INTRODUCTION

Peak Oil—a taboo idea whose time has come

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The most significant characteristic of modern civilization is the sacrifice of the future for the present, and all the power of science has been prostituted for this purpose.

—WILLIAM JAMES

The significant problems we face cannot be solved at the same level of thinking we were at when we created them.

—ALBERT EINSTEIN

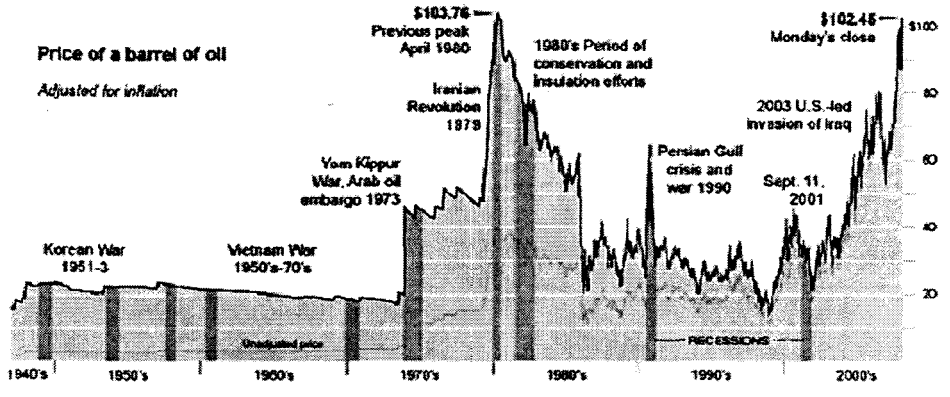
I. The latest reports

The end of cheap oil is *now.* "After 2015, easily accessible supplies of oil and gas probably will no longer keep up with demand," thus spoke Jeroen van der Veer, Chief Executive of Royal Dutch Shell plc, in an internal memo meant only for management last January 08.[1] The soaring price of oil today (USD135/barrel as of press time, and still rising), is way beyond the inflation-adjusted record set in 1980. And it is now being predicted that the price could reach the staggering US$ 200/barrel before the year ends.

The major causes of the spiraling price of crude oil, notes oil analyst Michael T. Klare, are: 1) soaring demand due to the intensifying competition for oil between the older industrial powers and rising economic dynamos like China and India; 2) the crisis in oil production.[3] To be sure,

there may be other causes, such as speculation, and the declining value of the once almighty US dollar.[4] The crisis of production, however, is a most crucial factor—indeed it fuels speculation, which, in turn, exacerbates the price increase.

Yet, in the Philippines, no one seems worried. Perhaps because people have been lulled by the media into believing that there is plenty of oil and forget that oil is a finite resource which is bound to decline. Thus, some quarters readily assume that the rising price of oil is simply the result of price manipulations or the geopolitics of oil. They have not been told about peak oil—the scientific explanation for why the supply of oil is declining now.



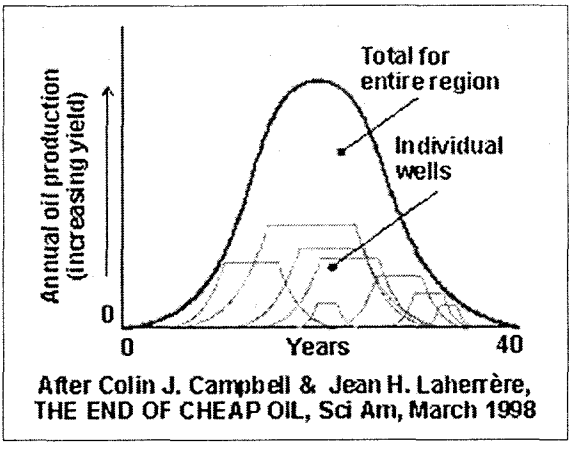
Sources: Federal Reserve; Energy Information Administration; Bloomberg Financial Markets

Note: Monday's close is March 3, 2008.[2]

What is peak oil?

- Peak oil is the year in which oil production reaches its maximum.
- Peak oil is the point in time at which half the oil in the world will have been burned. After that year there will be a continuous decrease in production until all oil has been consumed.

- Peak oil does not mean "running out of oil," but rather a steadily decreasing supply, increasing costs and major changes in the way we live. Without timely mitigation, the economic, social, and political costs will be unprecedented.



FLOW OF OIL starts to fall from any large region when about half the crude is gone. Adding the output of fields of various sizes and ages usually yields a bell-shaped production curve for the region as a whole. M. King Hubbert, a geologist with Shell Oil, exploited this fact in 1956 to predict correctly that oil from the lower 48 American states would peak around 1969. (Campbell and Laherrère 1998, p. 80)

The Energy Watch Group (2007), discussed below, announced last 22 October 2007 that peak oil arrived two years ago, in 2006. Thus, supply will not be able to catch up with demand by 2015—probably sooner.

The issue of global warming, thanks largely to Al Gore, is now standard fare in mainstream media, although concerned scientists have been sounding the alarm for decades now. But peak oil remains a taboo subject in the Philippines. Practically everyone has heard of the Kyoto Protocol (though not many have read the document). But how many have heard, let alone read, the Uppsala protocol?

On 28 September 2005, we held a symposium on "Peak Oil and Climate Change: The End of Industrial Civilization or The Beginning of Sustainable Communities", sponsored by the U.P Asian Center and the Department of Anthropology, U.P. Diliman—possibly the first ever symposium on peak oil in the Philippines. So successful was this symposium that the Development Studies Program of the College of Arts and Sciences at U.P Manila set up a second one in their Padre Faura campus. It was a standing-room-only event. However, these well-attended forums did not merit any mention in the mainstream media.

At that point, I realized that we should come up with our own publication on peak oil. Hence, this historic special issue of the Asian Studies journal.

Why is Peak Oil missing in Philippine public discourse? Is the Philippines following the example of petroleum-addicted countries where peak oil is a taboo subject? Some governments avoid the issue of peak oil even in their strategic plans. Two examples are remarkable. In the futuristic Report of the United States' National Intelligence Council 2020 project (NIC, 2004), peak oil is glaringly absent.

Against the grain

The NIC study lasted about a year, involved over a thousand scholars/ nongovernment experts around the world, and many conferences and symposia. The project leader was Robert L. Hutchings, chairman of NIC, and professor at Princeton University.

In his introduction, Hutchings declares that the report takes a long-term view of the future—how key global trends might develop over the next decade and a half to influence events. The focus is on "possible futures": "our report offers a range of possibilities and potential discontinuities, as a way of opening our minds to developments we might otherwise miss." "The trends we highlight in this paper provide a point of departure for developing imaginative global scenarios that represent several

plausible alternative futures." Curiously, the terms peak oil and global warming never figure in the report.

Climate change is discussed only in passing, in a boxed "special topic": "There is a strong consensus in the scientific community that the greenhouse effect is real and that average surface temperatures have risen over the last century, but uncertainty exists about causation and possible remedies" (NIC, 2004, p. 76).

The report's discussion of hydrocarbon fuels precludes peak oil—"Fossil fuels will continue to dominate in 2020" (p. 59). It asserts the following (p. 8):

- Growing demands for energy—especially by the rising powers—through 2020 will have substantial impacts on geopolitical relations. The single most important factor affecting energy will be global economic growth, particularly that of China and India.
- Despite the trend toward more efficient energy use, the total energy consumed probably will rise by about 50% in the next two decades to a 34% expansion from 1980-2000, with an increasing share provided by petroleum.
- Renewable energy sources such as hydrogen, solar, and wind energy probably will account for only about 8% of the energy supply in 2020. While Russia, China and India plan expansions of their nuclear power sector, nuclear power probably will decline globally in absolute terms in the next decade.
- The International Energy Agency assesses that with substantial investment in new capacity, overall energy supplies "in the ground" will be sufficient to meet growing global demand—a "relative certainty" in the 2020 global landscape.

It is stunning that the NIC 2020 report, with all the funding and resources and experts it could muster, is oblivious of peak oil.

Let us look at our second example. In 2007 the South Australian government launched its ambitious Strategic Plan which looks ahead 50 years—apparently longer than any other public planning process in Australia (Government of South Australia, 2007). Strangely, despite all the literature and public forums regarding peak oil, the futuristic plan completely ignores peak oil.

No matter how many experts were involved or how much it is based on computer forecasting models, a strategic plan is only as good as its assumptions. Yet several unrealistic assumptions of South Australia's Strategic Plan have been noted by permaculture founder David Holmgren (2006), to wit:

- Global extraction rates of all important non-renewable commodities will continue to rise.
- That there will be no peaks and declines other than through high energy substitution such as the historical transitions from wood to coal and from coal to oil.
- Economic growth, globalization and increase in technological complexity will continue to grow.
- Climate change will be marginal or slow in its impacts on human systems, such that adaptation will be possible.
- Household and community economies and social capacity will continue to shrink.

"Global oil peak has the potential to shake if not smash these unstated assumptions," writes Holmgren.[5]

The so-called expert advice that overall energy supplies "in the ground" will be sufficient to meet growing global demand, or that there will be no peaks and declines is belied by three more recent government-commissioned reports. Unfortunately, none of these very important scientific reports have been mentioned in the Philippine media. I can

wager that none of these are in the research libraries of the Philippine Congress, Malacañang, and our schools and universities. I shall discuss these reports in turn.

Compelling arguments

Three investigative peak oil reports agree that peak oil is imminent and the repercussions will be unprecedented, unless mitigation efforts are undertaken. But these will take time, effort and money.

- *Peaking of World Production: Impacts, Mitigation, and Risk Management.* The Hirsch Report. February 2005.

Produced by Science Applications International Corporation (SAIC), an independent research company, for the US Department of Energy, the report was prepared by Robert L. Hirsch, with his two associates Roger Bezdik (MISI) and Robert Wendling (MISI).

The report summarizes the case for peak oil:

> The peaking of world oil production presents the U.S. and the world with an unprecedented risk management problem. As peaking is approached, liquid fuel prices and price volatility will increase dramatically, and, without timely mitigation, the economic, social, and political costs will be unprecedented. Viable mitigation options exist on both the supply and demand sides, but to have substantial impact, they must be initiated more than a decade in advance of peaking.

After surveying the range of forecasts from optimists and pessimists alike, projecting a peak date anywhere from 2005 to 2037, the report examines three scenarios and their policy implications:

- Mitigation efforts are not undertaken until global oil production peaks—will leave the world with a "significant liquid fuels deficit for more than two decades" that "will almost certainly cause major economic upheaval" (p. 59);

- Mitigation efforts commence ten years in advance of peak—government intervention will be required and the world will experience a ten-year fuel shortfall;
- Mitigation efforts begin twenty years prior to the peak—offers "the possibility" of avoiding a fuel shortfall. This is the best case scenario.

The report stresses that "the world has never faced a problem like this" and that "both supply and demand side mitigation options will take many years to implement and will cost "literally trillions of dollars." It concludes, "If peaking is imminent, failure to initiate timely mitigation could be extremely damaging. Prudent risk management requires the planning and implementation of mitigation well before peaking. Early mitigation will almost certainly be less expensive than delayed mitigation." (Hirsch Report 2007, p. 6).

"Intervention by governments will be required, because the economic and social implications of oil peaking would otherwise be chaotic. The experiences of the 1970s and 1980s offer important guides as to government actions that are desirable and those that are undesirable, but the process will not be easy." The report warns of a global problem of "unprecedented" proportions with economic, social, and political impacts that are likely to be extremely severe." It forecasts "protracted economic hardship" for the United States and the rest of the world. It is a problem that deserves "immediate, serious attention." (pp. 4-5).

Because of its implications to policy and decision making, the Hirsch Report should have been widely disseminated. Instead there is nearly total silence. Indeed, the report mysteriously disappeared from its own website, laments peak oil analyst Richard Heinberg, author of *The Party's Over: The End of Cheap Oil* (New Society, 2005) and *Powerdown* (New Society, 2004).[6] Several weeks later, after enquiries by *Energy Bulletin* editors (http://www.energybulletin.net/12772.html) the report has been returned to the DOE website, albeit in a new and temporary location. The report is now available at: www.netl.doe.gov/publications/others/pdf/Oil_Peaking_NETL.pdf

- *Crude Oil. Uncertainty about the Future Oil Supply Makes it Important to Develop a Strategy for Addressing a Peak and Decline in Oil.* GAO (U.S Government Accountability Office) Report to Congressional Requesters. 28 February 2007.

Two years after the Hirsch report came, the urgency of the issue of peak oil must have finally dawned on the U.S. Congress. The authors of this report are Rep. Bart Gordon, Chairman, Committee on Science and Technology, House of Representatives, Rep. Roscoe G. Bartlett, and four other US congressmen.

The report makes several key points:

- Oil accounts for one third of all the energy used in the world (p. 9)
- Most studies estimate that oil production will peak sometime between 2007 and 2040 (p.13).
- The development and adoption of technologies to displace oil will take time and effort (p. 29) [Note that, unlike the Hirsch Report, the GAO Report makes no mention of the monetary cost].
- The U.S lacks a federal strategy for dealing with peak oil and its repercussions. Federal agencies do not have a coordinated strategy to address peak oil issues. Federal agencies have many programs and activities related to peak oil issues but peak oil generally is not the main focus of these effects (p. 35).

It discusses the repercussions of peak oil (pp 33-34):

> If the decline in oil production exceeded the ability of alternative technologies to displace oil, energy consumption would be constricted, and as consumers compete for increasingly scarce oil resources, oil prices would sharply increase. In this respect, the consequences could initially resemble those of past oil supply shocks, which have been associated

> with significant economic change. For example, disruptions in oil supply associated with the Arab oil embargo of 1973-74 and the Iranian Revolution of 1978-79 caused unprecedented increases in oil prices and were associated with world recessions. ...

Ultimately, however, the consequences of a peak and permanent decline in oil production could be even more prolonged and severe than those of past oil supply shocks. Because the decline would be neither temporary nor reversible, the effects would continue until alternative transportation technologies to displace oil became available in sufficient quantities at comparable costs.

Furthermore, because oil production could decline even more each year, following peak, the amount that would have to be replaced by alternatives could also increase year by year.

- *Crude Oil Supply Outlook.* The Energy Watch Group Report. October 22, 2007.

This is the latest and most convincing, albeit most disturbing, of the government-sponsored reports. It is the third of a series of papers by the Energy Watch Group that investigates future energy supply and demand patterns. The Group consists of independent scientists and experts who investigate sustainable concepts for global energy supply. The group has been initiated by a German Member of Parliament, Hans-Josef Fell.

Key findings

- Peak oil is now. The peak of world oil production was in 2006.

> For quite some time, a hot debate has been going on regarding peak oil. Institutions close to the energy industry, like CERA, have been engaging in a campaign trying to "debunk" the "peak oil theory". This paper is one of many by authors inside and outside ASPO (the Organization for the

> Study of Peak Oil) showing that peak oil is anything but a "theory", it is real and we are witnessing it already.

- There will be a steep decline of the oil supply after peak.

> Production will start to decline by several percent per year. By 2020, and even more by 2030, global oil supply will be dramatically lower. This will create a supply gap which can hardly be closed by growing contributions from other fossil, nuclear or alternative energy sources in this time frame (p. 16).

> The world is at the beginning of a structural change of its economic system. This change will be triggered by declining fossil fuel supplies and will influence almost all aspects of our daily life (p. 17).

Oil industry analyst Chris Skrebowski, noting that the Energy Watch Group report is "a very carefully done piece of work, for they've developed a methodology that's basically a production based methodology," stresses its stark message:

> Oil production "will decline steadily from here on out at about 3% a year. If you think that in 2006, crude and liquid production was about 81 million barrels a day, what the report is projecting is that it will fall to about 58 by 2020. Now this contrasts with the IEA's [International Energy Agency] hope that it'll be at 105 at that point. So that's a spectacular difference; even more spectacular by 2030 when the IEA was hoping the world would be fueled with 116 million barrels a day, the report sees the production down to 39 million barrels a day. It's therefore not difficult to see the sort of economic stresses and strains that this will produce in the world economy. (Chris Skrebowski on alarming new peak oil report http://globalpublicmedia.com/transcripts/2820. Accessed October 23, 2007).

Peak oil and global warming: converging crises

Peak oil is serious enough. But peak oil comes at a time of global warming. "Peak Oil and Climate Change are two closely coupled forces

that will shape future realities more than any other factors" (Holmgren, 2006). These are two crises, reinforcing each other synergistically—peak oil makes the impact of global warming worse and vice versa.

The world, however, has not devised a strategy for dealing with these converging catastrophes. Most of the talk on climate change and global warming, as championed by Al Gore for example, do not even mention peak oil.

Our analysis of the social impact of global warming, as well as our search for solutions, would be limited, if not unrealistic, if peak oil is ignored. Thus, there is something curious about famed scientist James Lovelock's statement that people will be flocking to the northern cities to avoid the catastrophic impact of global warming. (See "Do or Die" by Jeff Goodell, *PostMagazine* Nov 4, 2007). Lovelock repeats this three times: "moving the people to the cities better positioned for the future", "push people north, where they will cluster in cities", "hordes of people that will descend upon the cities."

There is of course enough evidence to support Lovelock's main point: that the global warming catastrophe is inevitable—that even if we suddenly stopped using hydrocarbon fuels 100% now, there is already enough CO_2 in the atmosphere to bring about all the dreaded disasters of global warming for at least 30 years: extremes of El Niño and La Niña, species extinction, famine, disease, the flooding of coastal areas, the sinking of tiny islands and coral atolls in Oceania, among others.

But why did the brilliant author of the Gaia hypothesis think that people will flock to the cities? This curious idea makes sense only if we completely ignore the impact of peak oil. In the event of a severe decline in oil, how could cities be "better positioned for the future"? In fact the repercussions will be worst in cities—among other things, the cost of transportation and commodities will be exorbitant, and food scarce. Combine the catastrophes of peak oil and global warming—and you have cities becoming uninhabitable "urban islands".

Scientists like Lovelock would do well to read James Howard Kunstler's *The Long Emergency: Surviving the Converging Catastrophes of the 21st Century* (London: Atlantic Books, 2005).

II. Coping with the end of cheap oil: implications for the Philippines

A government-sponsored one-day conference—**The End of Oil and Its Consequences for the Economy, Food Supply, and Climate Change**—was held in London on 11 October 2005. It was chaired by Dr. Ian Gibson, MP. The following issues were raised:

- We rely on energy to produce, process and transport food.
- As energy becomes more expensive, can industrial agriculture and supermarkets continue providing food for cities, towns and suburbs?
- Can the world continue to feed itself at all without cheap energy?
- What steps should we be taking right now to avert future hunger?
- Does the end of cheap oil herald the end of globalization?
- Is the notion of continual economic growth consistent with a shrinking energy supply?
- Some observers predict a recession of 1930s proportions, but lasting much longer. A prolonged scenario could have the following repercussions:
  - o A collapsed economy
  - o Widespread unemployment
  - o Breakdown of the transport system and the delivery of services
  - o Sustained brownouts
  - o Food shortages

Clearly, the Philippines must act now! But will it? Can it?

The essays we have lined up for this journal address this issue. Dr. Kelvin Rodolfo's "*Peak Oil*: The Global Crisis of Diminishing Petroleum Supply, and Its Implications for the Philippines" is the first ever study to relate the issue of peak oil to the Philippines—how the country is responding to the problems of peak oil and global warming, what proposed solutions should be avoided and what else needs to be done. Rodolfo is unequivocal in his rejection of natural gas and coal, as well as nuclear power, as substitutes for petroleum. He strongly endorses renewables as the best package of solutions for the Philippines: geothermal, draft animals, biofuels, mini hydro, wind, solar, and ocean waves. Rodolfo thus proposes the green solution. And he is confident that we can do it. We can learn, he says, from the example of Cuba.

The essay, "Why Produce Ethanol from Sugarcane in the Philippine Context" by Dr. Ted Mendoza, Professor of plant breeding at the University of the Philippines Los Baños, looks specifically at one of the solutions mentioned by Rodolfo. It addresses a raging controversy in the Philippines: Do biofuels provide a solution to the Philippines' energy crisis? What type of biofuel is best for the country?

Mendoza gives a qualified *yes* to the first question. His answer to the second is sugar cane. He recommends that the Philippines invest in research and development and put up the needed infrastructure to make ethanol production from sugar efficient and to address the environmental problem of waste disposal. We can learn, says Mendoza, from the experience of the world's biggest ethanol producer Brazil.

The essays of Rodolfo and Mendoza are milestone contributions towards understanding and solving the impending energy crisis in the Philippines. They provide a roadmap of where the Philippines should be heading—towards renewables. It is certainly feasible to shift to a system of agriculture that is not dependent on petroleum, as the example of Cuba demonstrates. More on this later.

However, the fundamental question remains: is it possible at all to be completely independent of fossil fuels? One affluent country in Europe thinks so. Sweden plans to be the world's first oil-free economy in 15 years, replacing all fossil fuels with renewables before climate change destroys economies and growing oil scarcity leads to huge new price rises.

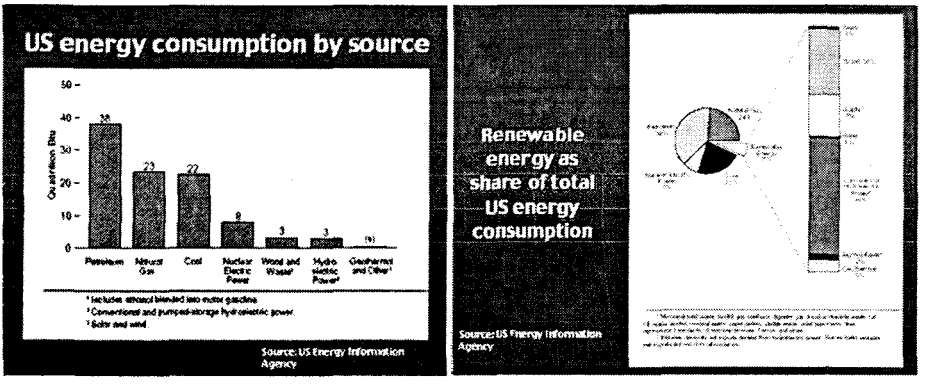
"Our dependency on oil should be broken by 2020," said Mona Sahlin, minister of sustainable development. "There shall always be better alternatives to oil, which means no house should need oil for heating, and no driver should need to turn solely to gasoline." (Vidal, "Sweden plans to be world's first oil-free", Feb. 8, 2006. http://www.guardian.co.uk/oil/story/0,,1704954,00.html#article_continue, accessed Nov. 2, 2007).

Can developed countries be completely oil-free and maintain the same living standards their citizens are used to? Is it even possible to do it in 15 years? Assuming that countries like Sweden can, how about the less developed countries? Shifting to an oil free economy entails costs—in time, effort and money. Can less developed countries afford the costs?

Consider the issues raised in the 2005 London conference on oil decline:

- Oil and gas supply 85% of the energy used in the UK.
- Nuclear power supplies 4%
- Renewables supply 1%.
- Can nuclear energy be expanded by a factor of 20, or renewables by a factor of 85?
- Will coal fill the gap? Do we have enough coal left to expand its use 12 times over?
- But at what cost to the environment and global warming?

Renewables comprise only a small fraction of the total energy available. And when the biggest portion of the energy pie—fossil fuels—disappear, the challenge is how to expand the renewables to fill in the gap.



Can developed countries such as the U.S and the U.K. fill in the oil gap? Rep. Roscoe Bartlett, U.S. House of Representatives, who was involved in making the GAO report on Crude Oil (discussed above) isn't so sure:

> It might seem possible to "fill the gap" in the short term. However, in the long term, this will be impossible. For one thing, it will hasten the exhaustion of other finite resources. That will make the inevitable transition to renewable sources more difficult and more painful.

James Lovelock argues that we should disabuse ourselves from the seemingly easy but false solutions (Godell, 2007, p. 20):

> Modest cuts in greenhouse emissions won't help us—it's too late to stop global warming by swapping our SUV's for hybrids.
>
> Capturing carbon-dioxide pollution from coal plants and pumping it underground? "We can't possibly bury enough to make a difference."
>
> Biofuels? "A monumentally stupid idea".
>
> Renewables? Nice, but won't make a dent. ... I wish I could say wind turbines and solar panels will save us, but I can't. There isn't any kind of solution possible. There are nearly 7 billion people on the planet now,

> not to mention livestock and pets. If you just take the CO_2 of everything breathing, it's 25% of the total—four times as much CO_2 as all the airlines in the world. So, if you want to improve your carbon footprint, just hold your breath. It's terrifying. We have just exceeded all reasonable bounds in numbers. And from a purely biological point of view, any species that does that has a crash.

According to Jeff Berg ("Peak Oil—A Seismic Shift", 9 November 2004, www.countercurrents.org, accessed Nov. 2, 2007), in the best case scenario, "the U.S. would have created enough [renewable] energy to replace 1% of its current fossil fuel energy needs":

> To give you an idea of our level of fossil fuel dependence: Imagine if the U.S. were to double all of its renewable energy capacity and then double it again. This would require all of the planning, approval, skilled labour, capital investment and time necessary to quadruple current renewable energy supply, a supply which has taken decades to build. There would also have to be rigorous safeguards put in place so as to ensure that the time and money that were devoted to this effort actually builds something productive in the end and doesn't simply, through boondoggle and/or theft, become an enormous waste of fiscal and political capital. If the U.S. managed to do all of these not inconsiderable things at the end of that time, however long that time may happen to be, the U.S. would have created enough energy to replace 1% of its current fossil fuel energy needs.

There is only one way, according to James Lovelock. In his essay, *Nuclear Power is the Only Green Solution*, Lovelock asserts:

> [We should] use the small input from renewables sensibly" but "we have no time to experiment with visionary energy sources; civilization is in imminent danger and has to use nuclear—the one safe, available energy source—now or suffer the pain soon to be inflicted by our outraged planet. (cited in Goodell 2007, p. 20).

Lovelock's nuclear solution has been criticized by concerned scientists and environmentalists. Richard Heinberg concedes that "Lovelock is partially correct: the time for a green energy transformation is mostly gone; we should have started in the 1970s and maintained the momentum." But then, "To replace oil with hydrogen from nuclear electricity would require about a thousand new nuclear reactors in the US alone. The problems with that scenario are rather obvious, starting with the sheer cost." (Banner, Interviews about Peak Oil and Solutions. http://www.energybulletin.net/3254.html, accessed Nov. 2 , 2007).

Jan Lundberg is more unforgiving:

> Lovelock must have bumped his head too hard. Anyone who has studied the possible role of nukes knows they can't be built fast enough and in great enough numbers to allow for anything like a seamless transition from fossil fuels. Anyway, nuclear power does not supply tires, asphalt, plastics, chemicals and the like, the way fossil fuels do. (Banner, Interviews about Peak Oil and Solutions. http://www.energybulletin.net/3254.html)

Kunstler (2005, p. 145) agrees: Atomic fission is useful for producing electricity, but there are things electricity can't do very well, if at all—for instance, "you can't fly airplanes on electric power from nuclear reactors."

Rodolfo, in his essay in this volume, has dismissed the nuclear option for the Philippines "because it is particularly hazardous in a volcanic and earthquake-prone area." And those who, like Philippine Energy Secretary Angelo Reyes, claim that the issue of safety can be solved, will have to address the three-fold question, raised by the three peak oil reports above, of time, effort and money.[7] Thus, the crucial question is, What happens to the economy when the cheap oil that has nourished its growth starts diminishing?

Oil and Economic Growth

The relation between energy and economic growth, though intuitively obvious, has not been fully theorized until Robert Ayres, a

physicist who became professor of engineering and public policy, came out with a model that showed a high correlation—a coefficient of 0.7%—between energy and economic growth. In Ayres' model, growth is explained by a combination of rising energy consumption and increasing energy efficiency (Strahan 2007, 122-23). Thus, something happens to the economy when oil production peaks and then declines. Ayres warns:

> The economy is utterly dependent on petroleum, and I think it is highly likely that when oil production peaks, so will the world economy. When petroleum gets more expensive everything that depends on it gets more expensive, and I cannot see how growth could really continue with much more expensive energy. It's kind of scary (Cited in Strahan, 2007, p. 123).

Can the largely unbroken economic growth we have enjoyed for the last half century continue once oil output declines? Some forecasters predict that once global oil peaks, production will fall by about 3%. At this rate, output would have dropped by almost 25% within ten years, and by almost 50% within twenty years (Strahan, 2007, p. 114).

When the price of oil soars, the cost of transportation will inevitably rise. This will have severe repercussions on trade. For example, goods that travel a long distance will cost so much more. It will also be more expensive to go to work or to school.

If the task seems daunting for the U.K and the U.S.A, how will it be for a debt-ridden, corruption-plagued, economically less developed country like the Philippines? Do we have the time and money, and can we muster the effort needed to mitigate the impending crises?

We may have run out of time. To date, peak oil does not even figure in policy making and governance. The top schools in economics, public administration and governance—Ateneo and U.P—do not discuss peak oil at all (Are the learned professors avoiding the topic or they are simply clueless about peak oil? But this begs the question of why they are clueless). There isn't even a national and local strategy for dealing with the impending crises—despite the Development Academy of the

Philippines or the Philippine Institute for Development Studies. As Sandi Brockway observed, "A full commitment to a renewable future is necessary. The only thing standing in the way is leadership and our short-sightedness" (Banner, Interviews about Peak Oil and Solutions. http://www.energybulletin.net/3254.html). That much-hyped 7% Philippine economic growth comes mainly from massive billion peso projects made possible by huge loans, and from overseas remittances. Compared to our Southeast Asian neighbors, our economy doesn't seem that strong—a point stressed in my essay in this issue.

To get the money needed to shift to renewables, the Philippines must borrow massively. How long can the Philippines afford to sink deeper in debt before it drowns? On the average, the Philippines spends almost a billion pesos a day in interest payments (debt servicing) alone. This eats out a huge chunk off the total pie—more than the outlay for all the departments and agencies of the government.

Consider the following: PhP722 billion debt service in 2006, an increase of 12% over 2005. (Cielito Habito, *Philippines Daily Iinquirer*, Nov 14, 2005). Those payments are equivalent to 69 % of the total expenditure program for 2006 (Source: http://bulatlat.com/news/5-45/5-45-budget.htm, accessed Nov.2, 2007). Whether the Philippines can afford to convert to renewables sufficiently and in time for the impending catastrophe is doubtful.

III. Coping with the Long Emergency: Demand-side solutionsvs. supply-side solutions

We have been assuming of course that renewables can wean us from our dependence on oil—that, with renewables, we can go on with business as usual, and, somehow, manage to maintain the same level of economic activity. But this assumption is problematic, if not false.

The bulk of the world's energy needs, as pointed out by the NIC 2020 report, come from hydrocarbon fuels. In all the talk about shifting

to alternatives and renewables, two essential points are overlooked. Firstly, *all* the alternatives—to produce and maintain them—depend on a "petroleum platform." Regarding alternatives such as nuclear fission, solar, wind, water, tidal power, and methane hydrates, Kunstler (2005, p. 100) points out:

> We will certainly use many of these things, and the various systems they entail, as much as we can, but they will not make up for the depletion of our oil supply. To some degree, ALL [emphasis mine] of the non-fuel energy sources actually depend on an underlying fossil fuel economy. You can't manufacture metal wind turbines using wind energy technology. You can't make lead acid storage batteries for solar electric systems using any known solar energy systems.

As oil production peaks and then declines, the use of nuclear generated electricity will increase but, as Kunstler (p. 146) reminds us, it will not necessarily make up for the losses incurred by fossil fuel depletion". Nuclear energy depends on a petroleum platform "to support the construction, manufacture, maintenance, mining and processing activities that are necessary to create and service nuclear reactors" (Kunstler, p.141).

Secondly, all the alternative fuels taken together won't be able to fill in the gap left by oil depletion. Industrialized as well as rapidly expanding economies, such as China and India, simply won't be able to continue their current rate of economic growth when the demand for oil exceeds supply.

And that's the problem with supply-side solutions to the peak oil crisis. If we think purely in terms of supply—of filling the hydrocarbon gap with alternatives—we won't be able to prevent the collapse of the global economy. One crucial point cannot be overemphasized: Because economic globalization depends on cheap transportation, the end of cheap oil simply means the end of economic globalization.

Thus, we will have to look at demand-side solutions: we have to learn to live with less fossil fuels—to "powerdown," as Heinberg puts it:

> I am generally skeptical about all supply-side solutions—nuclear, coal, hydrogen, methane hydrates, whatever. We need to slash demand—quickly and intelligently, but vigorously. Our problem as humans is that we have gotten so good at finding supply-side solutions to the ecological dilemma (resource depletion, population pressure, habitat destruction) that those are the only ones we even want to contemplate. Meanwhile, the ultimate limits of the planet's carrying capacity for people are vanishing from sight in the rear-view mirror.

This has tremendous implications. Kuntler points out:

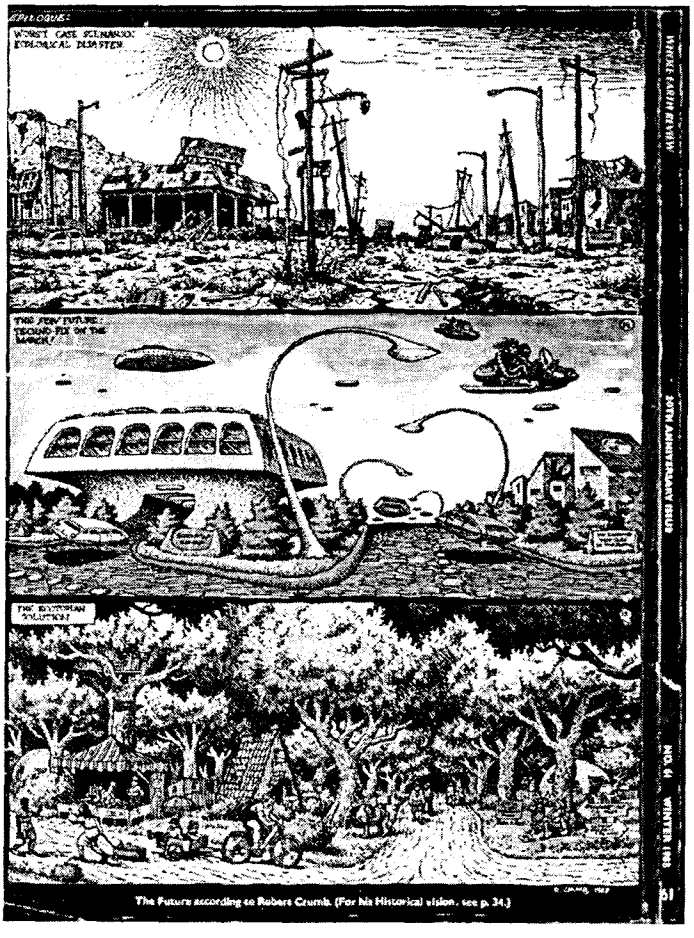
> It means we can have the lights on at night and refrigerate our food, but without the benefit of artificial fertilizers made out of natural gas, and diesel powered farm machinery to till the soil at industrial scale, we will have to completely reorganize agriculture. The implication of course is that we will have to reorganize virtually everything else in the way we go about in our daily lives (p. 146).

The notion of "sustainable development", according to Lovelock, is wrong headed. "We should be thinking about sustainable retreat." This means a change in the way we think and the way we live: "it's time to start thinking about where we live and how we get our food...and most of all, about everybody "absolutely doing their utmost to sustain civilization, so that it doesn't degenerate into the Dark Ages, with warlords running things, which is a real danger." (Goodell, 2007, p.20)

Ultimately, declares Lovelock, "It's really a question of how we organize society". And we have two options: 1) "we can return to a more primitive lifestyle and live in equilibrium with the planet as hunter-gatherers", or, 2) "we can sequester ourselves in a very sophisticated, high-tech civilization" (Goodell, 2007, p. 20).

How do we organize society? We can imagine three alternative futures (illustrated below):

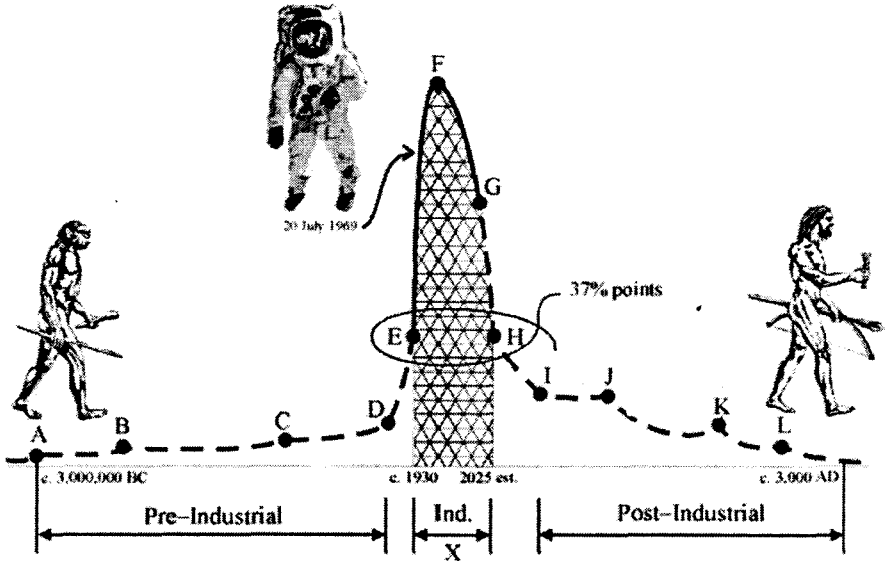
- Ecological disaster or what Jared Diamond (2005) calls collapse;
- Techno-fix—the fun future;
- Ecotopia



Source: http://photos1.blogger.com/x/blogger/5112/2223/1600/725806/r-crumb300.jpg

If we don't change our merry old ways we could be in for an ecological disaster, and end up like Easter Island (see Diamond, 2005). The second scenario is similar to Lovelock's "very sophisticated, high tech civilization"—it is unrealistic wishful thinking, the stuff of sci-fi. The third—the green option—is the preferred outcome of ecologists.

This ecotopia is not quite the same as Lovelock's primitive lifestyle as hunter-gatherers. It is an organized soçiety designed along ecological principles of sustainability (such as permaculture). Lovelock's notion is more akin to the outcome of geologist Richard Duncan's "die-off" model which he calls the "Olduvai theory", as illustrated below (Duncan, 2006):



The example of Cuba shows that Duncan's Olduvai scenario is not inevitable or that Lovelock's "primitive lifestyle of hunter-gatherers" is not the only sane alternative. Indeed the ecotopian solution is attainable, as the case of Cuba attests (see below). A heartening example, albeit on a smaller scale, is the permaculture model of Kinsale, Ireland. More on this later.

Beyond economic growth

To envision a sustainable post-peak oil society, we need to cast off our taken-for-granted assumptions, to wit:

- There is no alternative to the existing capitalist system
- Science and technology can solve all our problems
- The "good life" can only be attained by consumption as well as economic dogmas:
- Man is master of "his" environment
- We live in a planet of infinite resources
- Economic growth is necessary for social development
- Corporate profit is good for all ("the trickle down" effect) – a neoliberal fundamentalist idea.

Petroleum geologist Colin Campbell, founder of the Association for the Study of Peak Oil and proponent of the Uppsala Protocol (a global accord to stabilize oil prices and minimize the effects of peak oil) calls for discarding these economic dogmas. He writes,

> The economic fundamentalists ... have these really outdated economic principles inherited from the Industrial Revolution, when the world was indeed large and the scope for Man's activities was at that time more or less infinite. ... These economic principles ... are very short-term in their nature ... these people who say that there can be no [oil] shortage in an open market and their battle cry is liberalize markets - these people have become really the enemy (Source: http://en.wikipedia.org/wiki/Rimini_protocol, accessed May 29, 2007).

Discarding our economic dogmas entail changing the way we think about economics—a paradigm shift from the neo-classical model of economic growth to the "small is beautiful" ecological model of Schumacher. Both mainstream media and governments propagate the myth, made famous by then Prime Minister of U.K Margaret Thatcher, that there is no alternative to the neo-classical model. In fact there are alternatives—in theory and practice.

The neo-classical model rests on the sometimes unstated belief that a "free market" is necessary for the "efficient" pursuit of corporate profits, which leads to economic growth and contributes to employment and a higher standard of living. Economic growth—the accumulation of corporate wealth—eventually trickles down to the poor. Free trade between unequal countries is good: through comparative advantage, both rich and poor will gain. And it is the function of good governance to ensure such a condition of freedom. The unbridled pursuit of corporate profits, in the long run, redounds to the benefit of all—greed is good.

As Peter Manicas explains in his essay "De-Mystifying Mainstream Economic Theory", "This ideology is accepted as fact by large numbers of decision-makers everywhere."

It depends upon a body of theory which has had tremendous influence despite the fact that "it is easy to show that it lacks all the credentials of a valid scientific theory"— "*all* [of its] assumptions are false." Indeed, in an interesting footnote, Manicas cites several works among notable economists who have questioned or refuted the theory. Yet the ideology persists—thus, legitimizing policies that lead to all sorts of intractable problems such as inequality, and environmental destruction.

The belief that liberalization, privatization, deregulation are good, and that government regulation is bad because it hinders the *efficiency* of the market (hence the imperative of the "free market") is deconstructed by Manicas:

> Economic efficiency is defined in terms of exchange values. But surely this is not a reasonable notion. An economy could produce "efficiently" (as defined above) *and* wastefully *and* destructively [this is the issue of externalities]. Destructive but efficient production violates the environment, perhaps making it unfit for human life. Wasteful, but efficient production generates commodities which fail to serve human needs and wants, or fails to do so as well as it might. Star Wars technology is a good example of the former; poor quality housing an example of the latter.

Herman Daly, former senior economist of the World Bank (1988-94) and founder of Ecological Economics extends Manicas' critique that

an economy can be efficient, and at the same time wasteful and destructive. In his essay, "Uneconomic Growth in Theory and in Fact," Daly (1999) points out that growth in GDP and GNP can in fact be uneconomic: "in the U.S. and some other countries aggregate growth is now in fact costing us more than it is worth, and, at margins, lowers welfare."

Equally in need of deconstruction, notes Manicas (2007), is the theory of comparative advantage—"the theoretical lynch pin of arguments which celebrate global free trade policies." The whole theory may be coherent—the conclusions follow logically from the assumptions—but the assumptions are unrealistic.

If the assumptions are unrealistic or downright false, the model would lack scientific validity—that is, it would not generate accurate predictions. Indeed, where it actually matters (non trivial issues), economists have not made any correct predictions—no one, for instance, predicted the advent of the Asian financial crisis in the late 1990s.

How is comparative advantage related to peak oil? Kunstler (2005) notes that under economic globalism, comparative advantage in the free market was modified to mean that for the sake of "efficiency" less developed trading partners ought to forget everything else and pump out as much of their specialty as possible (using the money received to buy goods and services from other specialists). This "uneconomic" system, to use Daly's term, has been subsidized by cheap oil.

Kunstler writes:

> Populations, in effect, were eating oil, notably in food exports from the United States, where agribusiness had completely taken over from agriculture. Local farmers in Africa, Asia, or South America couldn't compete with corporate Archer Daniels Midland's oil-and-gas-based grain crops and U.S. subsidies. ... Farmers in those places felt that they had no choice but to migrate to the city and find some other way to get by. The only comparative advantage that these people possessed was their willingness to work for next to nothing. Cheap oil and free-market globalism turned comparative advantage into a new kind of feudalism,

> with the corporations as the lords and the overabundant locals as the serfs. And then, when the comparative advantage of cheap labor ($5 a day) of one place, such as Mexico, was superseded by the cheaper labor (99 cents a day) of another place, such as Sri Lanka, the corporations just moved their operations (p. 188).

But when cheap oil is gone, free-market globalism, which is made possible by cheap oil, will collapse. And this could lead to the end of industrial civilization. This does not however imply the end of civilized life or the return to tribal warlordism, as Lovelock feared. Indeed, the end of industrial civilization could mean the beginning of sustainable communities—a consummation devoutly to be wished. The example of Cuba demonstrates that a better world is possible, even without cheap oil.

No es facil; (pero) sí, se puede: the example of Cuba

The story of Cuba is a remarkable example not only of survival against the relentless assault of the most powerful nation-state in the world, but also of successfully turning a crisis into an opportunity for renewal towards sustainability and community.

As noted by Cliff DuRand, professor emeritus of philosophy at Morgan State University, (and coordinator of the annual Conference of North American and Cuban Philosophers and Social Scientists, www.cubaconference.org), since Cuba's triumphant revolution in 1959 and its emergence as socialist nation-state, ten U.S. administrations have sought to end the "threat" of a good example by subversion, sabotage, invasion, assassination, diplomatic isolation, economic embargo, propaganda, among others. The embargo—which Cubans call a blockade because it also seeks to prevent other countries from trading with Cuba—has cost the Cuban people well over $72 billion to date. DuRand (2006) writes:

> The Bay of Pigs invasion and the numerous acts of terror, launched mostly from U.S. soil, have taken 3,478 lives, making this a kind of slow-motion

> 9/11 (the proportional impact of which, given Cuba's small population, exceeds that of U.S. casualties in both the Korean and Vietnam wars). This little country has paid a heavy price for its independence.

Noam Chomsky, Distinguished Professor, Massachusetts Institute of Technology, in his interview during a conference in Cuba on 27-30 October 2003, likewise observed (Dwyer, 2003):

> Cuba has become a symbol of courageous resistance to attack. Since 1959 Cuba has been under attack from the hemispheric superpower. It has been invaded, subjected to more terror than maybe the rest of the world combined – certainly any other country that I can think of – and it's under an economic stranglehold that has been ruled completely illegal by every relevant international body. It has been at the receiving end of terrorism, repression and denunciation, but it survives.

Still reeling from the US economic blockade, Cuba received another blow in 1991.

The Soviet Union disbanded, and Soviet personnel left Cuba. The immediate consequences were horrific (from Pat Murphy's PowerPoint presentation on Cuba, community solution.org):

- Economic subsidies worth $6 billion annually stopped
- GDP down 85%
- Oil usage down over 50%
- Population lost weight (20 lb) – 30% per capita calorie decline
- Major decrease in standard of living

Cuba faced an unprecedented national crisis. The American trade embargo and the collapse of the USSR deprived Cuba of imports, the most essential of which was oil:

- Without oil, public transport shut down; TV broadcasts were shortened to save energy.

- Without oil, pesticides, fertilizers, spare parts became scarce; industrial farms shut down.
- With the collapse of industrial agriculture, there was less food to eat. Cubans had to skip a meal everyday. Thus, Cuban diet dropped from 3,000 calories/day in 1989 to 1,900 calories by 1993.

Instead of falling apart, as the U.S state department had wished and expected, the Cubans responded bravely and intelligently. Out of necessity, the country converted to sustainable farming techniques:

- Replacing fertilizer with ecological alternatives (organic compost, shit)
- Rotating crops to keep soil rich
- Using teams of oxen instead of tractors

The outcome was astounding:

- Over time, Cuban diet became sufficient and much healthier
- Ecologists hailed the Cubans' achievement in creating the world's largest working model of largely sustainable agriculture, independent of oil

(Bryan Appleyard, "Waiting for the lights to go out", *The Sunday Times Magazine*, UK, Oct 16, 2005).

We can better appreciate the Cuban people's remarkable achievement if we consider the comparable case of North Korea. Cuba and North Korea experienced the peak-oil scenario prematurely and abruptly due to the collapse of the former Soviet bloc (with Cuba suffering, in addition, from the intensified trade embargo imposed by the U.S.A). But the outcomes were strikingly different: North Koreans suffered a famine; the Cubans developed an exemplary model of sustainable agriculture.

Dale Jiajun Wen, a visiting scholar (from China) with the International Forum on Globalization, explains that the contrasting outcomes may be partly due to luck—the Cuban climate allows people to survive on food rations that would be fatal in North Korea's harsh winters. But the more fundamental reason is policy: "North Korea tried to carry on business as usual as long as possible, while Cuba implemented a proactive policy to move toward sustainable agriculture and self-sufficiency" (http://www.yesmagazine.org/article.asp?ID=1462, accessed Dec. 2, 2006).

Consequently, writes Jiajun Wen:

> Cuban agriculture now consists of a diverse combination of organic farming, permaculture, urban gardens, animal power, and biological fertilizing and pest control. On a national level, Cuba now has probably the most ecological and socially sensitive agriculture in the world.

For its achievements in sustainable agriculture, the Swedish Parliament awarded the Right Livelihood Award, known as the "Alternative Nobel Prize," to Cuba in 1999. (http://www.hartford-hwp.com/archives/43b/163.html).

Cuba is the only country in the world that enjoys sustainable development, according to the World Wildlife Fund's (WWF) The Living Planet Report 2006. (Full report is available at http://assets.panda.org/downloads/living_planet_report.pdf. See p. 19)

On top of all these, Cuba leads the Latin American region in education (see my essay in this issue), public health and sports. As well, despite its financial constraints, Cuban Cinema ranks among the best in the region.

In boxing, Cuba boasts of ten world champions. The most famous are: Teofilo Stevenson (Olympic Gold 1972, 1976, 1980; World Champion 1974, 1978, 1986), Felix Savon, heavyweight (Olympic Gold 1992, 1996, 2000; World Champion 1986, 1989, 1991 and 1993), and

Hector Vinent, junior welterweight (Olympic Gold 1992, 1996; World Champion 1993). Cuba has consistently won the Pan-American Boxing Championship. (http://www.ibhof.com/ibhfcuba2.htm#rollcall, accessed Oct 5, 2007)

Cuba's record in baseball is equally amazing. The Cuban National Team has won ten World Series of Amateur Baseball and the past four gold medals for baseball at the Pan-American Games. Cuba's baseball team beat Korea 3-0 in the final of the World Cup Baseball in Rotterdam, The Netherlands, Saturday, Sept. 17, 2005. (http://en.wikipedia.org/wiki/Cuba_national_baseball_team, accessed Oct 5, 2007)

Cuban achievement in Cinema, as well as social justice, is underscored in Robert Scheer's interview of Francis Ford Coppola in San Francisco, U.S.A., on 2 December 1975, shortly after the acclaimed filmmaker returned from a visit to Cuba. We quote the highlights (Scheer, 1975):

What did you think of Cuban films?

> *I thought they were very good. I have been traveling around and I know very well the pain of a country like Australia that's a wealthy civilized place and yet has no film industry, because it's cheaper for them to buy our old television shows and our old movies. You see them struggling to have a little bit of a film thing. Yet here you have Cuba, which is a small place by comparison, and they have healthy, real, ambitious films.*

There's something else about Cuba—public education and social justice.

> *For example, let's say you don't want to be a street cleaner anymore. How do you get out of it? And the key word was education. If you're a street cleaner and you want to be a draftsman or an electronic engineer, you have the opportunity to study three hours a day; you don't get paid any less. The state encourages it. It's made available to them and they are not docked in pay. That, to me, is a really exciting idea. . .*

> It seems that what you're saying is that in Cuba, for instance, people suddenly had the freedom to do something very positive like create a mental institution or a school, which in some sense is a freedom we don't have. Basically our freedom is still limited freedom.
>
> *We don't have the freedom to live in a society that is healthy. That is real freedom. We don't have the freedom to live in a society that takes care of people.*

What makes Cuba tick? We can look at three observations—two by professors, and one by (now retired) Cuban leader, Fidel Castro, who has the distinction of being able to consistently stand up to the bullying of the most powerful country in the world.

The life of the mind is vibrant even in a Cuban factory (quite unthinkable in the factories in the Philippines, or the U.S., for that matter). Here is Dr. Manicas, after visiting Cuba in 1996:

> *The Partagas factory, near the Ingleterra Hotel in Old Havana, is producing handmade cigars exactly the way it was done in 1848. Formerly only men made cigars; now there are women also. As has been the tradition for many decades, a "reader" reads to the workers some six hours a day, in the morning news and other materials, in the afternoon, a novel, perhaps Tolstoi, perhaps a mystery story* (Manicas, 1999).

In his *Envisioning a Sustainable Society* (State University of New York Press, 1989), Lester Milbraith, accounts for Cuba's resilience and vitality in terms of the fundamental differences between socialism and capitalism:

- Public ownership vs. private ownership (means of production)
- Utilization of planning vs. utilization of markets (Coordinate economic acts)
- Emphasis on cooperation vs. emphasis on competition
- Collective goods vs. individual goods
- Emphasis on equality vs. emphasis on individual differences (p. 137).

Fidel Castro sums it up most brilliantly (Castro, 2003):

> *Perhaps the most useful of our modest efforts in the struggle for a better world will be to demonstrate how much can be done with so little when all of society's human and material resources are placed at the service of the people*

That is in fact what Rizal and the Indios bravos and Katipuneros endeavored to achieve in the Philippines at the end of the nineteenth century. But, unlike Cuba, our blossoming nation was nipped in the bud, and we ended up with a most corrupt and morally depraved post-colonial political leadership. Today, our situation seems desperate—we urgently need the vision and a plan of action to deal with the converging catastrophes of peak oil and global warming.

My own essay in this issue, "Community in a Doomed World: Rediscovering Rizal's Prophetic Vision," reminds us that we can draw from the wellspring of our past—the prophetic vision of Rizal and the nationalist spirit of '96, as well as our indigenous cultural traditions—to revitalize our nation and build sustainable communities in a time of unprecedented crisis. The solutions are there—even if our greedy leaders don't see them. Actually, they are the only ones standing in the way.

Community Solutions to the Converging Crises of Peak Oil and Global Warming

Cuba is only one example. There are other models to learn and choose from—green community solutions that have sprouted from the "small is beautiful" ecological wellspring.

One outstanding example is the Kinsale 2021 Energy Descent Action Plan (2005). The rural town of Kinsale in Ireland has come up with the world's first local action plan for peak oil—dealing with broad issues relating to peak oil, including health, education, tourism and youth issues. Rob Hopkins, initiator of the plan, drew from his knowledge of permaculture,

and involved the youth of Kinsale in drawing up and implementing the plan.

Kinsale was the venue for a conference on The Challenge and Opportunity of Peak Oil in 2005. The central theme was Fueling the Future (without fossil fuels) through Building Community, Redefining Growth and Creating Abundance (Source: www.fuellingthefuture.org, accessed July 5, 2006).

The Kinsale example has inspired the Transition Towns movement of peak oil preparing towns in Europe. In the US, local organizers within the town of Willits, Califonia have begun work on the Willits Economic Localization Project (WELL). Many other communities around the world are embarking along similar paths. Several measures have been proposed and implemented in many localities towards building sustainable communities at a time of peak oil and global warming (some are listed in the Peak Oil Primer and Other Links website www.energybulletin.net/primer.hph#primer#primer, accessed July 5, 2007):

- **Energy curtailment.** The **Uppsala Protocol** or **Rimini Protocol** is an oil depletion accord, conceived by Colin J. Campbell and Kjell Aleklett of the Uppsala Hydrocarbon Depletion Study Group, Uppsala University, Sweden. It proposes a global framework for distributing the world's remaining oil reserves more equitably than free market forces would allow, to avoid resource wars, profiteering and economic collapse. It consists of provisions:
  1) No country shall produce oil at above its current Depletion Rate, such being defined as annual production as a percentage of the estimated amount left to produce;
  2) Each importing country shall reduce its imports to match the current World Depletion Rate.
  See Campbell (http://globalpublicmedia.com/

transcripts/208), and also Heinberg (http://www.richardheinberg.com/museletter/160).

- **Energy rationing.** For example, the **Tradable Energy Quotas (TEQs)** is a system for rationing fuel which includes everyone – individuals, industry and the Government – and which enables users to sell any rations they do not use. www.teqs.net
- **Permaculture/organic farming and gardening.** This was the keystone, introduced by Australian permaculturists, in the building of Cuba's sustainable agriculture. As explained in the Peak Oil Primer and Other Links website permaculture is a "design science" which enables us to live in relative abundance with minimal resource use. Permaculture principles and practice can be applied to functionally redesigning social systems, built environments, ecological and agricultural practices in the post-peak era. David Holmgren's 2001 book, *Permaculture: Principles and Pathways Beyond Sustainability,* deals explicitly with the global oil peak and proposes permaculture as the best set of strategies for dealing with what he terms "energy descent". (See the following websites: www.permaculturereactivist.net, www.permacultureinternational.org, www.holmgren.com.au).
- **Community currency.** Sometimes called alternative or local currencies, community currency is not meant to replace the national currency. See www.communitycurrency.org/resources.html. A "recovering economist", Richard Douthwaite, has proposed several alternative monetary systems to deal with the monetary crises that might arise post-peak. Douthwaite's publications are available for free online

at the website of The Foundation for the Economics of Sustainability (FEASTA), http://www.feasta.org/money.htm.

- **Intentional Community**—an inclusive term for ecovillages, cohousing, residential land trusts, communes, student co-ops, urban housing cooperatives and other related projects. (See the following websites: www.ic.org, gen.ecovillage.org, www.cohousing.org).
- **The new urbanism.** A movement that seeks to transform and revitalize cities/urban areas to make them more livable and better adapted to the impending crises of peak oil and global warming. The movement also aims at rectifying the distortions created by suburban sprawl—"the project of suburbia", which, according to Kunstler, is "the greatest misallocation of resources in the history of the world."

Crisis presents opportunities for change and social transformation—towards sustainable and vibrant communities. If our leaders can free themselves from their greed and the seductions of a false economic model, and if we can outgrow our *bahala na* (leave everything to fate or God) complacency, we can clearly see several green roadmaps available to us and, thus, embark on the road to renewal. It will of course take time and money, a concerted effort and sacrifice. It won't be easy. We owe it to our children.

Notes

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3 Michael T. Klare, "The Bad News at the Pump. The $100-plus Barrel of Oil and What It Means." http://www.tomdispatch.com/post/174904. Accessed 06 March 08.

4 See "The Oil Currency," Commonwealth Research

http://commodities.commbank.com.au/GAC_File_Metafile/0,1687,22489%255Fthegoodoil20080314,00.pdf, accessed March 15, 2008; also, Roberts, "Cheap oil is history. But why?" http://www.telegraph.co.uk/news/uknews/2021948/Cheap-oil-is-history.-But-why.html. Archived May 25, 2008.

5 Holmgren, David. "Energy Descent Scenarios: Integrating Climate Change & Peak Oil". www.energybulletin.net/22674. Archived Nov. 19, 2006.

6 See Richard Heinberg, "Where is the Hirsch Report?" 30 July 2005. http://www.globalpublicmedia.com/topics/politics. Accessed Aug. 3, 2005

7 In a keynote address to the Symposium on "The Converging Crises of Peak Oil and Global Warming," 27 February 2008, National Institute of Geological Sciences, U.P Diliman.

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