Energy Flow in Alaska

AEA Rural Energy Conference

September 2005

Steve Colt

UAA Institute of Social and Economic Research

steve_colt@uaa.alaska.edu

Energy satisfies our "end-use" needs

- Warm rooms
- Cold freezer
- Transportation (snowmachines, barges)
- Light
- Mechanical Power (power tools….)
- Sound (speakers)
- Communication (internet, telephone,…)

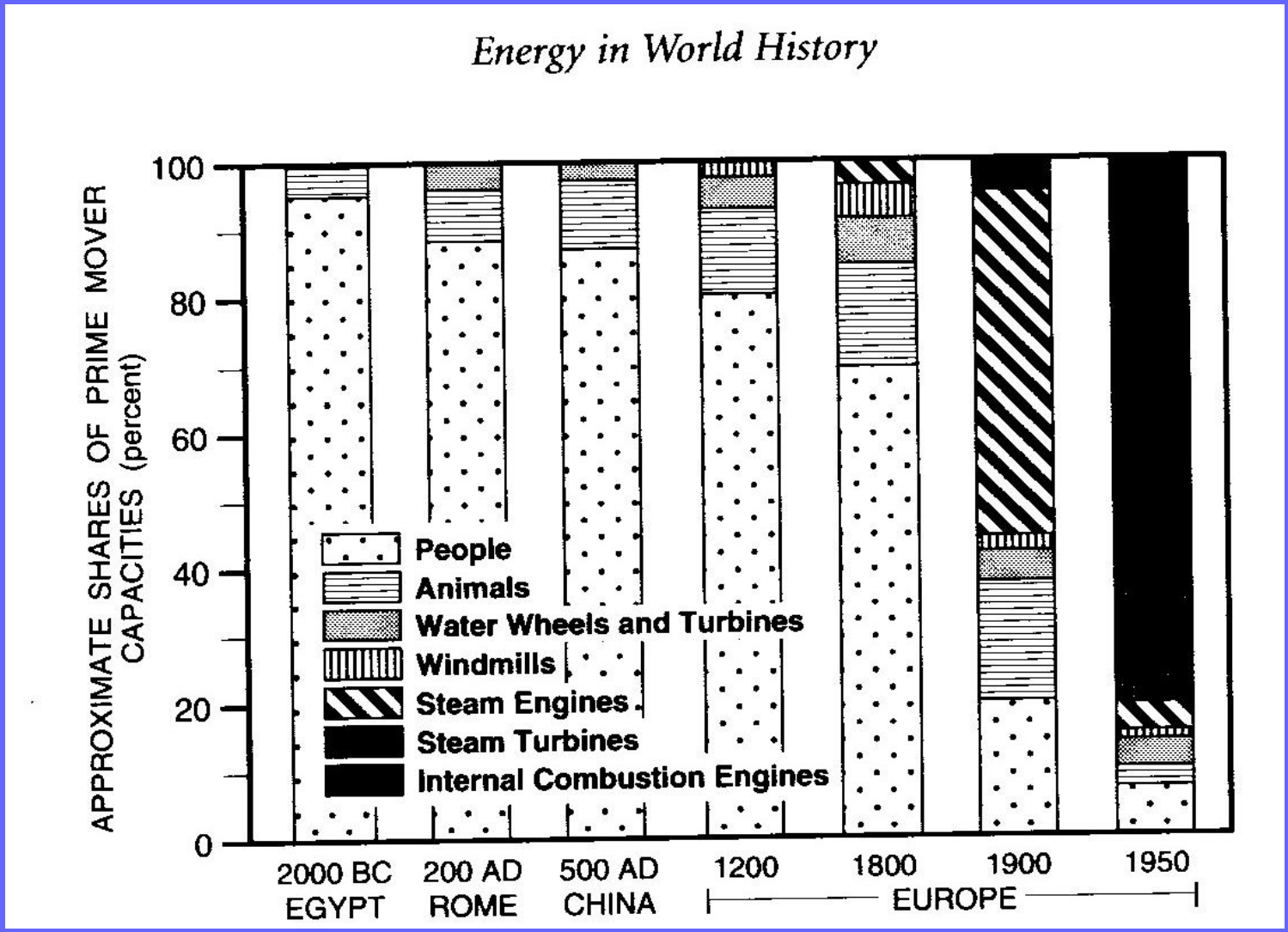
Energy is converted from one form to another

- Electricity is an energy "currency," not a primary energy source
- Hydrogen is an energy currency too!
- Example: Your Toaster

  Solar energy→ plants→Natural Gas→Electricity→Heat→

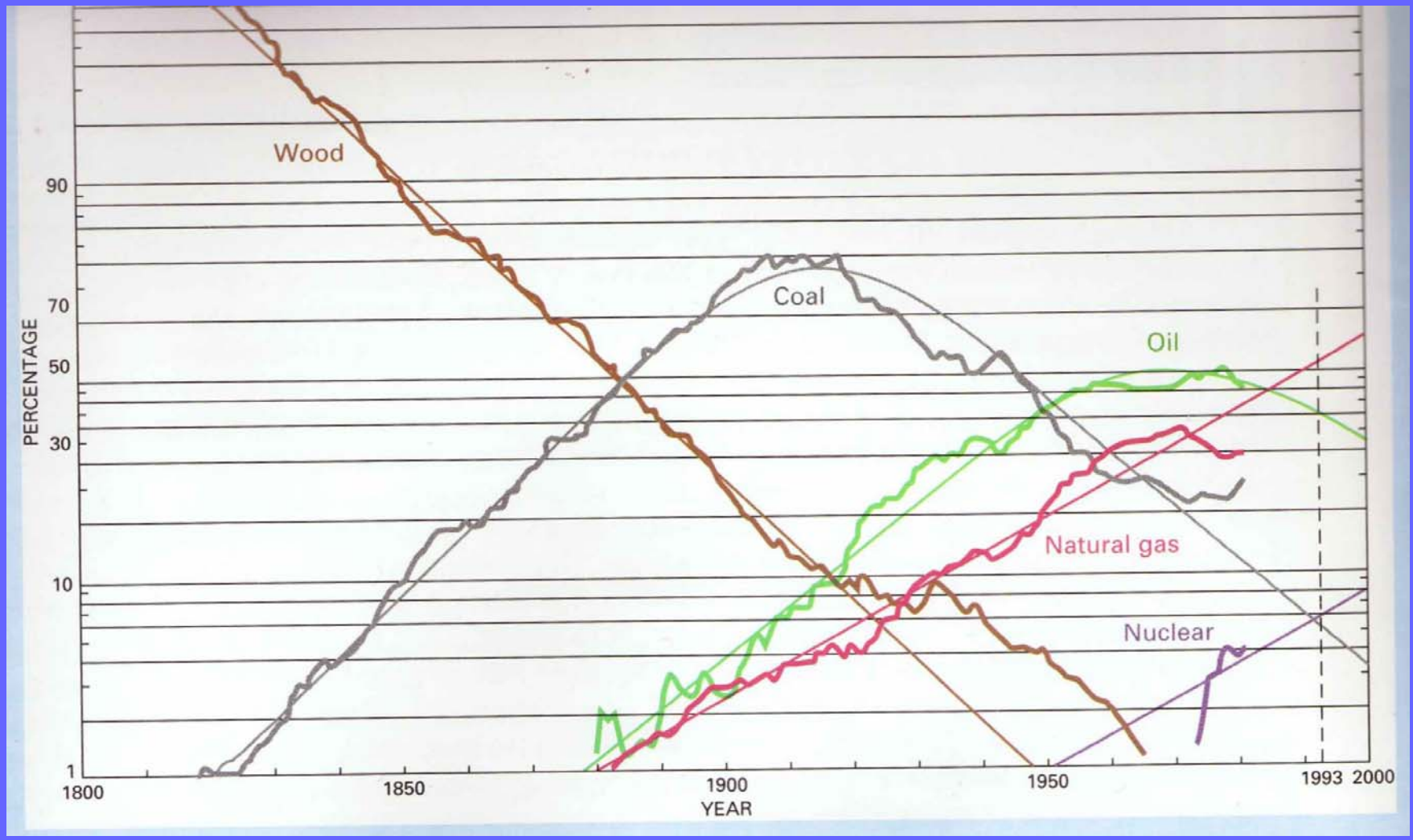
  (toast + low-grade heat)

Evolution of Conversion Devices



Source: Smil 1994

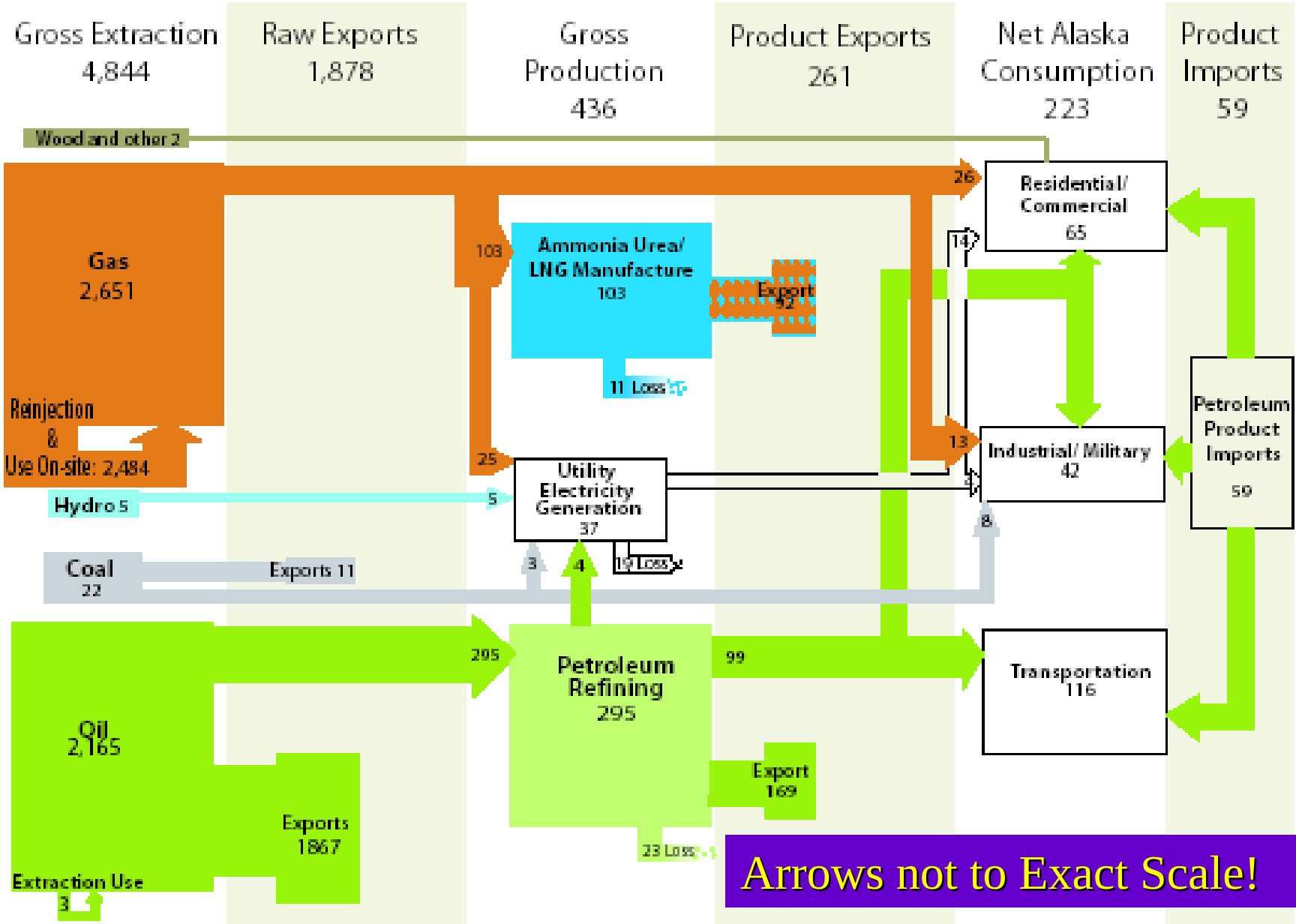
U.S. primary energy sources change over time



USGS 1991

Turning to Alaska--

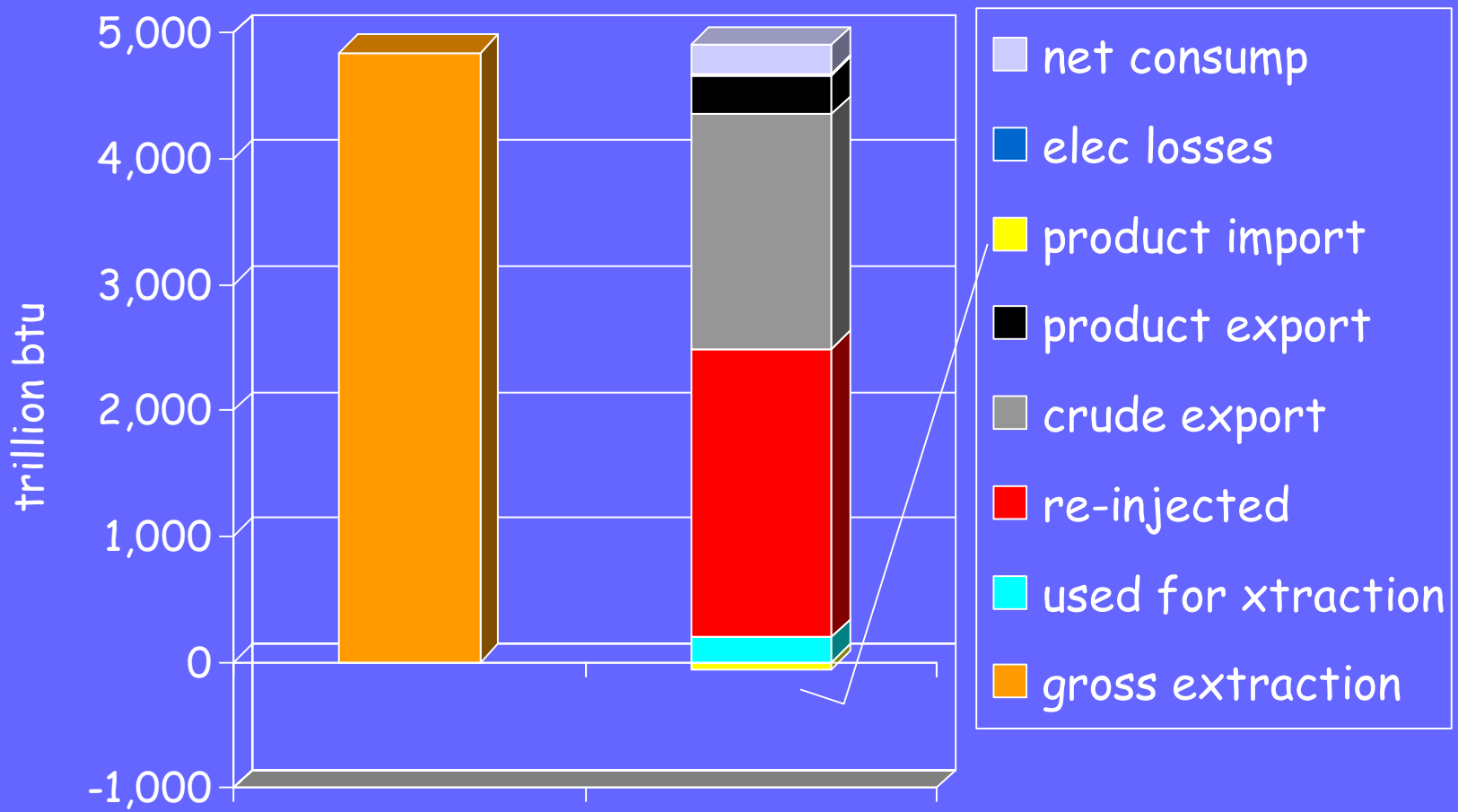
2001 Alaska Energy Flow (Trillion BTUs)



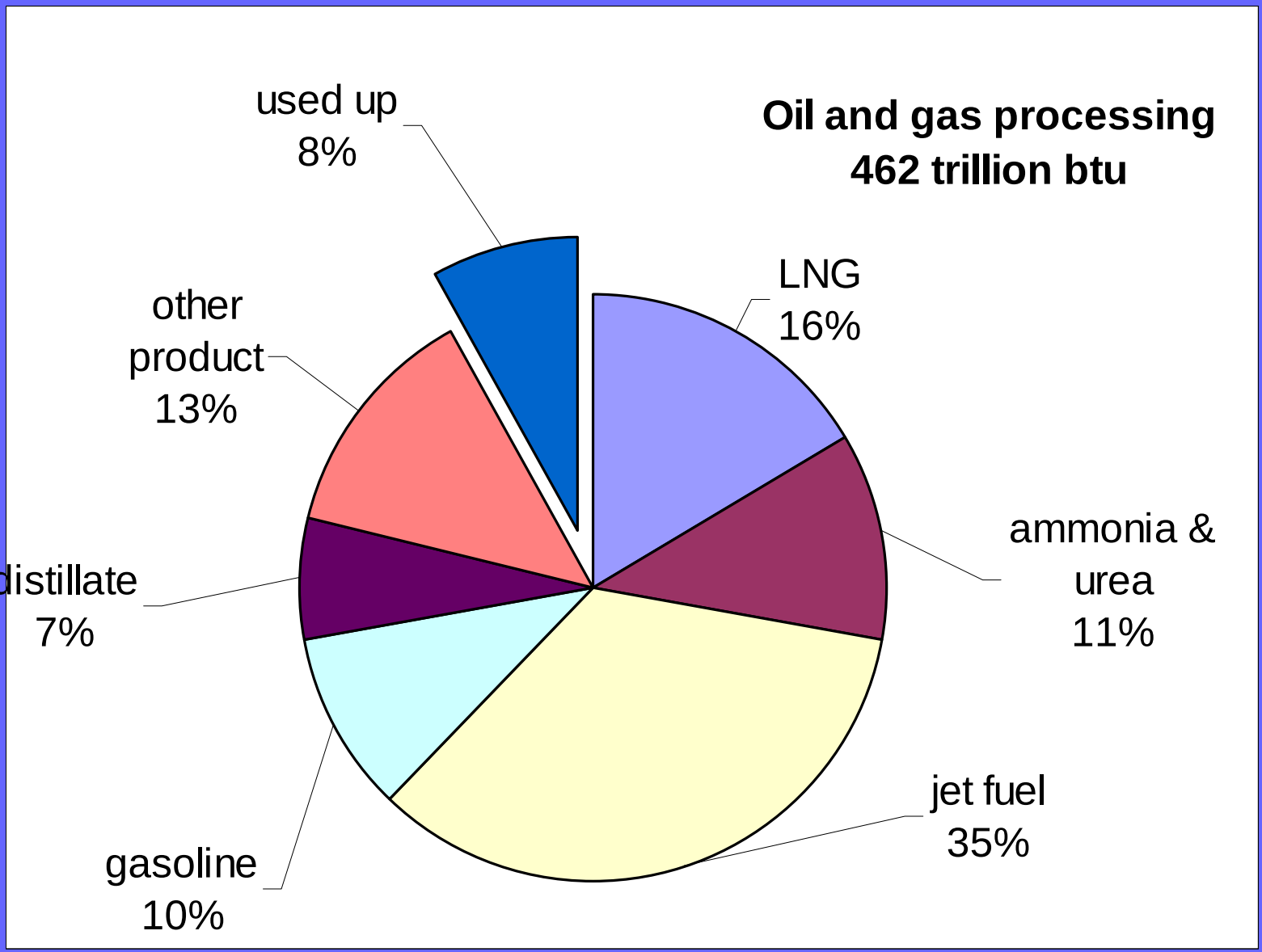
The really big picture: overall disposition of energy
(trillion btu)

	Coal	Natural Gas	Total petro leum	Hydro-electric	Wood, Ethanol, Wind, and Geothermal	Fossil Electri-city	Total
Gross Extraction	**22**	**2,651**	**2,166**	**5**	**2**		**4,845**
- Re Injected Gas		2,288					2,288
- Other Use during Extraction		196	3				199
= Net Extraction	**22**	**167**	**2,163**	**5**	**2**		**2,358**
- Raw Exports	11		1,868				1,879
- Processing Use		11	23				34
+ Refining conversion							-
=Alaska product disposition	**11**	**156**	**272**	**5**	**2**		**445**
- Product Exports		92	169				261
+ Imports			59				59
= Primary energy consumption	**11**	**64**	**161**	**5**	**2**		**243**
- Input to Electric Power	3	25	4	5			38
+ electricity output						17	17
=Final consumption	**8**	**39**	**157**		**2**	**17**	**222**

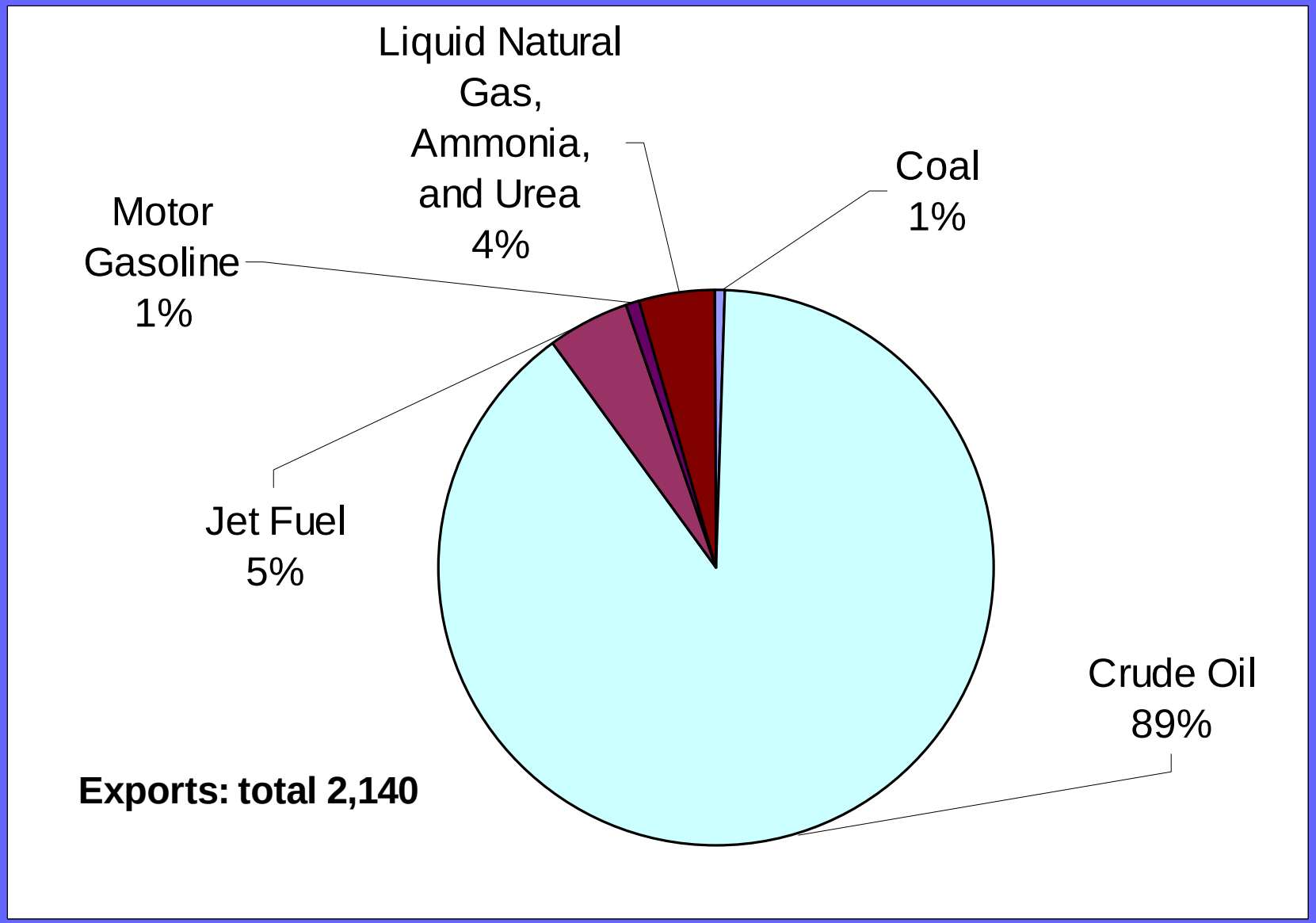
Overall Disposition of Energy



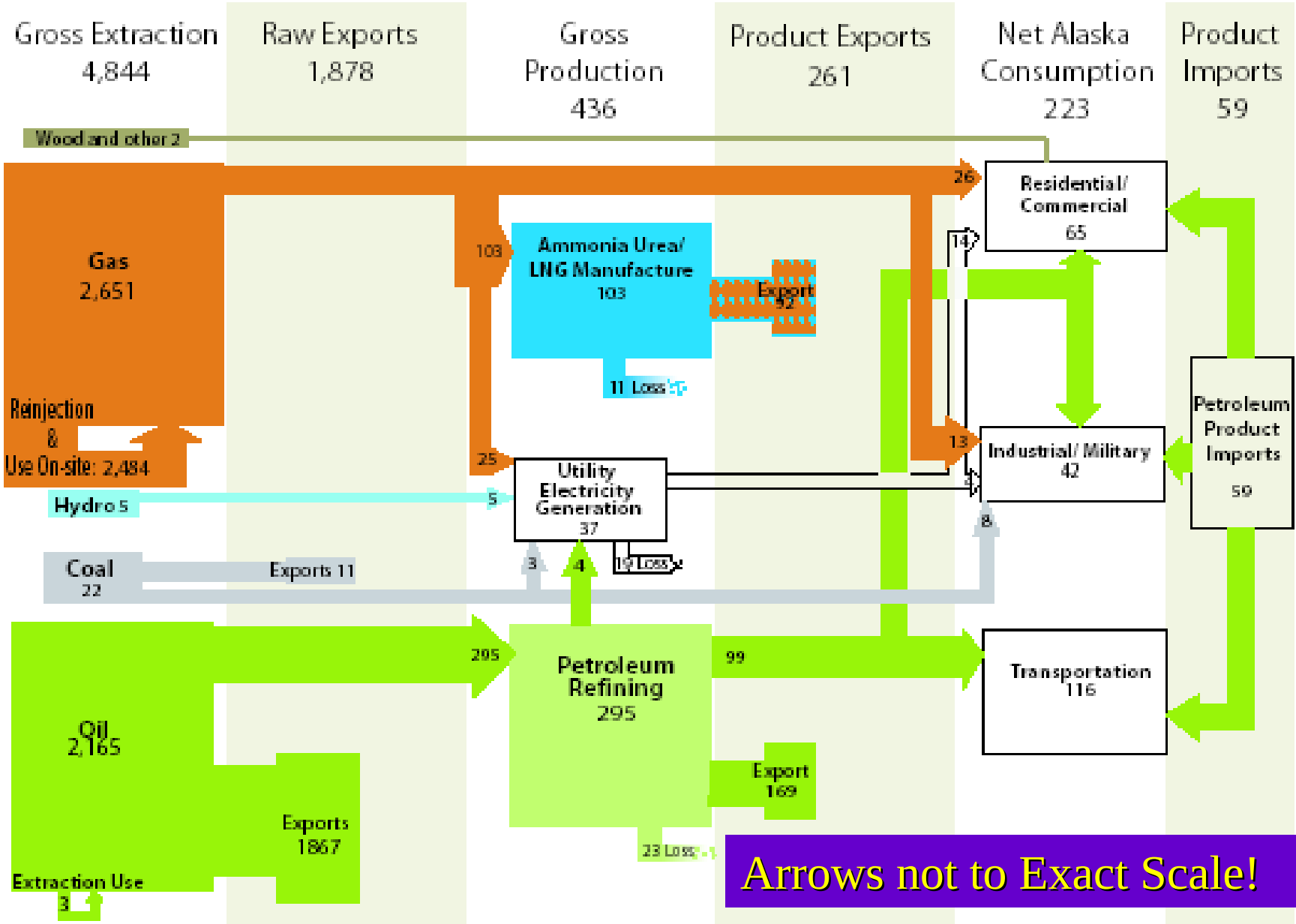
Oil & gas processing (462 trillion btu)



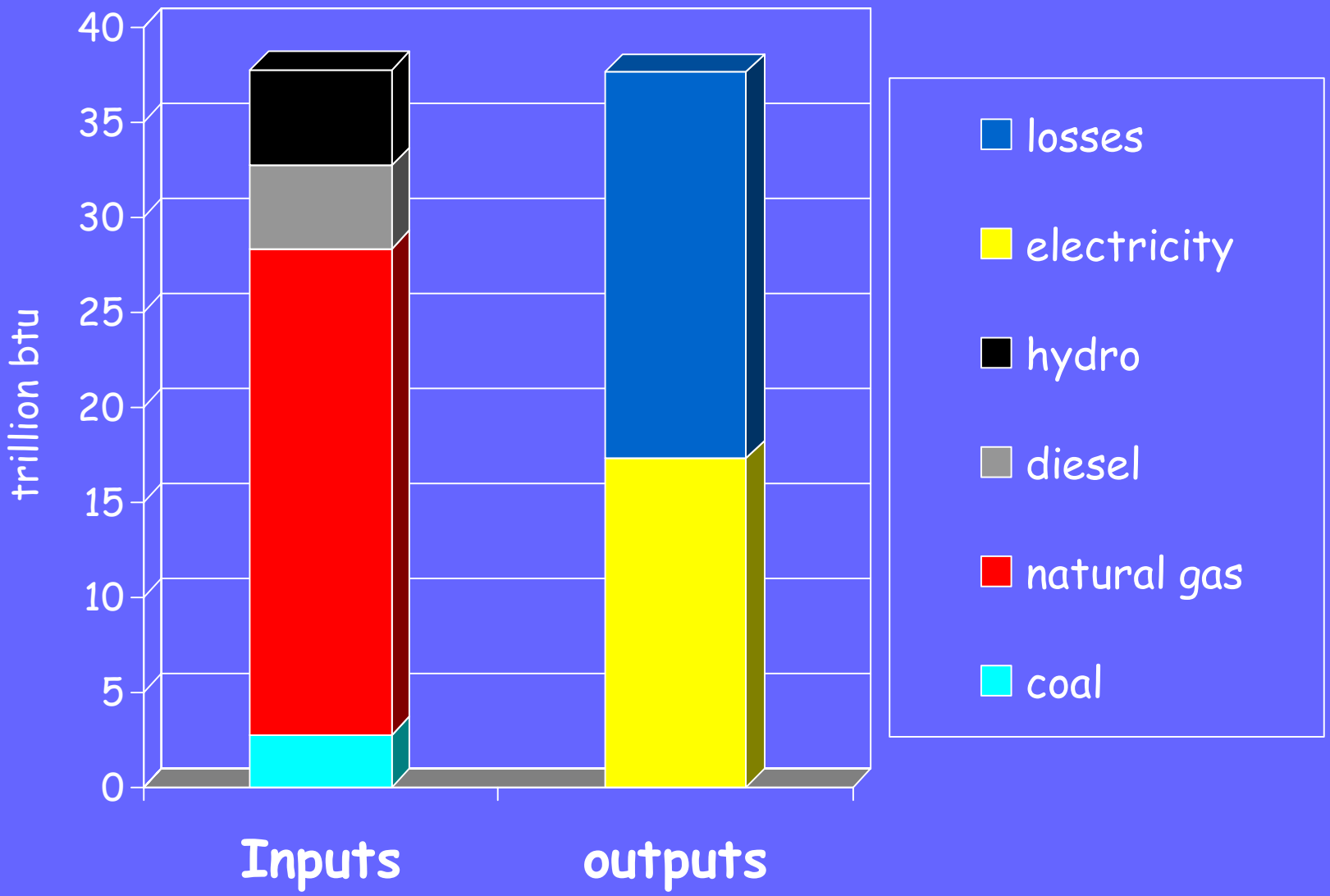
Exports (2,140 trillion btu)



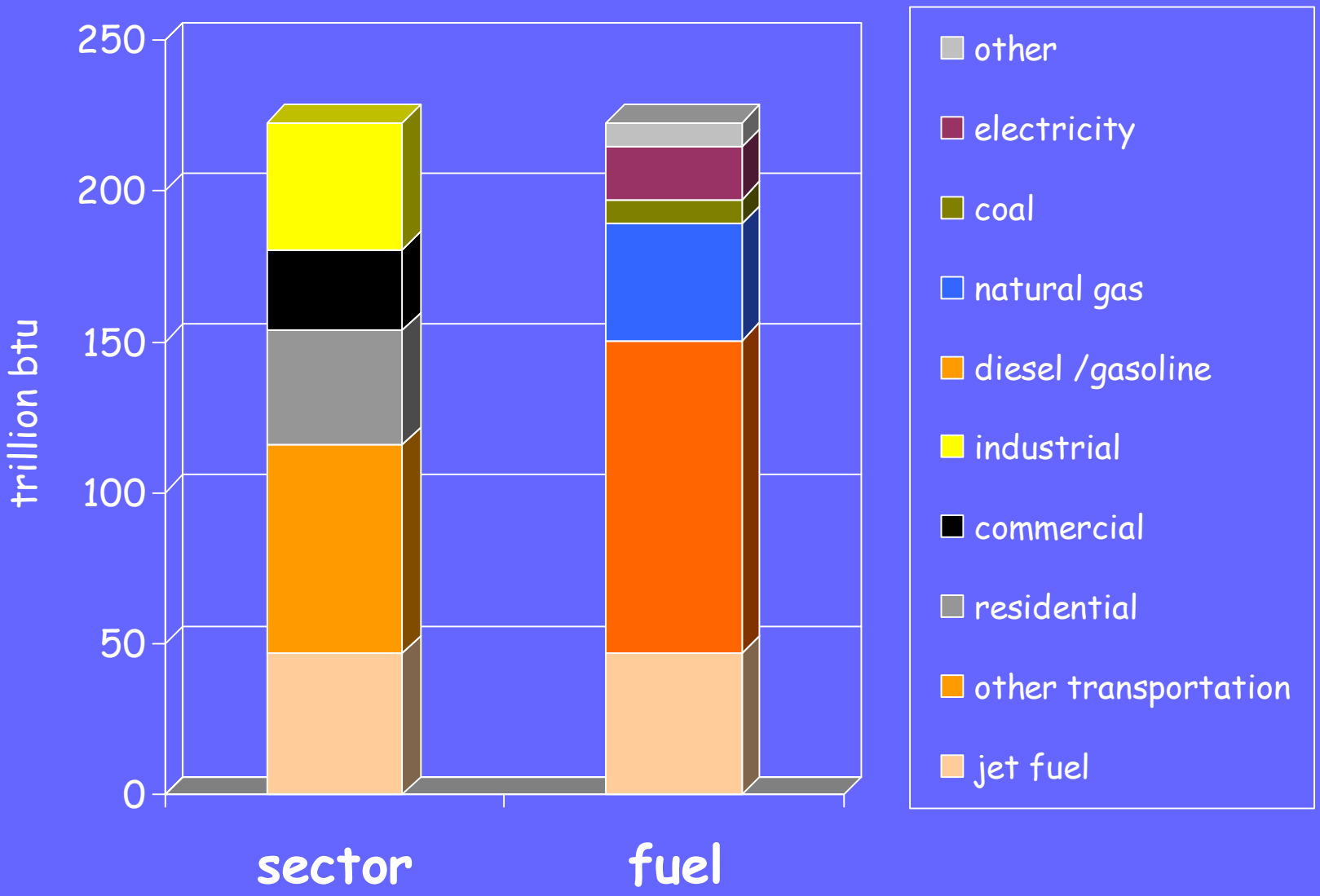
2001 Alaska Energy Flow (Trillion BTUs)



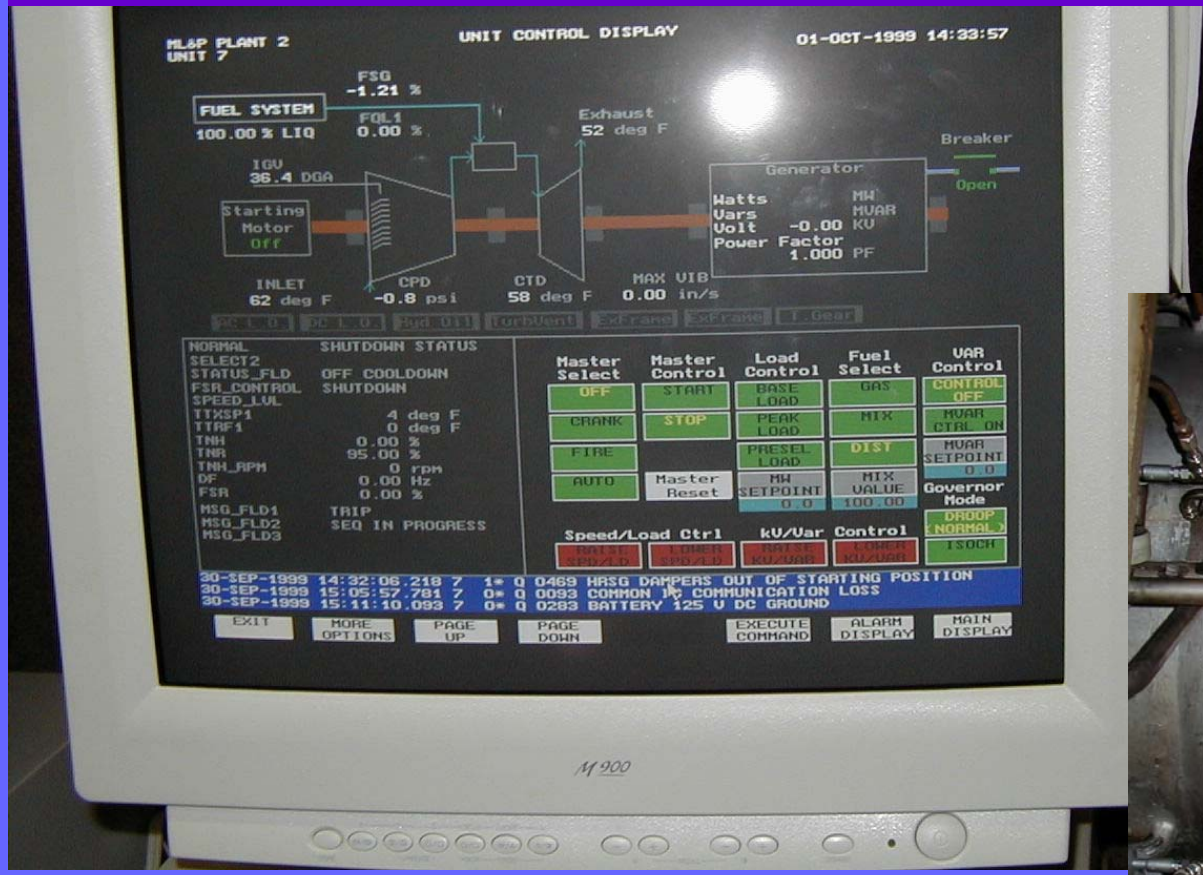
Electricity production (38 trillion btu)



Final consumption (222 trillion btu)

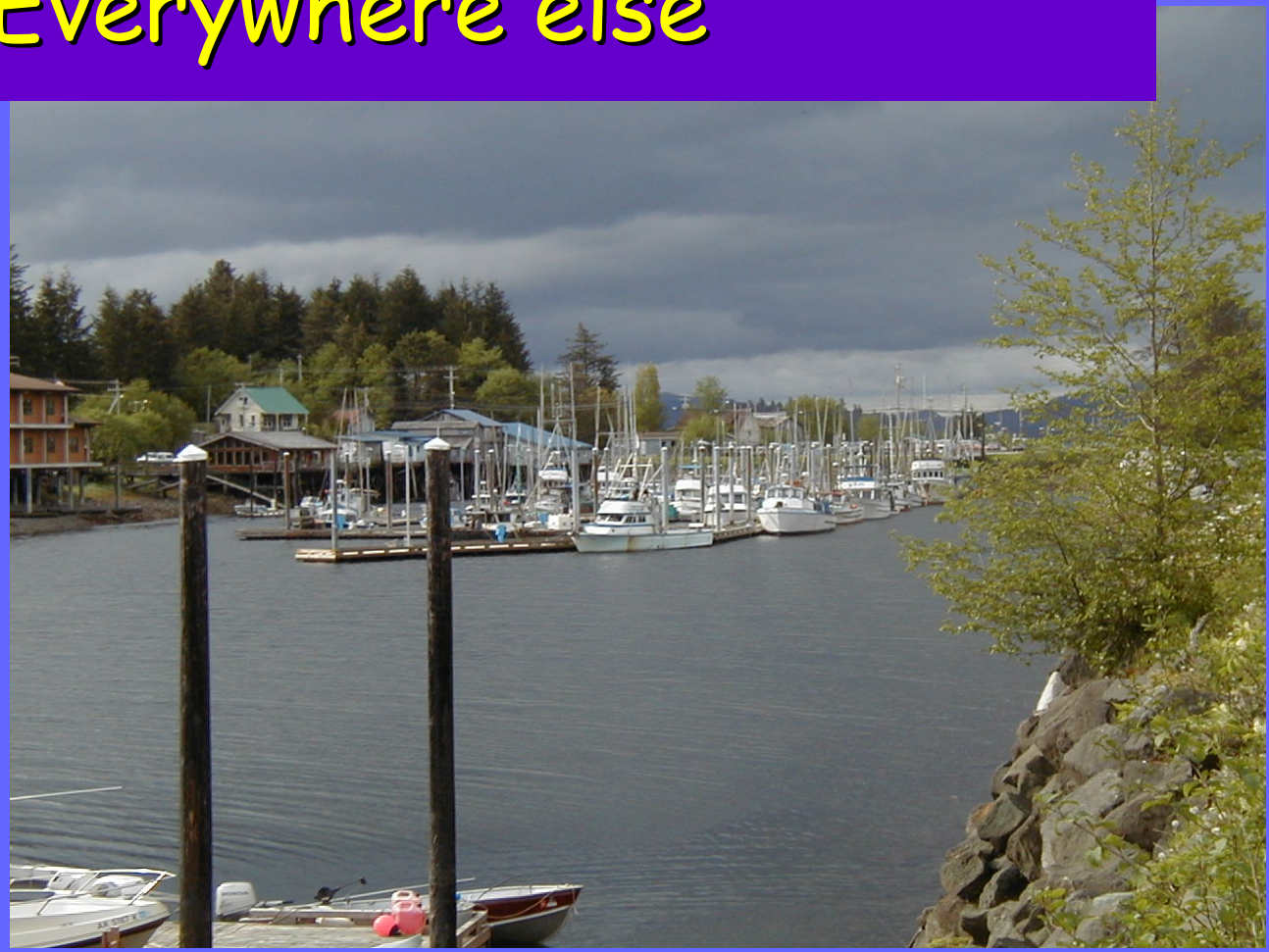


The Natural Gas Network



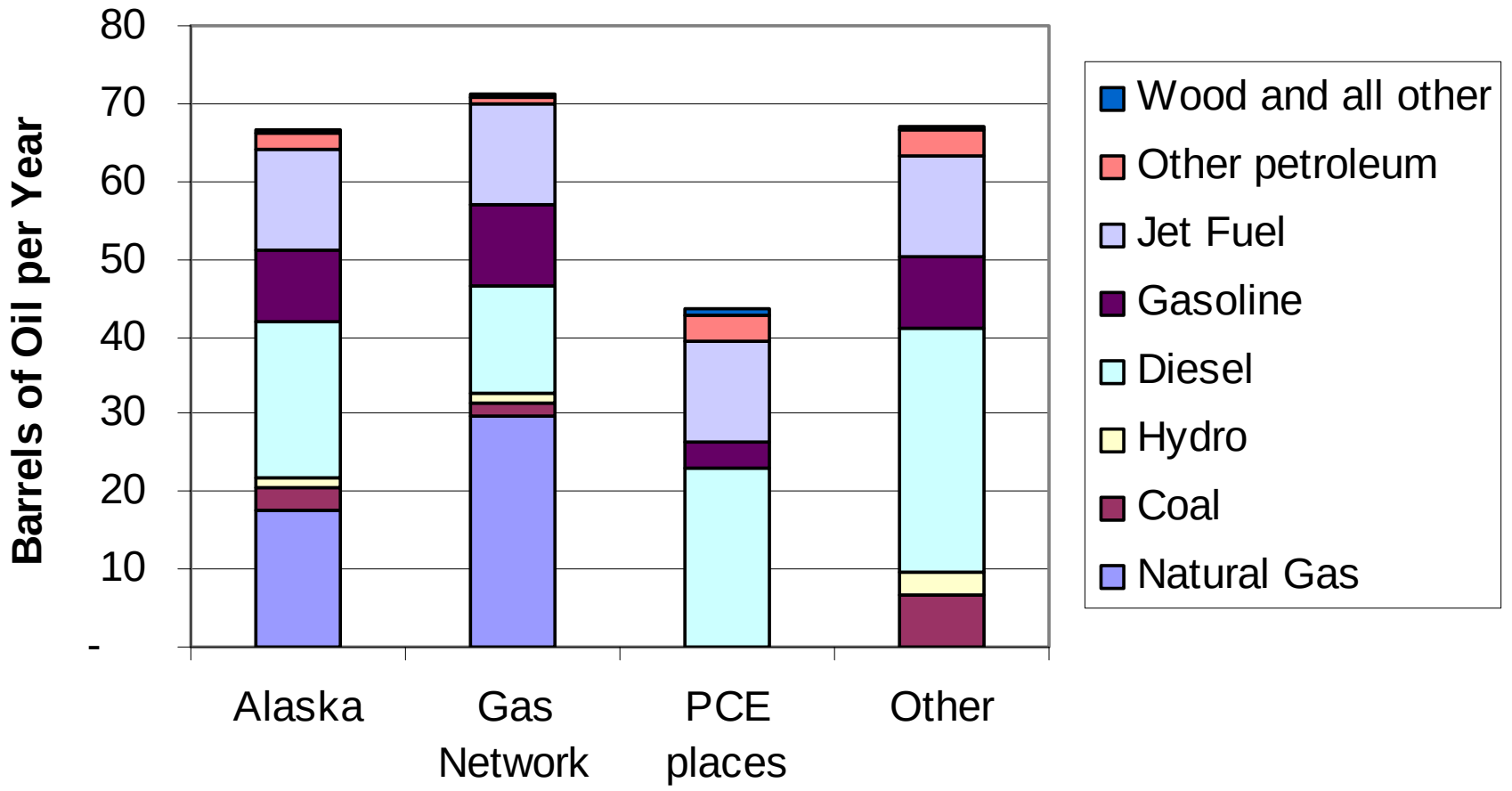
PCE Communities

Everywhere else



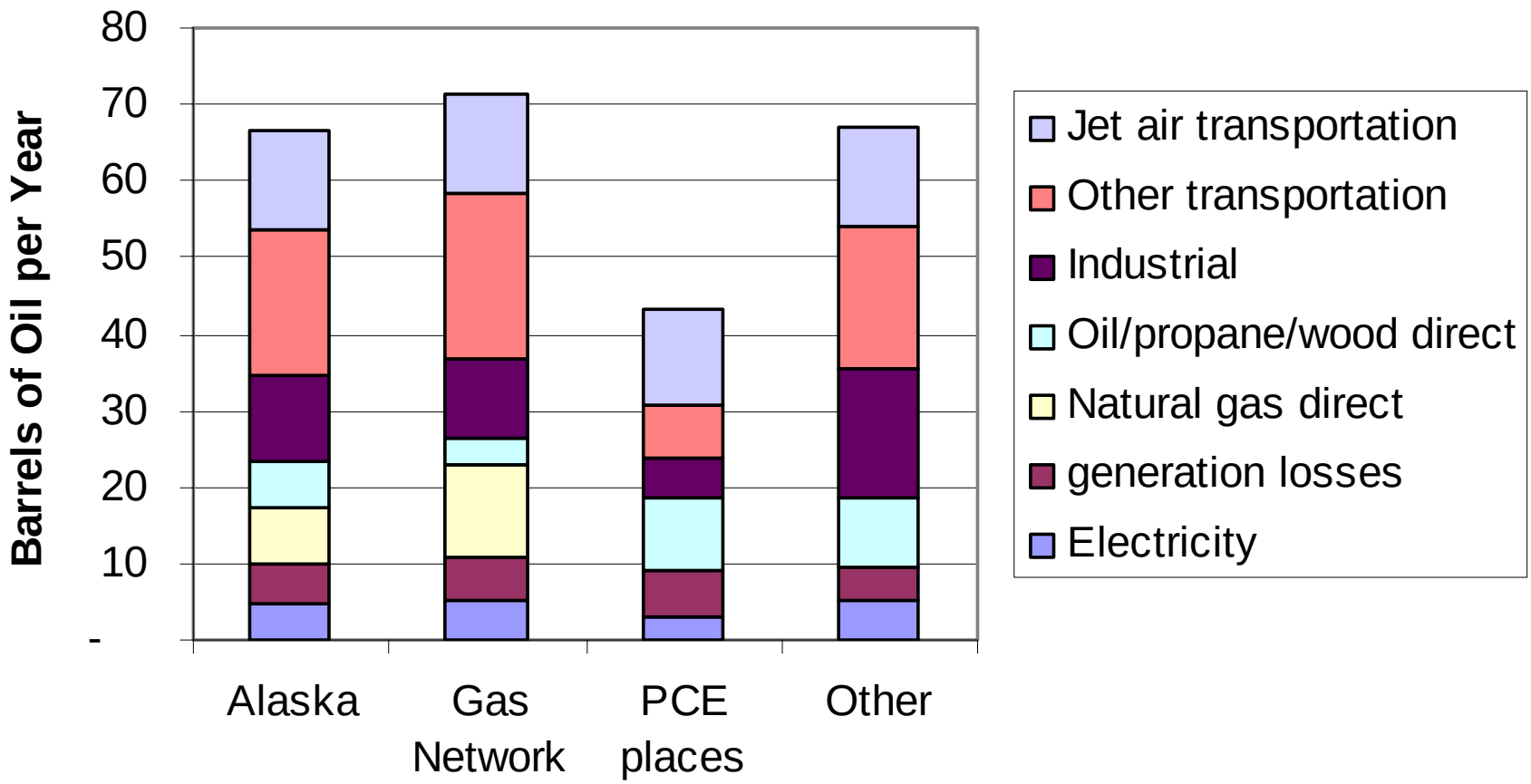
Primary energy consumption per Alaskan

barrels oil per person per year

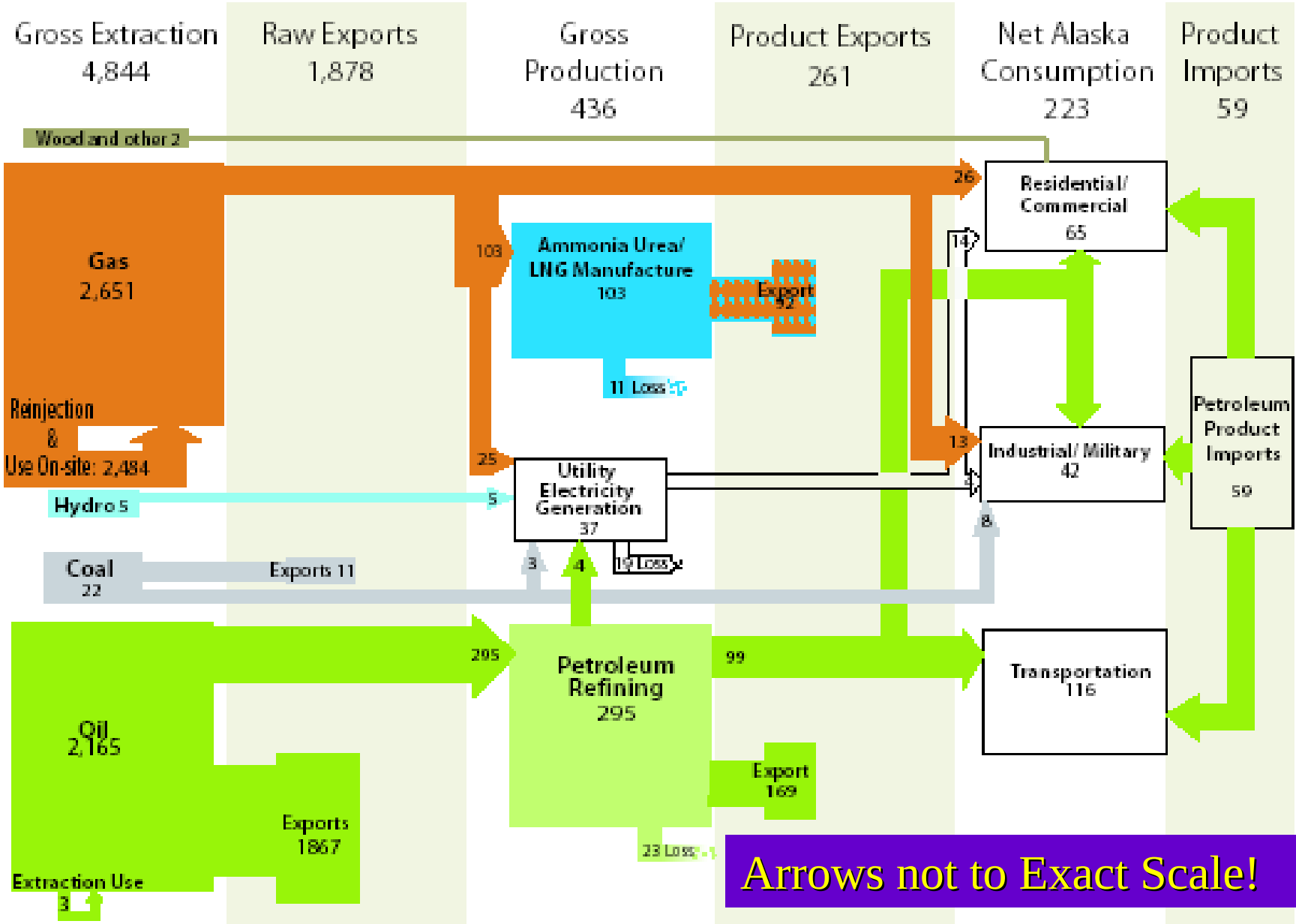


Final energy consumption per Alaskan

barrels oil per person per year



2001 Alaska Energy Flow (Trillion BTUs)



Alaska's Three Energy Challenges (Steve Colt's personal opinion)

- For the gas network, the era of cheap local gas is over
- For PCE places, the costs of liquid fuels delivered by barge are high and rising
- Alaskans have global responsibilities as energy consumers and carbon emitters

Full Report: Alaska Electric Power Statistics with Energy Balance www.iser.uaa.alaska.edu

- Other references:
- Alaska Electric Power Statistics (with Alaska Energy Balance) 1960-2001 by Scott Goldsmith, November 2003. http://www.iser.uaa.alaska.edu/Publications/akelectricpowerfinal.pdf
- BP Statistical Review of World Energy. 2004. www.bp.com/worldenergy
- Smil, Vaclav. 1994 Energy in World History. Westview.
- Smil, Vaclav. 2003. Energy at the Crossroads. MIT Press.