doe.gov/dnav/pet/pet_move_netl_a_ep00_IMN_mbbldpd_a.htm

Country	2007	%	Running %
1. Canada	2,243	19%	
2. Saudi Arabia	1,487	12%	31% *
3. Venezuela	1,336	11%	42% *
4. Mexico	1,258	10%	53%
5. Nigeria	1,131	9%	62% *
6. Algeria	663	6%	67% *
7. Angola	507	4%	72% *
8. Iraq	485	4%	76% *
9. Russia	412	3%	79%
10. Virgin Islands	345	3%	82%

(Another 150+ countries are in the whole list)

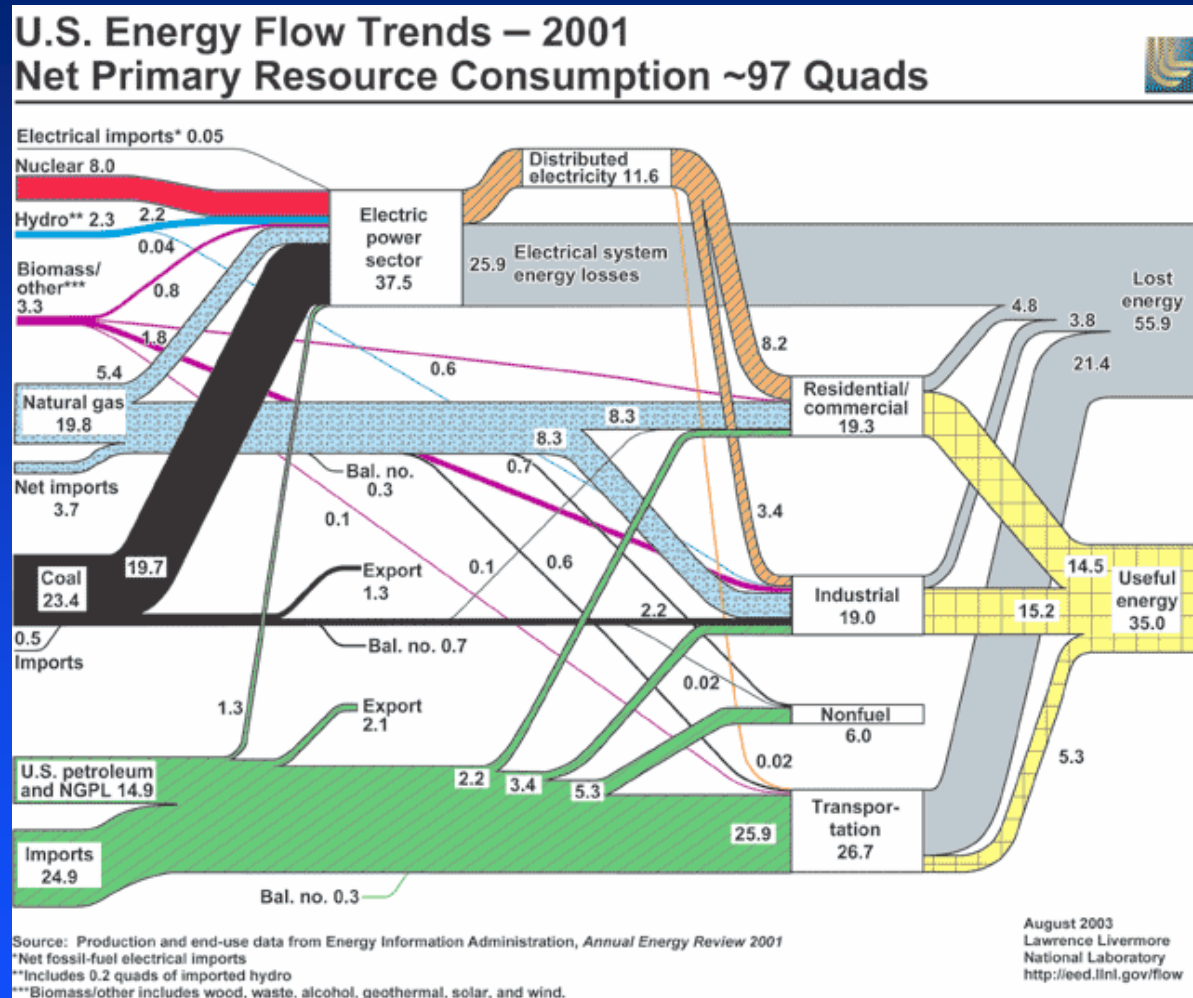
TOTAL NET IMPORTS 12,253

Worldwide region	2007	
Total All Countries	12040	
Persian Gulf Countries	2166	18%
OPEC Countries	5946	49%
Non-OPEC Countries	6094	12040 51%



Oil Systems #1 = Inefficient

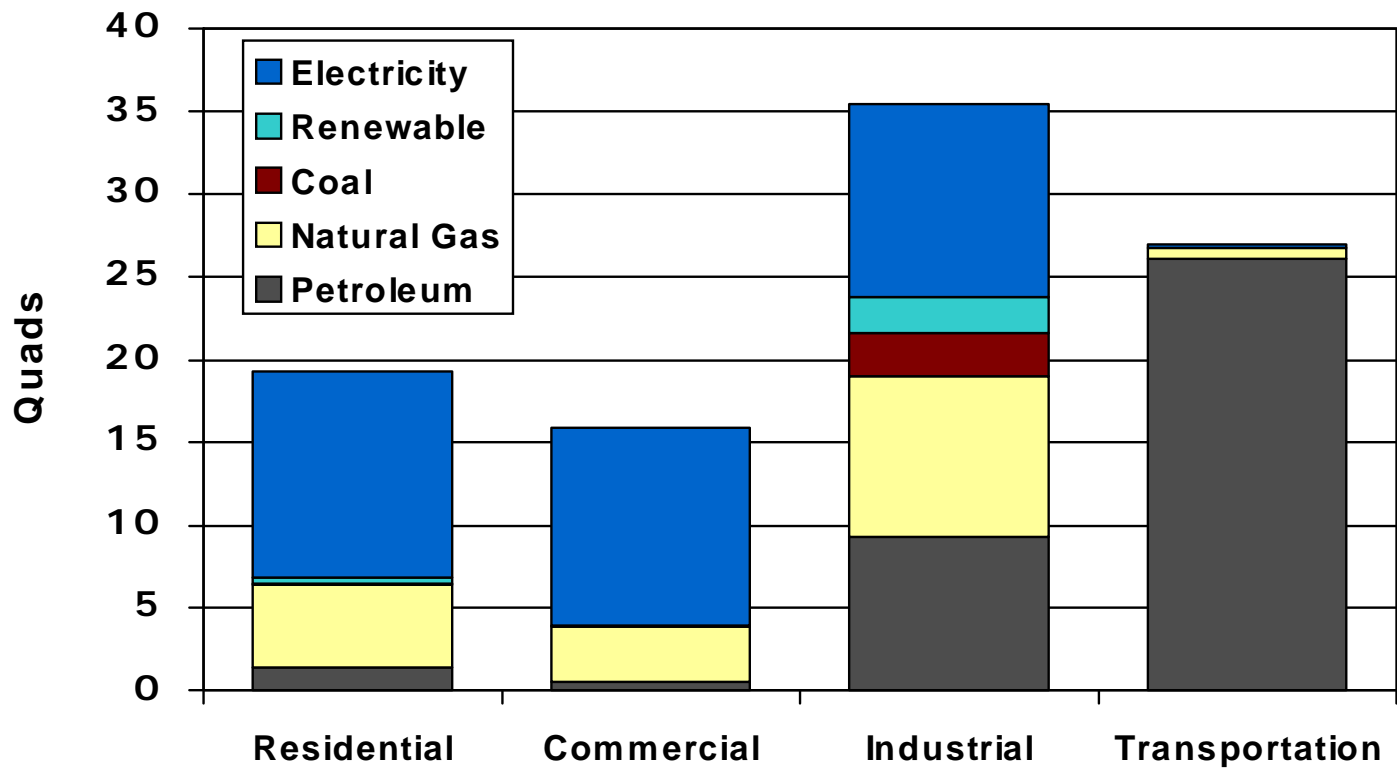
U.S. Energy Flow Map – 2001



This is why improving fuel economy and using hybrids is important!

Oil Systems #2 = Not diversified

Fuel Use Within Sectors



One Way to Look at Life-cycle Fossil Energy Efficiency

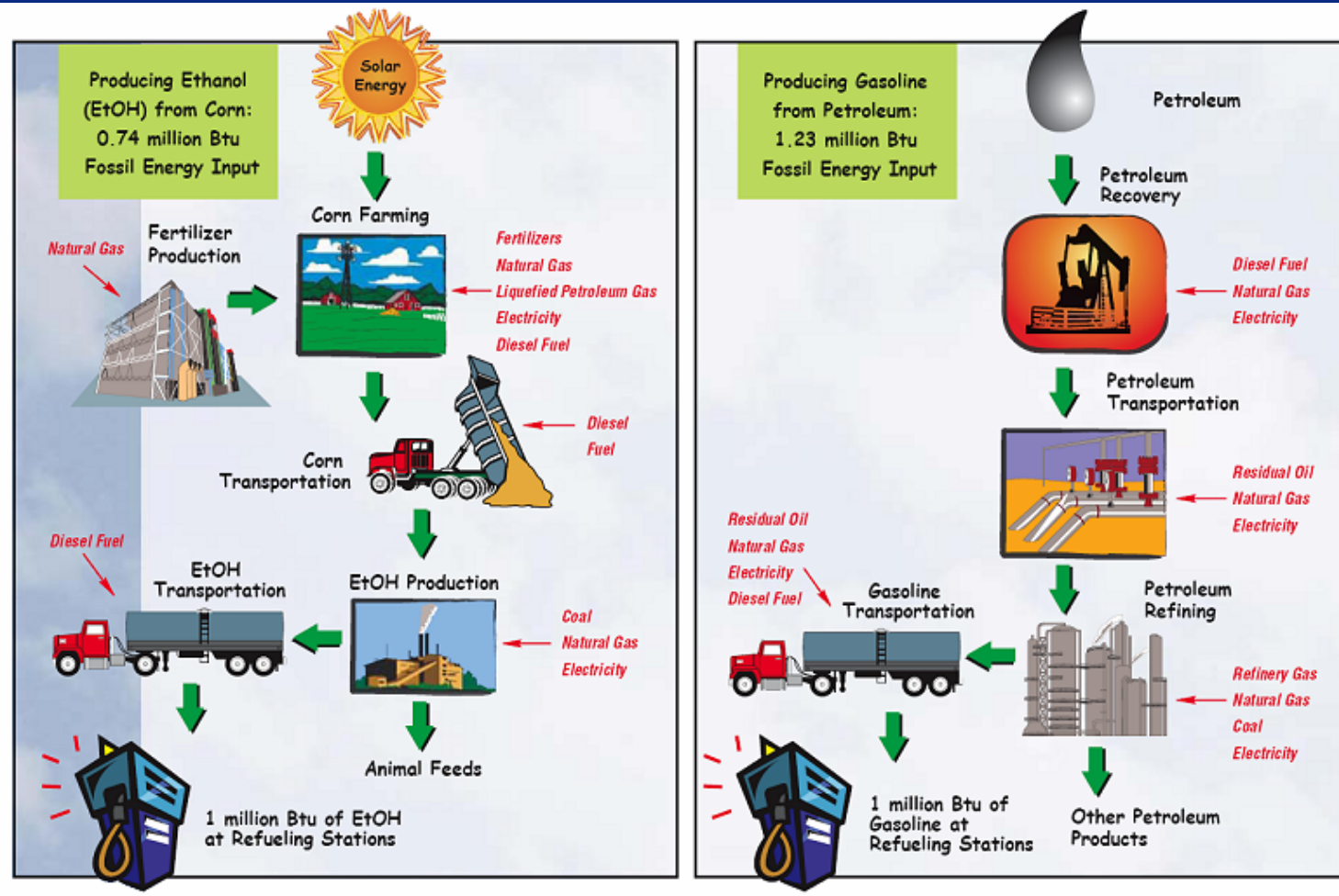
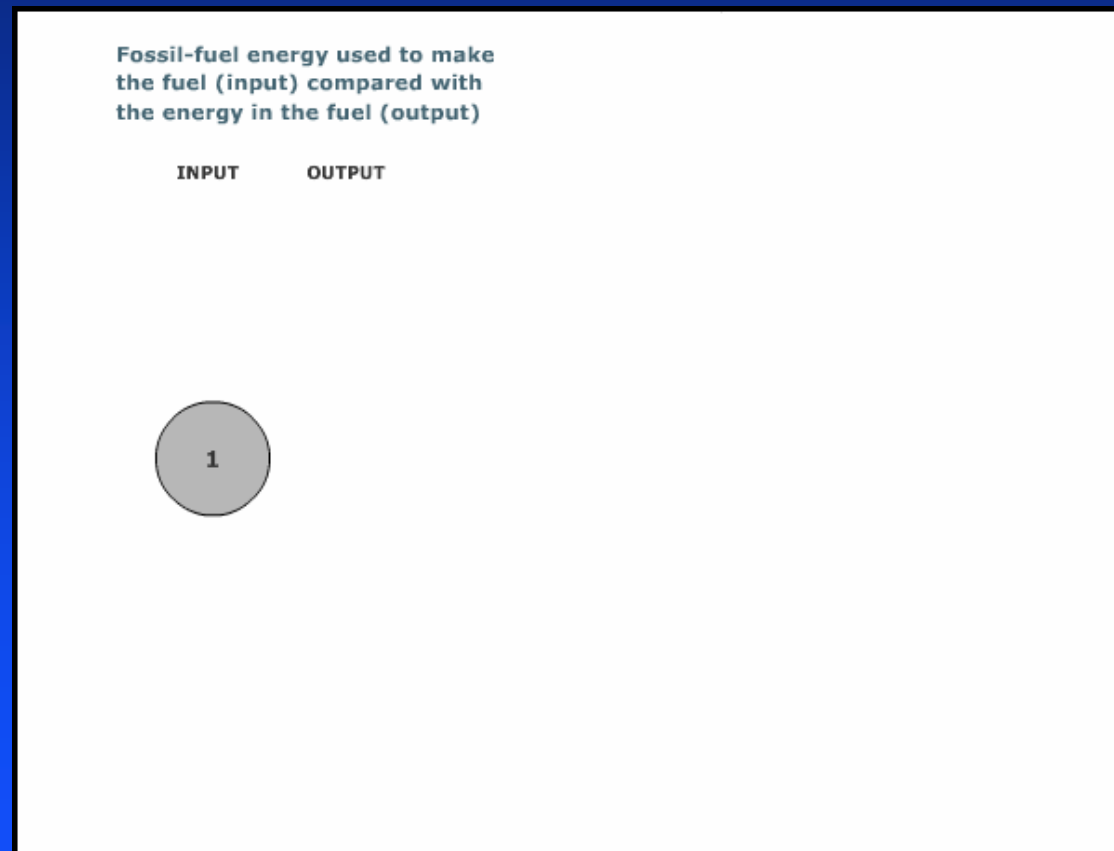


Image from the U.S. DOE & Michael Wang of Argonne Nat'l Lab and his GREET Model.



Fossil Energy In vs. Energy Out as Fuel: Basis

What you get
as output
for every
1 unit of
fossil energy
input:

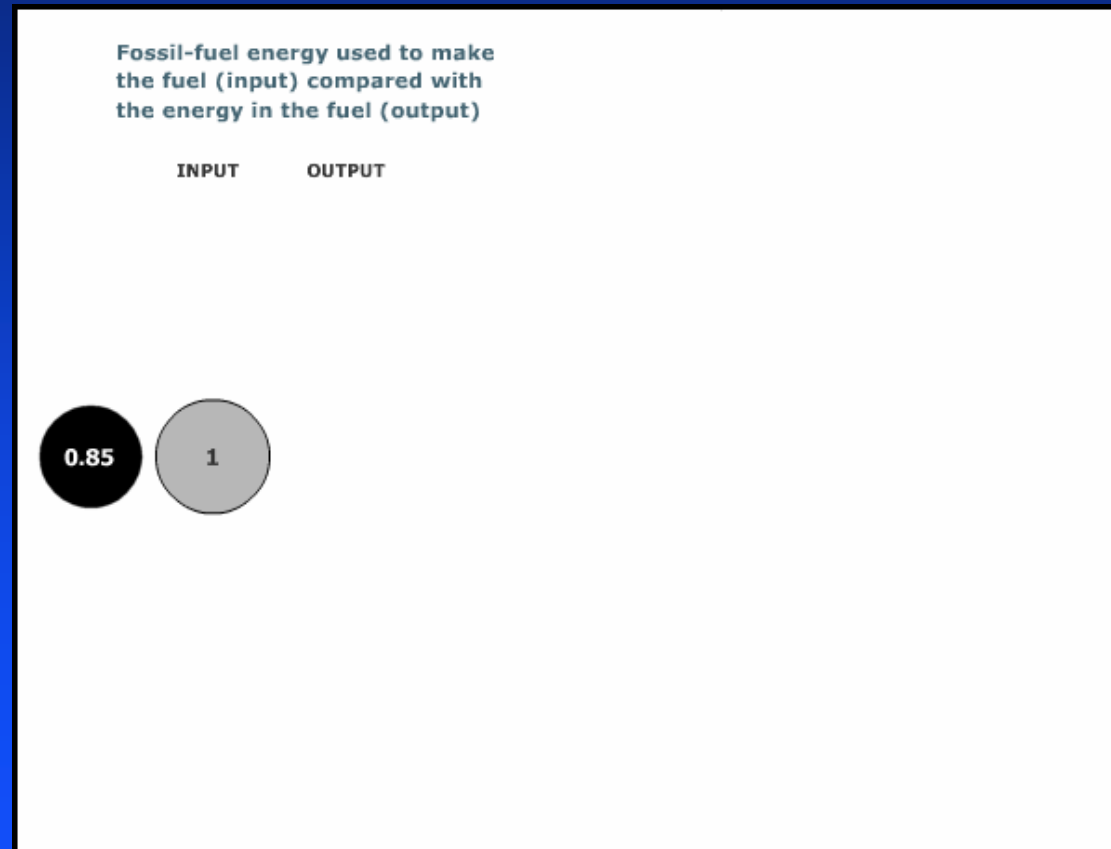


Circle graphs courtesy of nationalgeographic.com



Fossil Energy In vs. Energy Out as Fuel: Add → Gasoline & Diesel

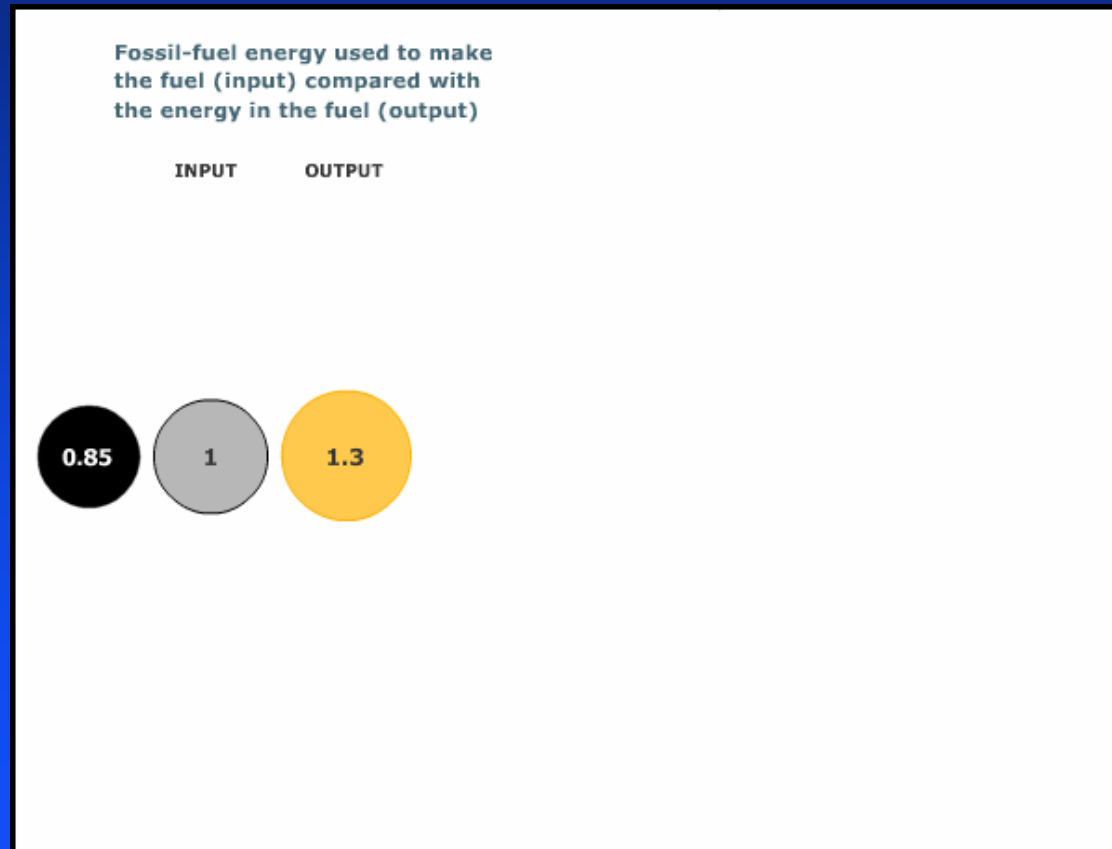
What you get
as output
for every
1 unit of
fossil energy
input:





Fossil Energy In vs. Energy Out as Fuel: Add \rightarrow Corn-based Ethanol

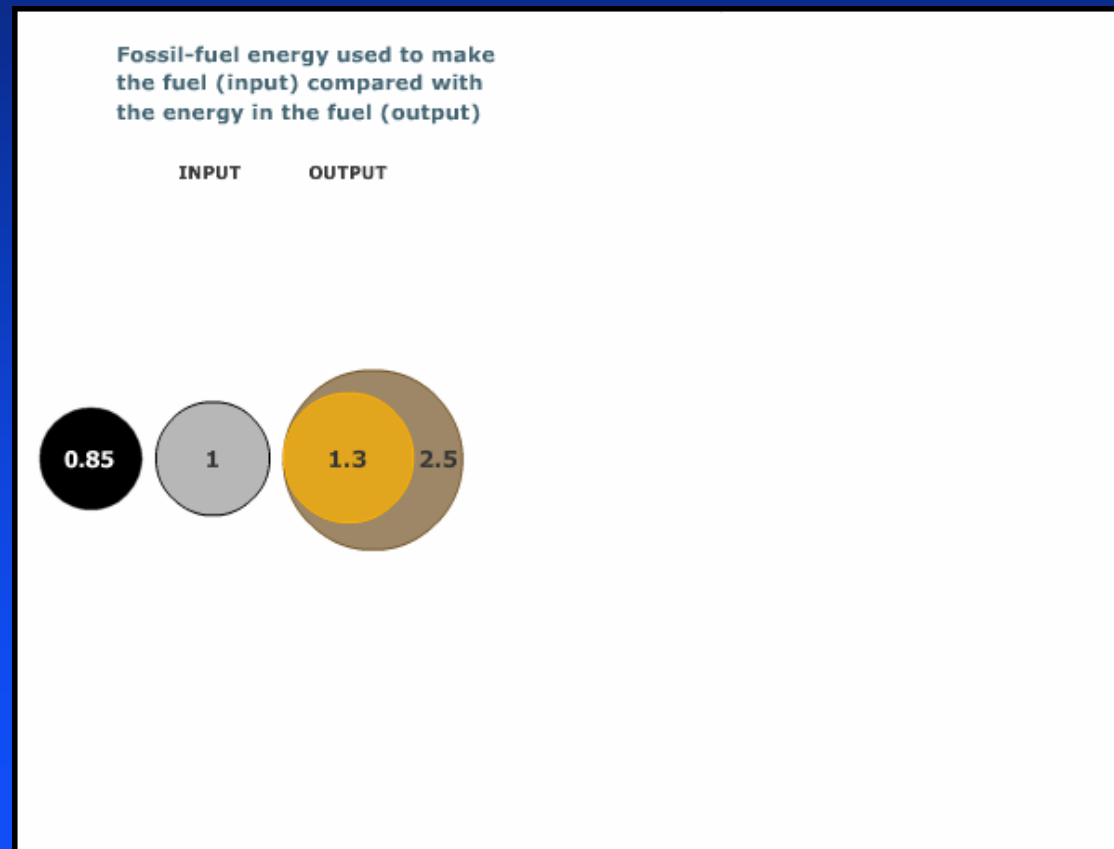
What you get
as output
for every
1 unit of
fossil energy
input:





Fossil Energy In vs. Energy Out as Fuel: Add → Today's Biodiesel (3.2-3.5)

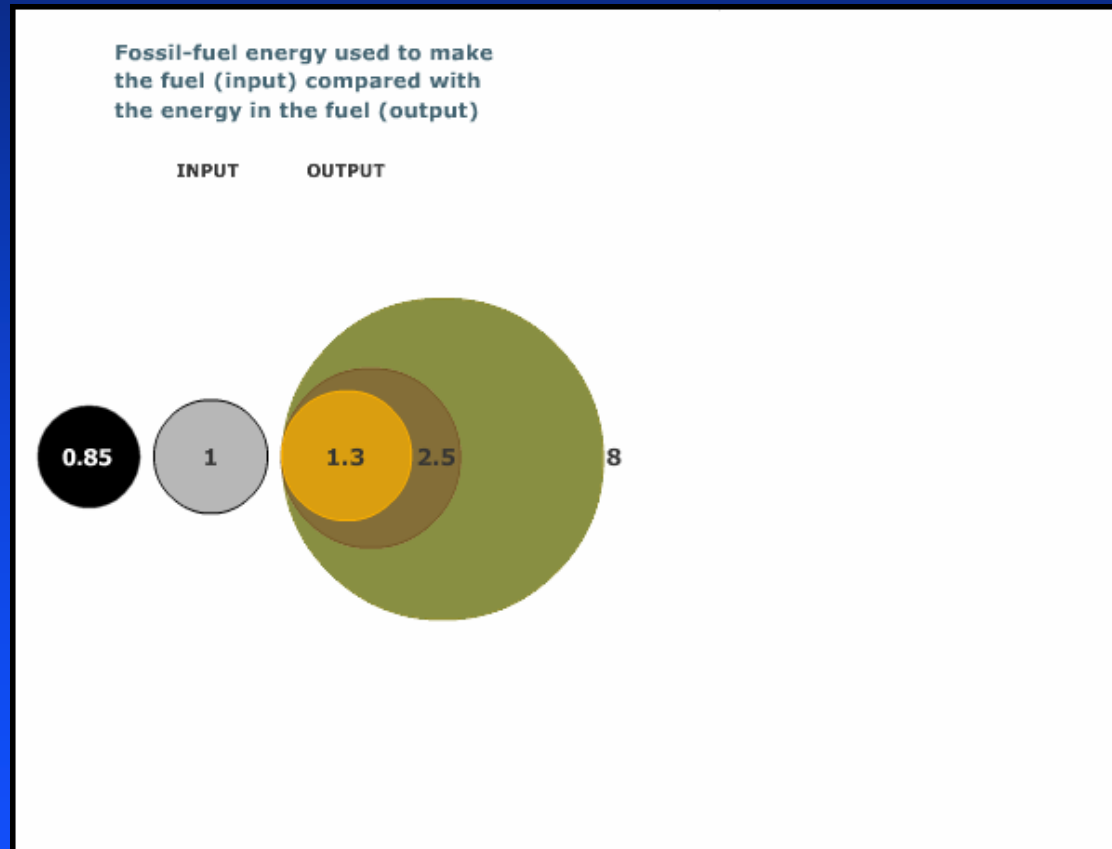
What you get
as output
for every
1 unit of
fossil energy
input:





Fossil Energy In vs. Energy Out as Fuel: Add \rightarrow Sugar-based Ethanol

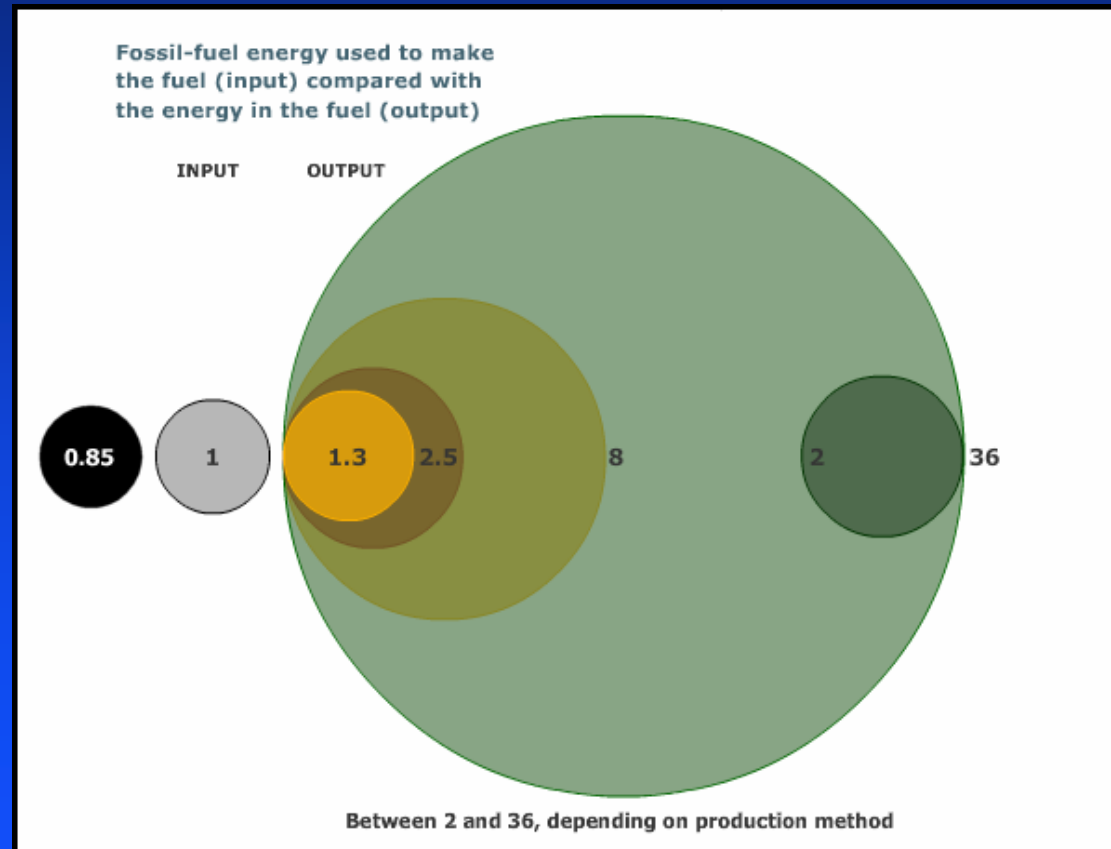
What you get
as output
for every
1 unit of
fossil energy
input:





Fossil Energy In vs. Energy Out as Fuel: Add → Cellulosic Ethanol

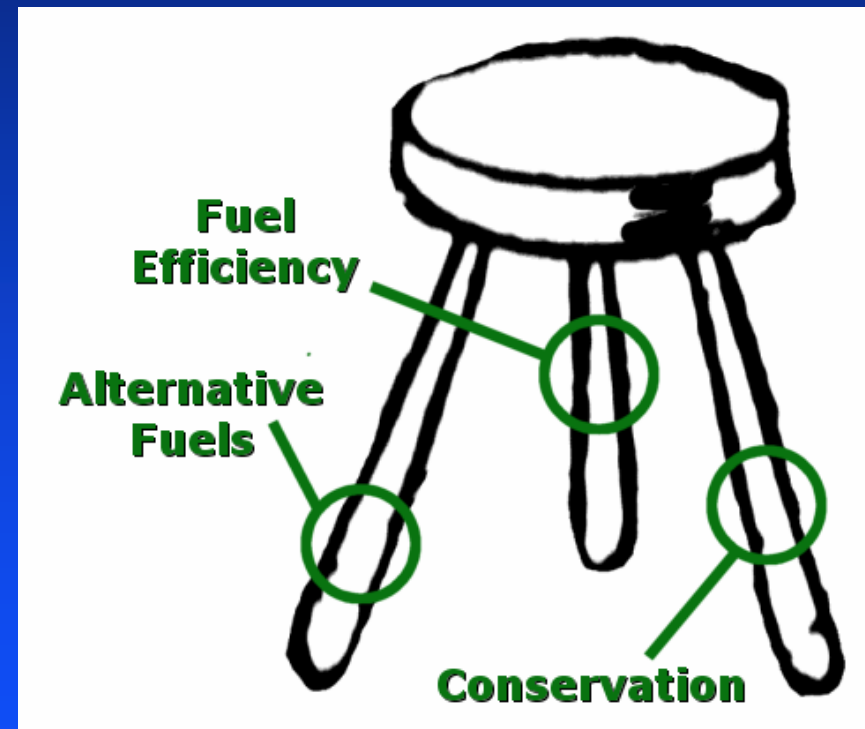
What you get
as output
for every
1 unit of
fossil energy
input:





The Conundrum: *Alternative Fuels Cannot Do It Alone!*

They must be teamed
with
significantly improving
vehicle fuel efficiency
and energy conservation
to really achieve the
ultimate goal of foreign
oil—or oil period—
independence.



Who is ready for the reality of reducing *their* petroleum consumption by 50% or more?



What is the ETCFC?



- Designated member of U.S. DOE “Clean Cities” program
- 6-yr old nonprofit in East TN, attached to UTK
- Focused on transportation sector change: diversify away from petroleum alone and use less!
- Meetings; direct fleet & fuel supplier assistance; workshops; presentations to the commercial/industrial/gov’t community and to schools; multiple newsletters

West TN

Andrew Couch

Middle TN

David Pelton





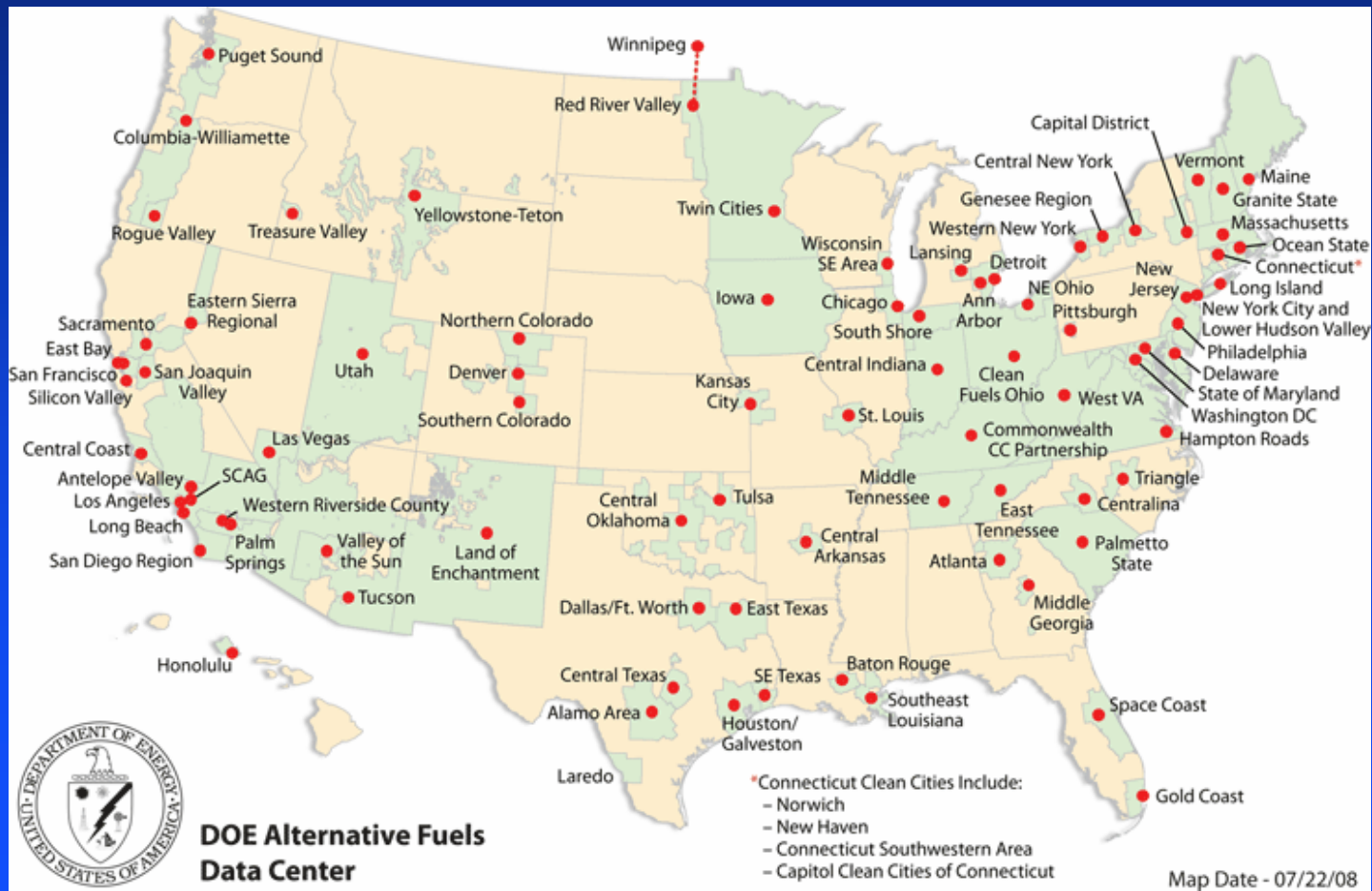
How did the ETCFC get started?



- In late 2001, learned of the DOE Clean Cities program
- Began researching what it is and how it works
- Found tremendous support from regional organizations in starting our own coalition; lack of SE coalitions further supported developing coalitions in Tennessee
- Received seed funding from State Energy Office
- **Early drivers:**
 - ◆ Air quality improvement locally, internationally
 - ◆ Expand vehicle fuel options for fleets and individuals
 - ◆ Develop regional networking & relationship building to share information and help one another with fuels



The Clean Cities map - 2008





Who is the ETCFC? - Examples



- Core staff out of Knoxville
- Fuel suppliers: Calloway, McNutt, Rogers, Benton, JAT, Appco, Pilot, Tri-Cities, Sweetwater Valley, Pioneer
- Industrial fleets: Eastman, ALCOA, Lodge, NFS, Blalock
- City fleets: Sevierville, Chattanooga, Gatlinburg, Knoxville, Maryville, Alcoa, Johnson City, Athens
- Fuel producers: Nu-Energie, Suns-Oil, Genera Energy
- Others: UTK, DOE-ORO, utilities, Friends of the Smokies, GM, Toyota, mass transit agencies, TDOT, Hwy Dept.s

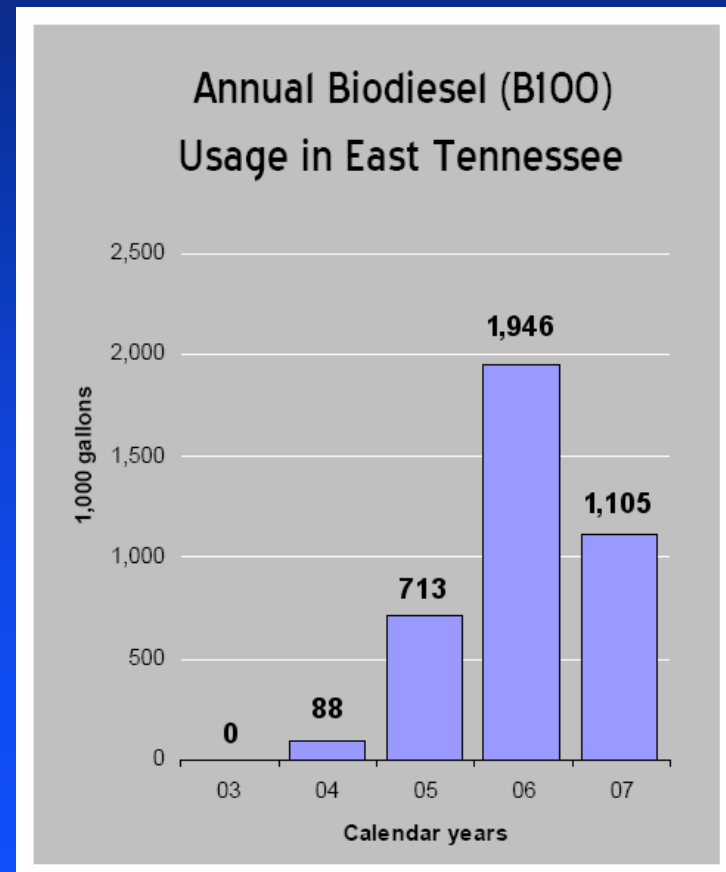
Who? - Regional Biodiesel Fleets





Success Stories – Example #1: East Tennessee Biodiesel Use

- From humble beginnings in 2004, biodiesel use expanded fairly rapidly through 2007, with major peak in 2006 (pricing)
- In 2006, our total life-cycle CO₂ emissions reductions in East TN from fleets using biodiesel blends was a minimum of **6,400 tons CO₂**





Success Stories – Example #2: Education & Outreach



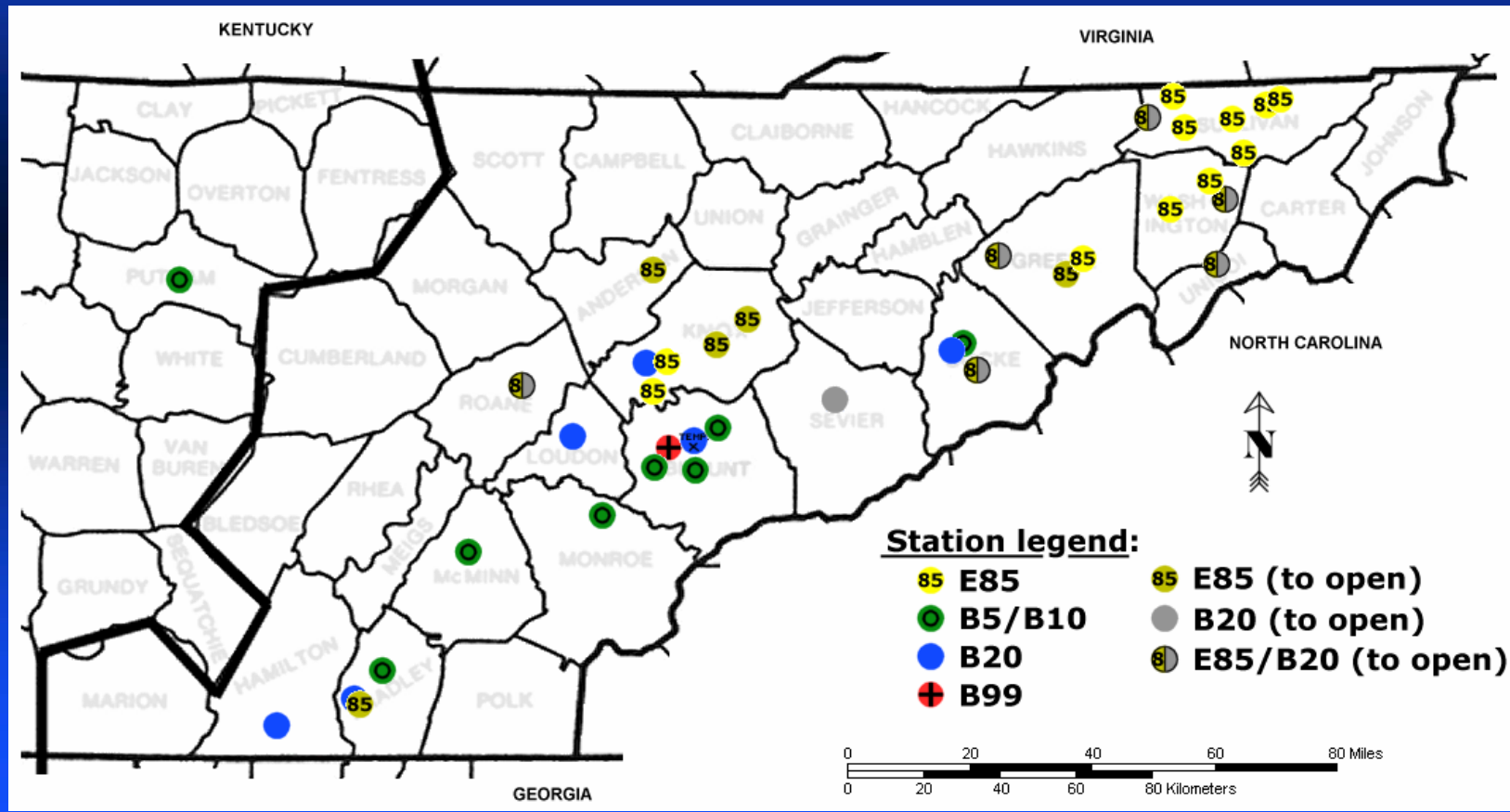
- In '07-'08 scholastic year, reached almost 1,700 East TN students with presentations on alt fuels and AFVs
- Regularly hold meetings in Knoxville, Tri-Cities and Chattanooga to update and network with local actors
- Hold annual *Run for Clean Air* in Knoxville to raise awareness about transportation and fuel options
- Manage the state-wide fuels newsletter the *Tennessee Clean Fuels Advisor* to spread information about action
- Speak with thousands throughout the year through events, presentations, workshops, conferences and expos



Current ET Public Biodiesel/E85 Stations

Biodiesel: 14 -- B99-1, B20-5, B5-8

E85: 11 (possible 12 more to open this year!)





Where do we go from here?

- For us, keep making progress and inroads with getting alternative fuels and advanced technology vehicles used in East TN
- If Tennessee and Tennesseans get serious about finding ways to save money, change how we use fuels, and diversify away from petroleum alone, then we have a chance at deriving economic benefits from the switch
- It takes action at many different levels, and everyone finding what they can do is the essential component, whether that is a fuel user, a fuel supplier or community economic development organization
- Be proactive in working in your area – be a voice for innovation and options for fleets!



*“Do not follow where the path may lead.
Go, instead, where there is no path
and leave a trail.”*

- Ralph Waldo Emerson

Your Link to Alt Fuels Info in East TN:

ETCleanFuels.org

(865) 974-3625

Questions?