

Lawns to Food:

- Peak Oil
- Sustainability
- Community

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Peak Oil: U.S. Government and International Reports

- 2005 February
 - U.S. Department of Energy (DOE)
 - “Peaking of World Oil Production: Impacts, Mitigation & Risk Management”
 - http://en.wikipedia.org/wiki/Hirsch_report
- 2007 April
 - U.S. Department of Defense (DOD) Energy Report
 - “Transforming the way DOD looks at Energy: An approach to establishing an energy strategy”
 - <http://www.lmi.org/publications/AllReports.aspx>
- 2007 February
 - U.S. Government Accountability Office (GAO)
 - “Crude Oil: Uncertainty about future oil supply makes it important to develop a strategy for addressing a peak and decline in oil production”
 - www.gao.gov/new.items/d07283.pdf
- 2007 March
 - U.S. Congressional Statements
 - New GAO Peak Oil Report Provides Urgent Call to Action: U.S. Vulnerable and the Government Unprepared for Unacceptably High Risks of Oil Supply Shock
 - <http://www.hubbertpeak.com/us/Congress/GAOPeakReportBartlettUdall20070329.pdf>
- 2008 November
 - International Energy Agency (IEA)
 - Executive Summary of the International Energy Agency Annual World Energy Outlook
 - http://www.worldenergyoutlook.org/docs/weo2008/WEO2008_es_english.pdf

U.S. Government View - 2005 DOE Report

- “As peaking is approached...the economic, social, and political costs will be unprecedented.”
- “...peaking will be extremely complex, involve literally trillions of dollars and require many years of intense effort.”
- “Peaking...will cause protracted economic hardship in the United States and the world.”
- “...the problem of the peaking of world conventional oil production is unlike any yet faced by modern industrial society.”

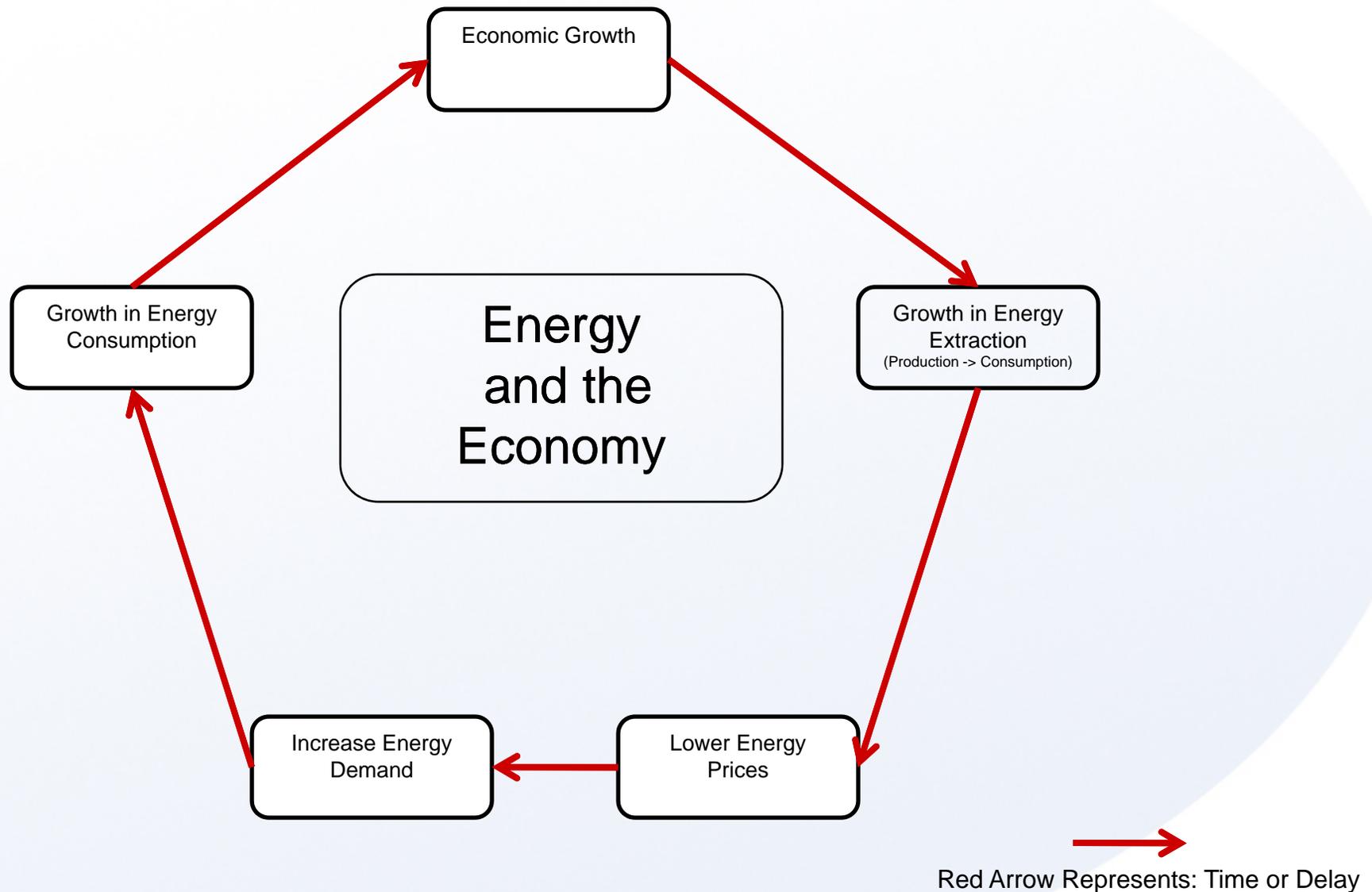
Executive Summary from “Peaking of World Oil Production: Impacts, Mitigation & Risk Management”

-- Dr. Robert Hirsch, February 2005

Why Is Peak Oil So Important?

- Core Assumptions
 - Our economy “runs on oil.” Oil “fuels our economy”
 - Our material welfare (income) is measured by the economy
 - Stated baldly: our income is based on oil consumption
- Economy grows when oil consumption increases
- Economy shrinks when oil consumption decreases
- Implies major societal change when demand exceeds supply
 - Oil prices will rise rapidly but shortages will still occur (global perspective).
 - *Energy constraints could be the trigger of long-term recessions*

A Simplified Systems Perspective: Past ~100 Years



Economics 101 of a Oil Based Economy: Peak Oil

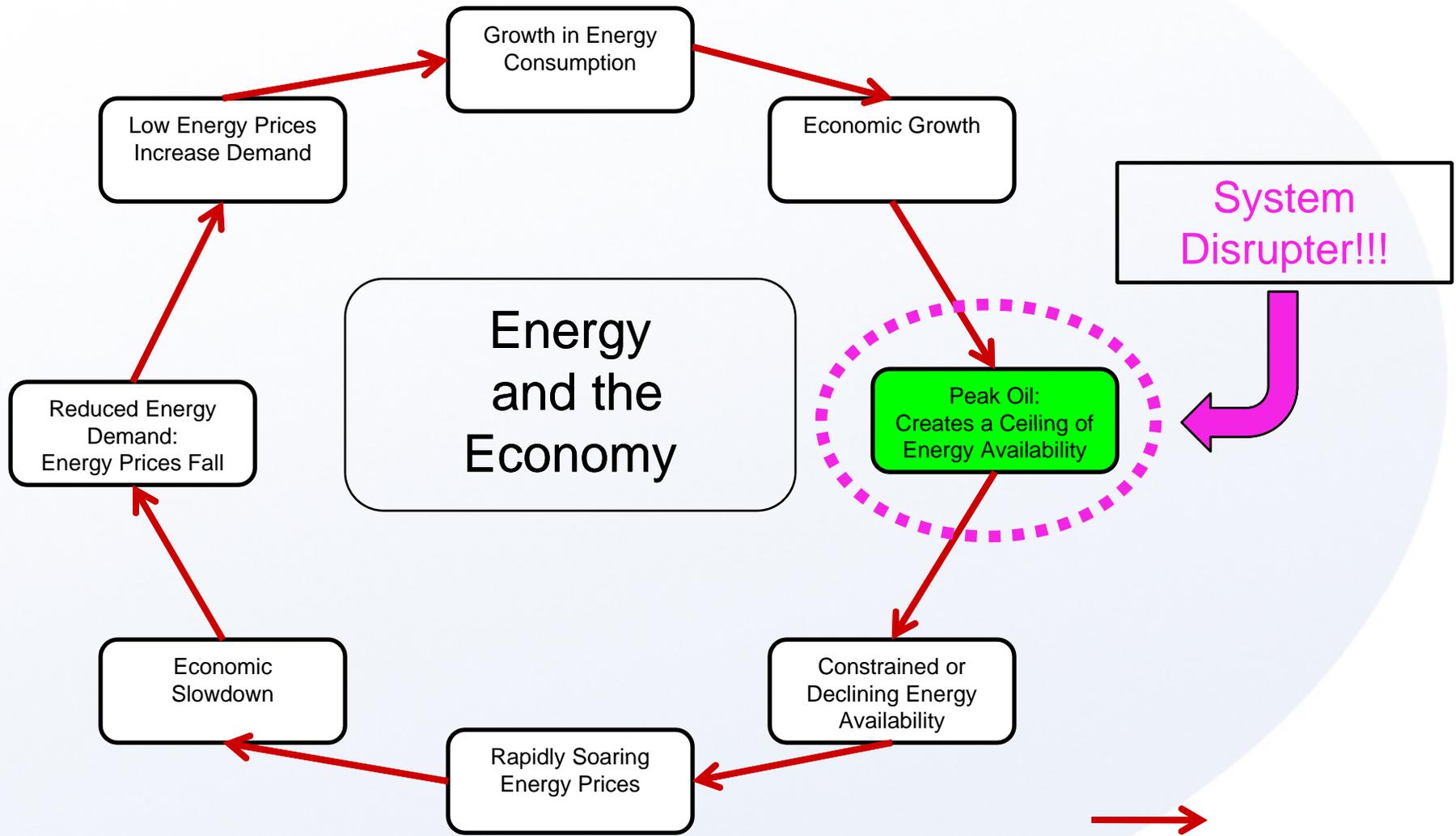
- Leveraged Economy -- Leveraged on Energy (Oil)
- Current Paradigm Growing Economies – Fueled by Greater Energy Needs
- Peak Oil effectively becomes a Ceiling for Energy Availability
- Limited Energy Supply and Growing Demand -- Result in Rapidly Escalating Energy Prices
- Soaring Energy Prices Result in an Economic Slowdown
- Slowing Economy Reduces Energy Demand -- Energy Prices Fall
- Low Energy Prices Will Increase Demand and Consumption
- Increased Energy Consumption will result in Economy Growing
- Economic Growth will Hit Energy Ceiling and Cycle Repeats itself

Questions remain:

- Depending on reaction of Global Community: Will oscillations of the above cycle become more radical, extreme and violent? Or will the oscillations dampen?

A Simplified Systems Perspective: Peak Oil

Depending on reaction of Global Community: Will oscillations of the illustrated cycle become more radical, extreme and violent? Or will the oscillations dampen?



Petroleum Energy Embodied in Food

- Average U.S. Citizens put as much fossil fuel in their refrigerators as in their automobiles
- 400 gallons of oil are used per person, per year (about 17% of total USA energy use) for agriculture -- a close second to automobiles
- Synthetic fertilizers, pesticides and herbicides use more petroleum than all farm machinery combined -- more than 1/4 of all farming energy is contained in synthetic fertilizers
- Every food item in a typical U.S. meal has traveled an average of 1,500 miles
- The energy used for drying, milling, cutting, sorting, baking, packaging, warehousing, refrigeration etc. totals more energy calories than is in the actual food! *[Approximately 10 Calories of Fossil Fuel Energy is embodied for every 1 Food Calorie of Nutrition]*
- “If every U.S. citizen ate just one meal a week composed of locally and organically raised meats and produce it would reduce out country’s oil consumption by over 1.1 million barrels of oil *every week.*”

Contextually, how much is a gallon of 'liquid carbon' fuel really worth?

One Truck + One Gallon of Diesel Fuel

- 80,000 lb. Truck full of **Vegetables**
- 5 miles (up a shallow grade) (**5 Miles per Gallon!**)
- 60 Miles per Hour

By Hand

- 1 person with 1 garden cart = 250 lbs/load
- 1 person could potentially move 4 loads five miles in 1 day
(Total of 20 miles and 1,000 lbs. in one day)

Comparison

80,000 lbs. can be moved 5 Miles in:

5 Minutes by Truck

- or -

80 Days by Foot & Cart



Maintenance Costs of Lawns in an Energy Constrained World

- In purely fiscal terms, the maintenance costs of conventionally managed landscapes are in direct ratio to their considerable energy requirements. For publicly maintained sites, gasoline or electricity for the maintenance equipment, transportation of equipment, crew to and from the site, tipping fees or composting costs for grass clippings, leaf litter and other organic waste material, synthetic fertilizers, pesticides and herbicides, sod, seeds, water treatment and irrigation, bulb, shrub and tree costs should all be considered when tallying a final figure (not including the embodied energy represented in all equipment, fuel and supplies). Although costs vary substantially from site to site, they are nevertheless considerable.
- The true maintenance costs of conventional landscaping are hard to determine specifically, as they are typically buried in general departmental budgets along with such things as recreation facilities management and maintenance costs. For municipally maintained turf landscapes, however, a good estimate is roughly US \$1,200 per acre per year (Northeastern Illinois Planning Commission, 1997).
- In the private realm, significant amounts of money are also spent on turf and garden maintenance. Annual expenditures on private lawn care in the US alone come in at US \$25 billion, with US \$5.25 billion of this figure spent on fossil fuel-derived fertilizers and US \$700 million on pesticides (Bormann et al, 1993).
- <http://www.for-wild.org/whenciti/ingram-21.htm>

Environmental and Ecological Costs of Lawns

- In North America the area dedicated to exotic lawn cover in residential properties is approximately 83,000 square kilometres (Rappaport,1997)⁸
- In the United States alone, private lawns receive approximately 30.15 million kilograms of pesticides a year (Daniels, 1995)
- North American residential lawns receive approximately four times the pesticides and herbicides per hectare as agricultural crops do(Feagan, 1997)
- 32 of the 34 most widely used pesticides and herbicides in lawn and turf care have not been tested for health and environmental risks(Daniels, 1995)
- A 1990 EPA groundwater survey identified 12 of the 32 untested pesticides and herbicides at sampling sites (Daniels, 1995)
- The incidence of childhood leukemia is approximately 6 1/2 times greater among families using lawn pesticides than among those who do not (US National Cancer Institute, 1987)
- One hour of grass cutting with a gasoline powered mower emits an equivalent amount of greenhouse gases, in particular CO₂, to 560 kilometres auto travel in a 1991 model year car (Stein, 1993)
- In the US alone, there are an estimated 40 million lawn mowers that consume 1,914 million litres of gasoline a year (Rappaport, 1993; Bormann et al, 1993)
- The US EPA estimates that approximately 56.1 million litres of gasoline is spilled every year in the filling of privately owned lawn mowers in the US alone (Northeastern Illinois Planning Commission, 1997)
- On average, between 30 to 60 percent of municipal fresh water is used for watering lawns (Hough, 1995)

- <http://www.for-wild.org/whenciti/ingram-21.htm>

Lawn Replacement Approaches Based upon Population Density



Rural

Low Population Density



Urban

High Population Density



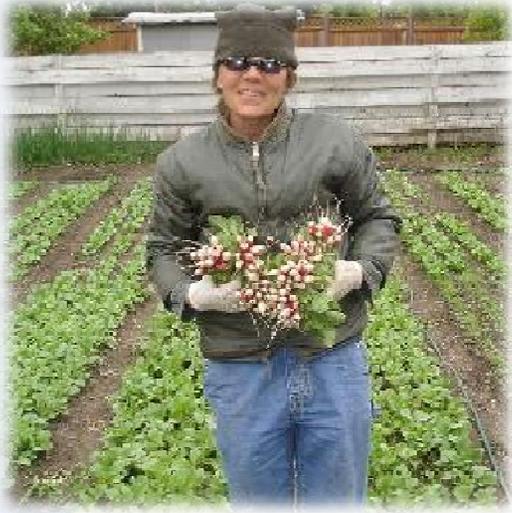
Native Ecology
(Forage Design)

Food Forest

Edible Landscapes

Highly Cultivated
(Small Plot Intensive Gardens)
<http://www.spinfarming.com/>

Small Plot Intensive Gardens



Newly Established (1st Year) Permaculture Inspired:
Hybrid Small Plot Intensive Garden/Edible Landscape (Cedar Rapids Iowa)



Edible Landscaping



Food Forests

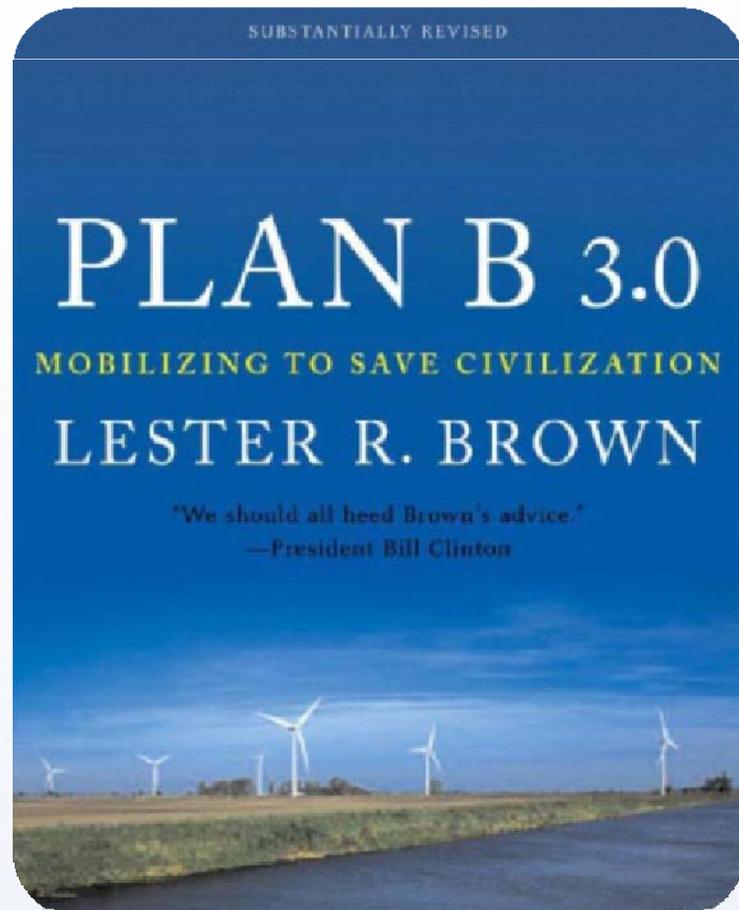


Native Ecologies (Design for Forage)



Economics + Benefits = Lifestyle

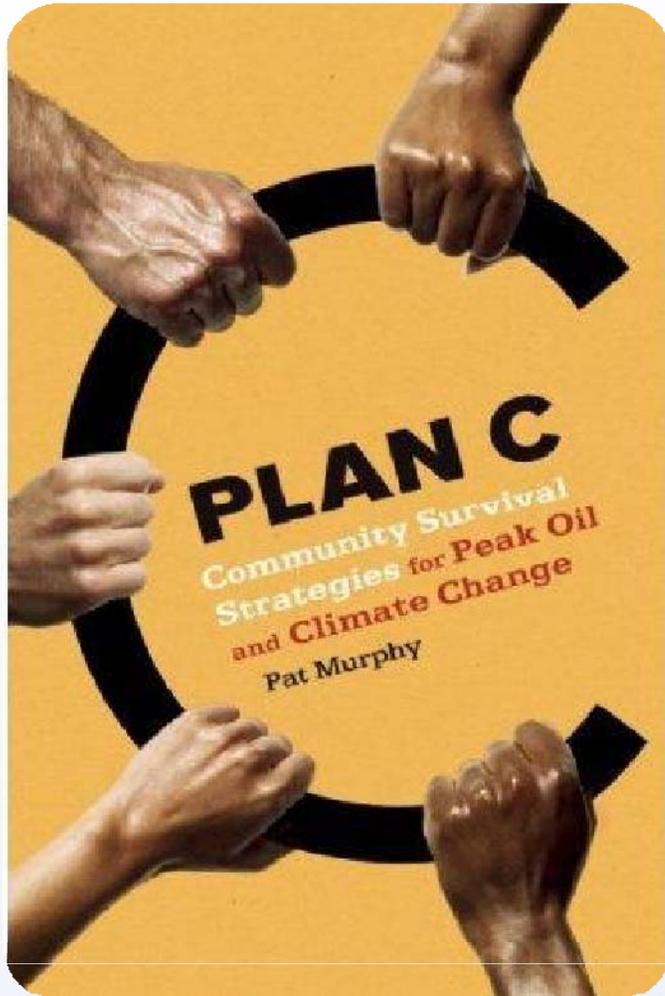
- Reduces Energy Consumption and Grounds Maintenance Cost
- Spurs Micro- enterprises and Cottage Industries:
 - Community Supported Agriculture, Gardens, Beekeeping, Willows
- Benefits: Community Involvement and Interaction, Family Time, Education (such as true cost of food), Recreation
- Transition: From Consumers to Producers (stewardship)



In this updated edition of the landmark Plan B, Lester Brown outlines a survival strategy for our early twenty-first-century civilization. The world faces many environmental trends of disruption and decline, including rising temperatures and spreading water shortage. In addition to these looming threats, we face the peaking of oil, annual population growth of 70 million, a widening global economic divide, and a growing list of failing states. The scale and complexity of issues facing our fast-forward world have no precedent

With Plan A, business as usual, we have neglected these issues overly long. In *Plan B 3.0*, Lester R. Brown warns that the only effective response now is a World War II-type mobilization like that in the United States after the attack on Pearl Harbor.

Hard times are currently upon many people. Communities across the county can ****IMMEDIATELY**** benefit from elements outlined in Plan C.



Plan C explores the risks inherent in trying to continue our energy-intensive lifestyle. Using dirtier fossil fuels (Plan A) or switching to renewable energy sources (Plan B) allows people to remain complacent in the face of potential global catastrophe. Dramatic lifestyle change is the only way to begin to create a sustainable, equitable world. The converging crises of Peak Oil, climate change, and increasing inequity are presented in a clear, concise manner, as are the twin solutions of community (where cooperation replaces competition) and curtailment (deliberately reducing consumption of consumer goods). *Plan C* shows how each person's individual choices can dramatically reduce CO2 emissions. It offers specific strategies in the areas of food, transportation, and housing. One chapter analyzes the decimation of the Cuban economy when the USSR stopped oil exports in 1990 and provides an inspiring vision for a low-energy way of living.

Example: Main Front Lawn

- Approximately 2 Acres
- 2008 Lawn Care Budget
 - \$16,362
 - Mowing Grass
 - Applying Chemicals for Weed Control and Fertilizer



Proposal

- Transform the front lawn from a financial drain -- into a thriving community resource that creates value and enhances the lives of employees and for those who live in the surrounding area in which the company operates.
- Transformation achieved by reallocating financial resources used to maintain front lawn into creating a community garden.
- Propose that an initial \$30,000 tax deductible grant be made to the Sustainable Living Coalition, an Iowa based 501 (c) 3 Not-for-profit organization.
- The grant would be used to pay the “growing season wage” for a Community Garden Coordinator along with materials/equipment required to begin establishing the garden. The coordinator would be responsible for developing the garden design (applying permaculture techniques) and engaging local residents to participate in the community garden.

Proposal Continued

- Produce raised on the grounds would be shared amongst the Community Gardeners tending the plot.
- Fresh, in-season, organic, local produce could be sold to employees as well as the local farmers market. Proceeds from the sales would be used to supplement the Garden Coordinator wages as well as further develop the garden.
- Surplus produce would be donated to local food pantry.
- Annual financial support continued to be made year-over-year to the Garden Project in dollar amounts equivalent to what would have been spent on lawn care.

Community Supported Local Agriculture

- **Community-supported agriculture (CSA)** is a socio-economic model of agriculture and food distribution. A CSA consists of a community of individuals who pledge support to a farm operation so that the farmland becomes the community's farm, with the growers and consumers providing mutual support and sharing the risks and benefits of food production. CSA's focus is usually on a system of weekly delivery or pick-up of vegetables and fruit, sometimes dairy products and meat.
- Wikipedia: http://en.wikipedia.org/wiki/Community-supported_agriculture

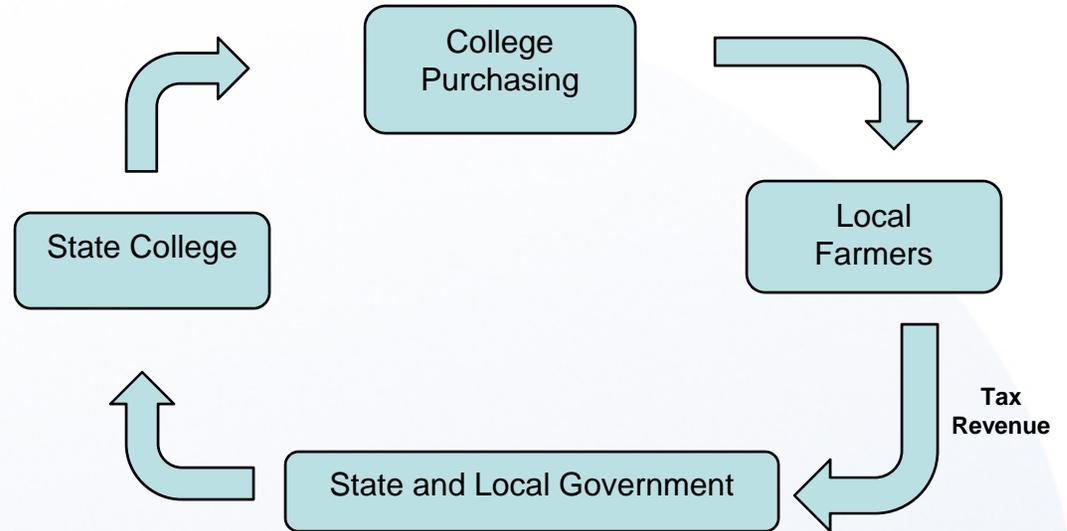
WHY LOCAL?

Be aware of the impact of your dollars.
A locally owned independent business returns approximately 80% of each dollar spent back to the community. Local, independent businesses assist the community through a “multiplier effect”: one dollar spent at a locally owned business will return five times that amount within the community through city taxes, employees’ wages, and purchase of materials and supplies at other independent businesses. In addition, these businesses will turn that dollar back into the community through school funding, social services, and contributions to local non-profit organizations.

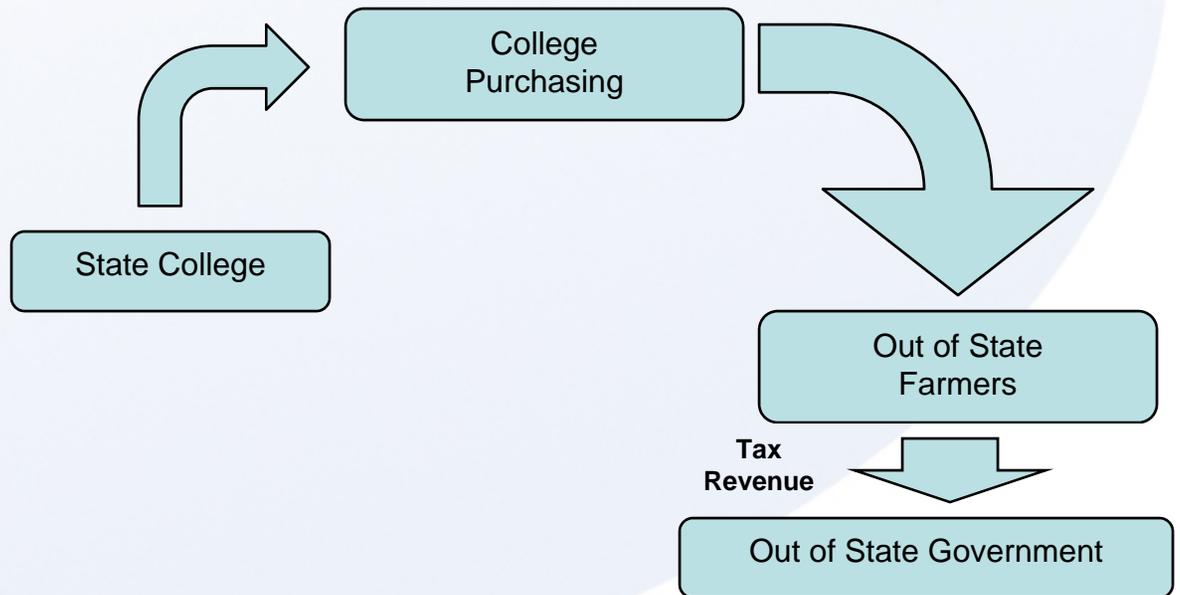
'A dollar spent at a locally owned store is usually spent 6 to 15 times before it leaves the community. From \$1, you create \$5 to \$14 in value within that community, 'Spend \$1 at a national chain store, and 80% leaves town immediately.'

Dollars circulating locally -- good. Dollars leaving community -- bad.

Example of Healthy Local Economic Multiplier



Example of a Weak Economic Multiplier



Permaculture

Permaculture is a method of gardening and living, that looks to nature for guidance, emulating the patterns found in natural ecosystems. The word Permaculture is a combination of *permanent* and *agriculture*, and stresses the importance of low maintenance perennial crops, natural water catchment, and low energy inputs.

The essence of permaculture gardening is the development of *perennial* agricultural systems that mimic the structure and interrelationship found in natural ecologies.

Via companion planting, diversity, edible and non-edible plantings, eliminating mono-culture and utilizing all three dimensions of a space -- pest and weed control is integrated into the garden design and eliminates the need for chemical treatment.

Once established a permaculture garden is a veritable organic “food forest.”

Stable, established, balanced, forests don't require chemical fertilizers, pest or weed control.

A Permaculture Garden does not look like a field of 'row crops' such as corn or soybeans. It is diverse, balanced, pleasing and a sensual oasis.

Permaculture (continued....)

- Permaculture is a multidisciplinary design approach that strives to create human systems that have the stability, diversity, and resilience of natural ecosystems. Permaculture design techniques have been developed and successfully applied for nearly 40 years – beginning in the 1970's.
- Permaculture includes renewable energy systems, energy efficiency, agriculture and food systems, building, rainwater management, urban planning, along with the economic, political, and social policy that make sustainable design possible and practical.

More information at: <http://en.wikipedia.org/wiki/Permaculture>

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Permaculture Video Example: Greening the Desert

- Though *the video focuses on a very narrow aspect* of permaculture, it is a most profound and powerful example of what permaculture can achieve.
- Greening the Desert conveyed what happened when permaculture techniques were applied to 10 acres of arid desert – a flat, salted landscape 400m below sea level -- 2 km from the Dead Sea -- where August temperatures reach 50 °C (122 °F)
 - <http://www.youtube.com/watch?v=sohl6vnWZmk>

Onsite garden can divert portions of the waste stream

- Cardboard can be used for sheet mulching
- Scrap lumber can be used to create raised beds
- Lunchroom waste can be composted on-site for use in the garden
- Rainwater Catchment from Building Roof can be used for summer irrigation
- Any required Top Soil, Mulch or Compost is often free from local municipalities