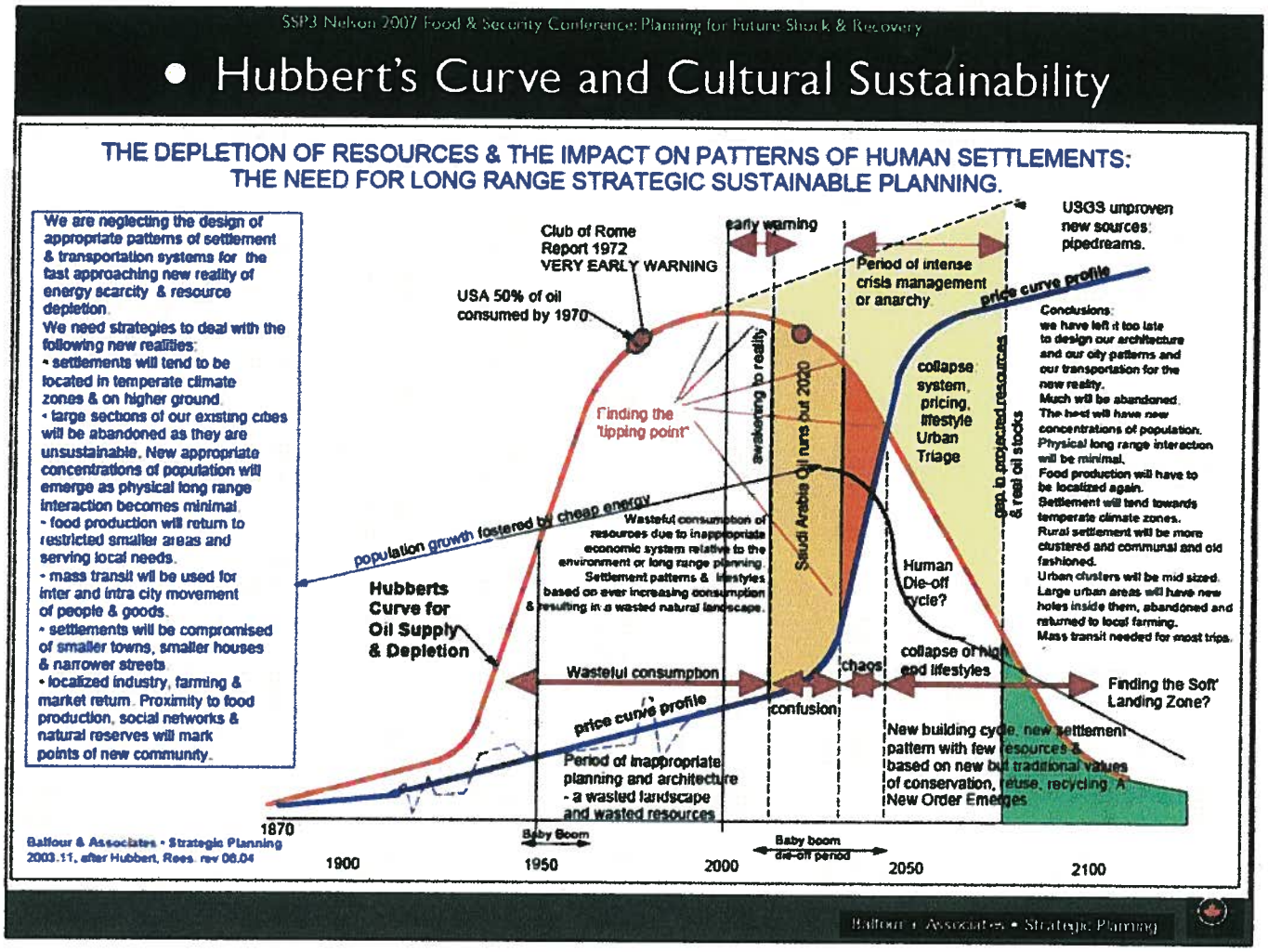
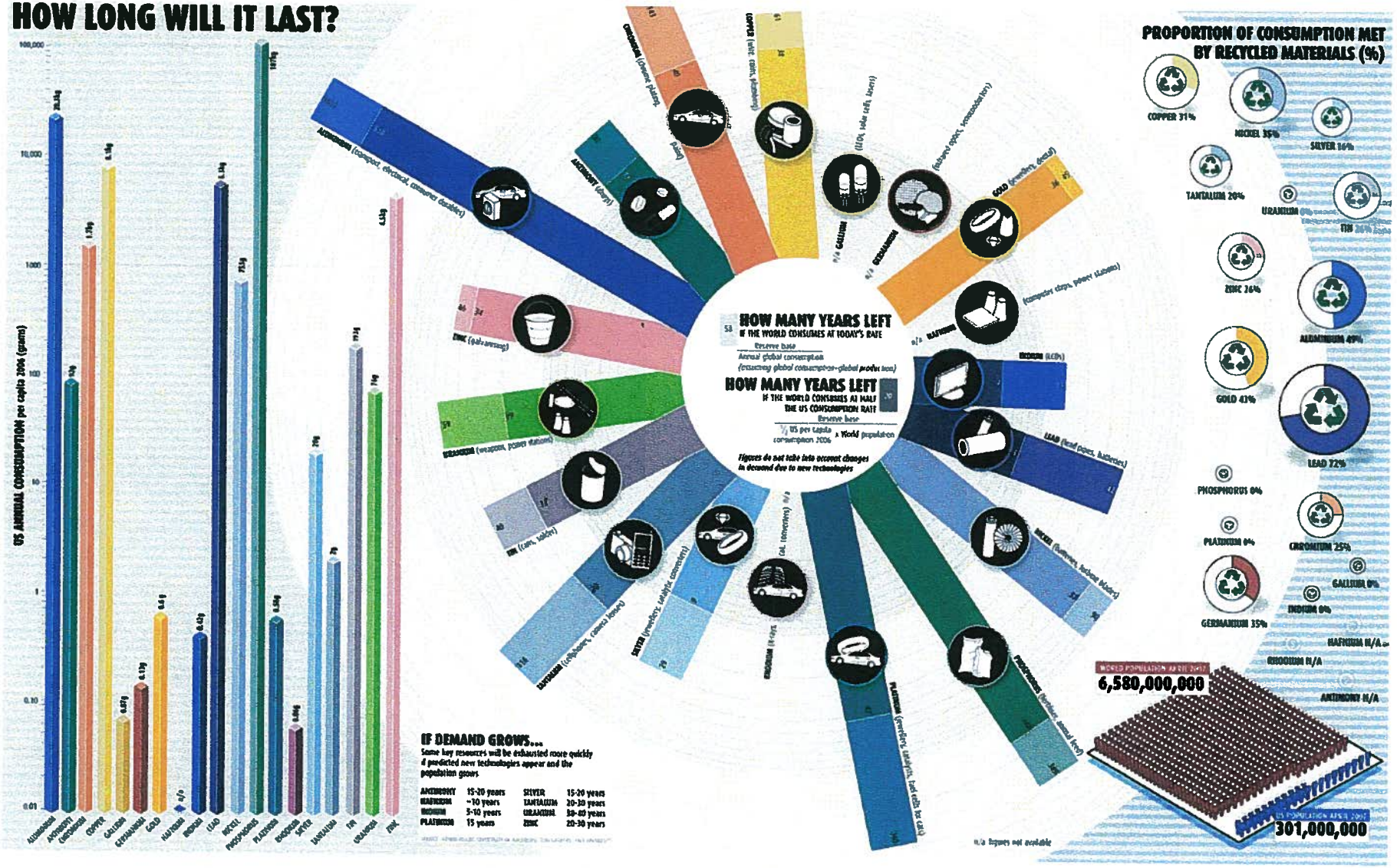
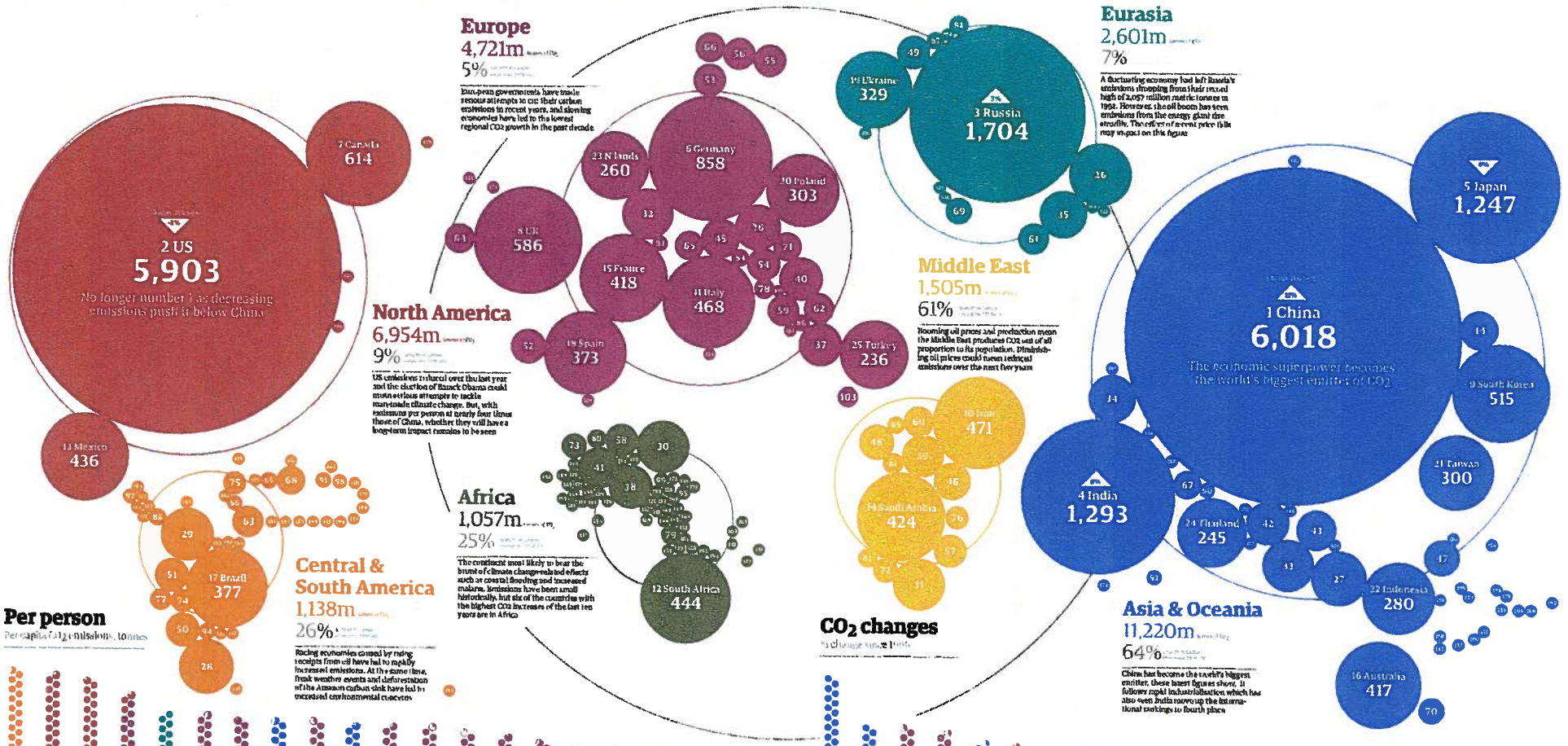

SSP3 Nelson 2007 Food & Security Conference: Planning for Future Shock & Recovery
• Hubbert's Curve and Cultural Sustainability
THE DEPLETION OF RESOURCES & THE IMPACT ON PATTERNS OF HUMAN SETTLEMENTS:
THE NEED FOR LONG RANGE STRATEGIC SUSTAINABLE PLANNING.
We are neglecting the design of appropriate patterns of settlement & transportation systems for the fast approaching new reality of energy scarcity & resource depletion.
We need strategies to deal with the following new realities:
- settlements will tend to be located in temperate climate zones & on higher ground.
- large sections of our existing cities will be abandoned as they are unsustainable. New appropriate concentrations of population will emerge as physical long range interaction becomes minimal.
- food production will return to restricted smaller areas and serving local needs.
- mass transit will be used for inter and intra city movement of people & goods.
- settlements will be compromised of smaller towns, smaller houses & narrower streets.
- localized industry, farming & market return. Proximity to food production, social networks & natural reserves will mark points of new community.
Club of Rome Report 1972 VERY EARLY WARNING
early warning
USA 50% of oil consumed by 1970
USGS unproven new sources; pipedreams.
Period of intense crisis management or anarchy
price curve profile
Finding the "tipping point"
awakening to reality
Saudi Arabia Oil runs out 2020
collapse system, pricing, lifestyle Urban Triage
gap in projected resources & real oil stocks
Conclusions:
we have left it too late to design our architecture and our city patterns and our transportation for the new reality.
Much will be abandoned.
The best will have new concentrations of population.
Physical long range interaction will be minimal.
Food production will have to be localized again.
Settlement will tend towards temperate climate zones.
Rural settlement will be more clustered and communal and old fashioned.
Urban clusters will be mid sized.
Large urban areas will have new holes inside them, abandoned and returned to local farming.
Mass transit needed for most trips.
population growth fostered by cheap energy
Wasteful consumption of resources due to inappropriate economic system relative to the environment or long range planning. Settlement patterns & lifestyles based on ever increasing consumption & resulting in a wasted natural landscape.
Hubberts Curve for Oil Supply & Depletion
Human Die-off cycle?
Wasteful consumption
chaos
collapse of high end lifestyles
Finding the 'Soft' Landing Zone?
price curve profile
confusion
Period of inappropriate planning and architecture - a wasted landscape and wasted resources
New building cycle, new settlement pattern with few resources & based on new but traditional values of conservation, reuse, recycling. A New Order Emerges
1870
1900
Baby Boom
1950
2000
Baby boom die-off period
2050
2100
Balfour & Associates • Strategic Planning 2003.11, after Hubbert, Rees rev 06.04
Balfour + Associates • Strategic Planning


HOW LONG WILL IT LAST?
US ANNUAL CONSUMPTION per capita 2006 (grams)
ALUMINIUM
ANTIMONY
CHROMIUM
COPPER
GALLIUM
GERMANIUM
GOLD
HAFNIUM
INDIUM
LEAD
NICKEL
PHOSPHORUS
PLATINUM
RHODIUM
SILVER
TANTALUM
TIN
URANIUM
ZINC
HOW MANY YEARS LEFT
IF THE WORLD CONSUMES AT TODAY'S RATE
Reserve base
Annual global consumption
(economy global consumption-global profits tax)
HOW MANY YEARS LEFT
IF THE WORLD CONSUMES AT HALF THE US CONSUMPTION RATE
Reserve base
½ US per capita consumption 2006 x World population
Figures do not take into account changes in demand due to new technologies
IF DEMAND GROWS...
Some key resources will be exhausted more quickly if predicted new technologies appear and the population grows
ANTIMONY 15-20 years
HAFNIUM ~10 years
INDIUM 5-10 years
PLATINUM 15 years
SILVER 15-20 years
TANTALUM 20-30 years
URANIUM 50-60 years
ZINC 20-30 years
n/a figures not available
PROPORTION OF CONSUMPTION MET BY RECYCLED MATERIALS (%)
COPPER 31%
NICKEL 35%
SILVER 16%
TANTALUM 20%
URANIUM 0%
ZINC 26%
ALUMINIUM 49%
GOLD 41%
LEAD 72%
PHOSPHORUS 0%
PLATINUM 0%
CHROMIUM 25%
GALLIUM 0%
INDIUM 0%
GERMANIUM 35%
HAFNIUM N/A
RHODIUM N/A
ANTIMONY N/A
6,580,000,000
301,000,000

Climate change **The carbon atlas**



The carbon list Full data for each country

The Balloon Diagram and Your Future

Charles A. S. Hall and Jessica Gail Lambert
State University of New York, College of Environmental Science and Forestry

INTRODUCTION

Human history, including contemporary events, can be considered essentially about energy, the technologies required to exploit and use energy and the increased ability of humans to employ energy to exploit other resources. Once the necessities of life are met (food, shelter, clothing etc.), surplus energy allows a society to grow in size, develop in complexity and have discretionary income.

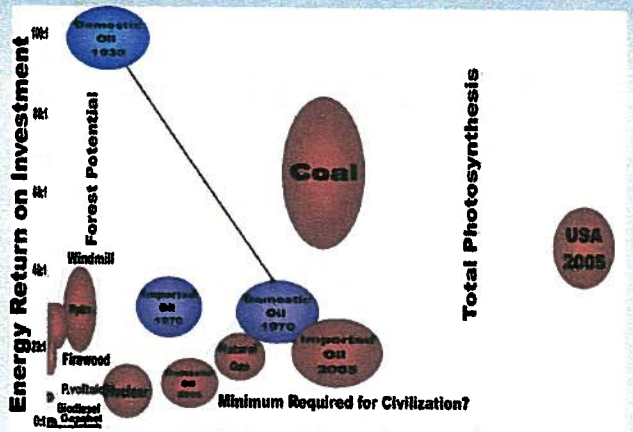
THE AMERICAN DREAM

Historically, economic growth is correlated with increased energy exploitation. Prior to industrialization, energy available for humans was derived directly from the sun, e.g. biomass, human muscle power and draft animals. The development of civilization was basically a result of increased exploitation of higher grades of energy. The concentrated energy found in fossil fuels and the development of technology to capture and utilize this energy (to produce greater power) created a period of massive agricultural, industrial and economic growth in the United States. This gave rise over the past 150 years to what is normally considered the "American Dream".

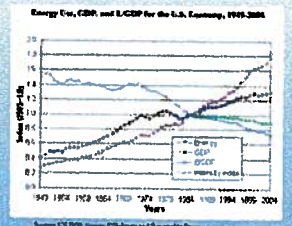
PEAK OIL

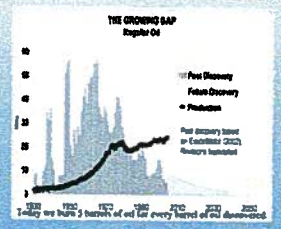
Fossil fuels have characteristics that allow for rapid industrial growth: relatively low cost, high abundance, high energy density, transportability and relatively low environmental impact. Unfortunately, oil, gas, and coal are, by their very nature, non-renewable, guaranteeing that eventually their supply will decline. The issue is not when will we "run out" of oil but rather when will we no longer be able to pump more out of the ground than in previous years. Thus, oil production must peak and then decline. This concept is not an academic exercise but a reality. Fifty of the eighty major oil producing nations have already reached their peak. United States oil production peaked in 1970, and natural gas shortly thereafter.

BALLOON DIAGRAM



The Balloon Diagram (above) summarizes the most important attributes of our various fuels resources. The areas of the "balloons" represent size or total and the relative size of the balloons is a rough index of the qualitative uncertainty of the EROI (quality) and quantity of the fuel. The arrows represent connections between different points in time. The United States used approximately 100 quads of energy in 2005.





ENERGY RETURN ON INVESTMENT

The energy return on investment (EROI), plotted on the Y axis of the balloon diagram, is the ratio of energy obtained relative to the energy invested in obtaining that energy. It is a method for measuring and comparing the net energy returned to society from various fuels. It allows us to estimate the amount of energy required to produce the next unit of energy.

FOSSIL FUELS AND YOUR FUTURE

Fossil fuels have had a relatively high EROI. During the 1930's U.S. oil had an EROI of over 100:1. The abundance of oil during this period permitted a rapid expansion of our economy. During the next fifty years this EROI dropped to 30:1 and then in the early 2000's it decreased to about 14:1. In 1970, the EROI for oil imported to the U.S., derived from oil prices and the energy cost of generating foreign exchange, was approximately 25:1. This fell to 9:1 following the oil price increase in 1973 and again to 3:1 after the second oil price hike in 1979. Subsequently, it has gone up and then back down. It is likely that this declining trend will continue.

ALTERNATIVE FUELS AND YOUR FUTURE

Most alternatives to fossil fuel exploit solar power via some type of photosynthesis. All alternatives, with the possible exception of nuclear power, do not have the favorable characteristics of fossil fuels. Existing technologies, for most alternatives, are not yet capable of replicating both the quantity and quality of energy currently gained via combustion of fossil fuels.

The exhaustion of high EROI fuel sources coupled with the difficulty in finding viable alternatives is likely to have an enormous impact on future economic growth. Efficiency improvements, on the whole, are important but appear insufficient to compensate for depletion. If the U.S. is to continue as a viable society then we must anticipate these issues and learn to live within our resource realities.

Who has the oil?