

## Sustainability

# Systems crunch time

We hear a lot about the state of our global environment problems, a lot of claims and counter-claims. **HOLLY VYNER** gives an overview of the global challenges we face based upon highly respected research and discusses how business must provide solutions to these in the near future.

Do you ever feel like you're living in a movie? Surely this world around you can't be real? Technology has brought great social change in the space of a lifetime. How would it be to have a life without aeroplanes, cars, refrigerators, TVs, CD players and mobile phones, to name but a few? The downside is that the lubricant of our lifestyle is mostly based on finite resources which are running out. Oil in particular. Is there anything around you that hasn't used oil in its production or distribution? Agriculture relies on it, all plastic fibres contain it, industrially manufactured products rely on it and transport depends on it.

We are now told that we can't physically go on living the way we have been for much longer. There is an urgent need to find alternative sustainable options to our way of life – or we and future generations will pay the consequences.

## OIL – DANGEROUSLY ADDICTIVE

Experts can't predict the future, but mathematics and science can show us approximately where we are at and where we are headed with fossil fuels.

Currently the world consumes 84,000,000 barrels of oil a day. This is equal to 154,583 litres a second or 4.874 cubic kilometres a year. Everyone would agree oil is a very valuable finite resource. One barrel of crude oil represents the energy of 25,000 hours of human labour. It is the equivalent of having 12 people work all year for you and today it costs about \$100 (Bartlet, 2005). No alternative energy source yet comes close to providing this amount of energy.

We now have an improved knowledge of how much oil may be left in the ground undiscovered, plus or minus 40% (Bartlet, 2002). Since the 1960s the rate of oil discoveries has been falling but our need has been on the increase (Figure 1).

Currently the world's oil consumption is increasing at a rate of 2-2.25%. Work out the exponential growth of 2-2.25% and you will find it has a doubling time of just 31-35 years (see Box 'Understanding exponential growth'). Unfortunately, we don't

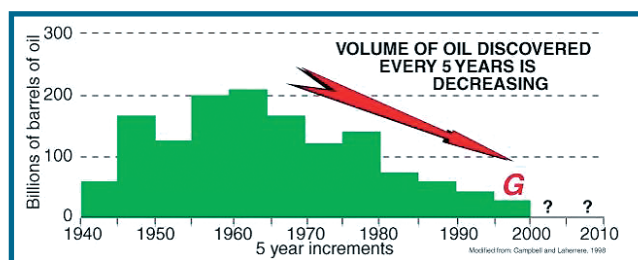


Figure 1: declining oil discoveries.

### Box 1: Understanding exponential growth "The world's most dangerously overlooked simple calculation" (Bartlet, 2002)

To work out the doubling time:

$$T2 = 70 \text{ divided by } \% \text{ growth per unit time}$$

#### Examples

1. In 1999 news reports indicated population had reached 6 billion and was growing at 1.3% a year. Therefore:

$$T2 = \frac{70}{1.3} = 53 \text{ years}$$

2. Current growth rate of consumption of oil is 2-2.25%

$$T2 = \frac{70}{2} = 35 \text{ years}$$

have enough oil – discovered or undiscovered – that will see us through the next 31-35 years considering that we would need double the amount of oil that has ever been used in history.

Because oil makes our world go around, the consequences will be catastrophic if we don't slow down our energy consumption to about 10% and find alternative sources before it eventually runs dry.

## ECOSYSTEM SERVICES

Resources other than oil are being stretched by industrialisation and unsustainable population growth. We are experiencing the global problem of degraded and out of balance ecosystems, resulting in global warming, declining water quality, increasing soil degradation and decreasing biodiversity.

With a continued population growth of 1.3%, the doubling time of our population is only 53 years. How are our already stretched ecosystems going to cope? For example, the demand for food is projected to increase by 70-80% in the next 50 years (Millennium Ecosystem Assessment, 2005). How will we be able to meet this demand without further harming the environment and the integrity of the food supply chain?

Perhaps the greatest challenge we have to face is our culture of growth. Our society is driven by growth of production, population, personal assets, etc. It is our gauge of success and driver of wealth. In Japan, it is considered a recession when growth is less than 3%! What most people don't yet consider is that a lot of this growth depends on finite resources and



**We can make a difference by applying sustainable practices to our daily lives and by educating our children.**

simple services that ecosystems provide such as clean water, timber, clean air, etc.

While we are comfortable now, it is easy to turn a blind eye. However, as Prince Charles reminds us, what will our children think of us if we don't take action? There is the option to be proactive now; or react later to whatever consequences ecosystem changes will inflict on us.

### OPPORTUNITIES AND CHALLENGES

The good news is that every threat creates opportunity. A report of the Millennium Ecosystem Assessment says: "Business is positioned to be a very positive force in addressing these challenges through pursuit of new business opportunities and markets, reduction of operational footprints, development and deployment of new technology, and establishment of effective partnerships. In addition, businesses can demonstrate leadership in support for and reform of public policy that seeks to raise industry environmental performance standards in order to gain first-mover advantages while improving the reputation of their industry as a whole with important customers and constituencies" (Millennium Ecosystem Assessment, 2005).

In our pursuit of solutions, we must remember that in the past many of our problems had their origin in misguided solutions to earlier problems. We have to be careful not to cause more problems with solutions to the problems we face.

In January Prime Minister John Howard reaffirmed the government's commitment to achieving a target of at least 350ML biofuel production by 2010. This is about 2% of our demand for oil. Ethanol fuel from grains, however, is not a solution. We have to understand that currently there is as much energy going into the production of ethanol in planting, fertilizers, harvesting and distillation as is provided in the end product (Cornell University, 2005).

It also takes up valuable cultivated land space for food production. Friends of the Earth report that "the development of oil-palm plantations was responsible for an estimated 87% of deforestation in Malaysia." This 'solution' is already accelerating rather than ameliorating climate change (Friends of the Earth et al, 2005).

We have a lot of work to do in order to find viable long-term solutions. Biological and organic farming provide one of the only real solutions to the pressures we are facing.

Agriculture is responsible for about 30% of global warming mainly through emissions of carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>) and nitrous oxide (NO<sub>x</sub>). Organic farming CO<sub>2</sub> emissions

are 40-60% lower per hectare than conventional systems because they don't use synthetic nitrogen fertilizers. On top of this they act as a valuable sink for carbon dioxide, being able to sequester carbon in the form of stable humus for up to 2000 years. A 23-year ongoing research project by the Rodale Institute in the United States found that if only 10,000 medium sized farms in the US converted to organic production, the carbon they would store in the soil would be the equivalent to taking 1,174,400 cars off the road, or reducing car travel by 27 billion kilometres (The Rodale Institute, 2003). There are 800 million cars on the road today, which means we have a long way to go!

Further benefits to our eco-systems from organic farming include the better water-holding capacity of humus helping reduce irrigation, preventing runoff of nutrients and soil erosion and resulting in better yields in times of drought. In addition there is increased biodiversity and resistance to pests and disease through a focus on soil health. And it doesn't create pollution of waterways or contribute to dead spots in water due to nitrogen leaching.

Organics is therefore already providing a solution to the developing problems we face. It's easy to see why it is agriculture's fastest growing sector and can only be expected to continue to grow.

Organics, although an effective solution to many problems, is not the only one. Every industry and sector of society must do its bit to reduce waste and unsustainable practices.

Individually we can make a difference by applying these practices to every part of our daily lives and by educating our children.

**THANKS:** Thanks in the writing of this article goes to Philip Higson, zealot of peak oil and sustainable practices, Brisbane. The next issue of *AOJ* will explore some of the best ways of reducing our environmental footprints. ■

**To be successful with this experiment of human life on earth, we have to understand the laws of nature as they are encountered in the study of the sciences and mathematics.**

Bartlet, 2002.

### REFERENCES

- Bartlet, Albert, 2002. *Arithmetic, Population and Energy*, DVD/Video for Department of Physics, University of Colorado, Boulder, USA.
- CSIRO Sustainability Network, 2005. *Sustainability Network Update No. 54E*.
- Millennium Ecosystem Assessment, 2005. *Ecosystems and Human Well-being: Opportunities and Challenges for Business and Industry*. World Resources Institute, Washington, DC, USA. <[www.millenniumassessment.org/en/index.aspx](http://www.millenniumassessment.org/en/index.aspx)>
- Bartlet, Roscoe, 2005, May 11, Speech, US House of Representatives. <[www.energybulletin.net/6082.html](http://www.energybulletin.net/6082.html)> or <[www.xecu.net/thorn/PO/May11-2005-4thTalk.htm](http://www.xecu.net/thorn/PO/May11-2005-4thTalk.htm)>.
- Cornell University, 2005, *Producing Ethanol and Biodiesel*, Natural Resources Research (Vol. 14:1, 65-76).
- The Rodale Institute, 2003, *The Rodale Institute Farming Systems Trial*® <[www.newfarm.org/depts/NFfield\\_trials/1003/carbonsequest.shtml](http://www.newfarm.org/depts/NFfield_trials/1003/carbonsequest.shtml)>
- Friends of the Earth et al, September 2005. *The Oil for Ape Scandal: how palm oil is threatening orang-utan survival*. Research report. <[www.foe.co.uk/resource/reports/oil\\_for\\_ape\\_full.pdf](http://www.foe.co.uk/resource/reports/oil_for_ape_full.pdf)>.