

## What YOU can do about Peak Oil

### Introduction

In March 2008, crude oil (the chemical used to make petrol and diesel) reached the record high price of US\$110 per barrel. In Australia, this led to city petrol prices near \$1.50/litre, roughly as high as those following the Hurricane Katrina disaster in 2005. Those of us living outside the city face even higher prices at the pump.

Experts are of the opinion that oil prices are going to climb higher over the long term as the big oilfields are starting to dry up and there isn't enough new oil to be found. New oil discoveries are still happening – and will continue in the future – but the new finds are getting smaller and our demand for oil is getting bigger.

Fortunately for us in Australia, as a whole we currently are *not* living very energy-efficient lifestyles and there are plenty of “easy wins” for most of us to reduce our fuel consumption (and therefore cut our fuel bills!). The following document is written by an ordinary Australian who has studied this issue in detail. This booklet is designed to help fellow Australians deal with increasingly high fuel prices in practical ways. I hope that you find it helpful.

Many of the strategies suggested below involve leaving the car at home (eg cycling, or using the bus) and are only useful for able-bodied persons. Speaking as someone who watched his mother spend the final years of her life with a severe physical disability (multiple sclerosis), I must state that if we are going to discuss solutions to mobility *it is absolutely essential* that we remember there are people who cannot avoid “inefficient” forms of transport. Therefore it is up to the rest of us to do our bit and reduce the strain on fuel supplies by opting for the most efficient transport that we practically can.

### Oil and transportation

Although petroleum (oil) is used to make all sorts of chemicals and plastics, it is overwhelmingly used to fuel the transport of raw materials, consumer goods and of course people. The most obvious pain caused by high oil prices is the increasing cost of petrol in the household budget.

While some people can afford to trade in their large car on a small Toyota Prius (a very fuel-efficient hybrid), most of us are not in that boat. And besides, if we all did, who would buy all of the large cars? In any case, if everyone *could* buy a new fuel-efficient car, the extra energy used to build all those cars would defeat the purpose of buying them!

Leaving your car at home and shifting to more frugal forms of transport (eg joining a car-pool, using public transport or getting on a bicycle or a motorscooter) is strongly recommended. However, if you do need to think about buying a new car, a partial list of fuel-efficient models is provided below.

Fuel consumption will be quoted in “litres per 100km” throughout this booklet. Table 1 (in the appendix at the back of the booklet) shows how to converting “litres per 100km” to “kilometres per litre” and “miles per gallon”, for people who prefer those standards.

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## Short-term options – reducing fuel costs *now*

### Option 1. Car-pooling

The biggest advantage of car-pooling is that it's *free* – you can use your current car without buying a single thing! Most of our cars tend carry only one person at a time, with three or four lonely seats just yearning to be filled with eager colleagues, friends or family members. Think about it – increasing the number of people in your car from 1 to 2 will effectively halve your fuel consumption (per person)! A small car carrying two people (eg 7L/100km divided by 2 = 3.5L/100km per person) is roughly as fuel efficient as if the same two people were each riding motor-scooters (eg 3L/100km per person)! Car-pooling encourages community growth and there are already a bunch of websites dedicated to assisting people to find car-pool buddies – whether you are looking for a ride in someone else's car or offering a seat in your own:

- [www.thecarpool.com.au](http://www.thecarpool.com.au)

- [www.needaride.com.au](http://www.needaride.com.au)
- [www.carpoolaustralia.com.au](http://www.carpoolaustralia.com.au)
- [www.ecarpool.com.au](http://www.ecarpool.com.au)

### Option 2. The “one-car household”

My grandfather still remembers growing up when it was uncommon for a household to own a car at all. And until quite recently, it was certainly uncommon for households to own more than one car. There are enormous savings to be made just by unregistering a car (you don't even have to sell it – if you want, you can keep it in case something goes wrong with the first car). You will save money on registration, insurance and maintenance. And, because having one less car available forces the people in your

household to combine their trips into one, or use other forms of transport (like bikes and buses), you will notice a decrease in fuel costs too!

### Option 3. Public transport

In terms of fuel consumption per person, buses are potentially better than *any* other form of powered transport on the road, perhaps with the exception of some electric bicycles. If you factor in the cost (including money, time and stress!) of parking your car in the city, public transport between the Adelaide CBD and Mt Barker is usually very favourable compared to driving.

- [www.adelaidemetro.com.au](http://www.adelaidemetro.com.au) – timetables and route information for Adelaide’s metropolitan buses, trains and trams
- [www.bussa.com.au](http://www.bussa.com.au) – Bus SA website, with links to regional bus timetables (eg Barossa, riverland) and route information
- [www.gsr.com.au](http://www.gsr.com.au) – Great Southern Railways (for rail journeys between Adelaide, Perth, Darwin, Melbourne and Sydney).

Table 2 (in the appendix) shows a rough guide to the fuel cost savings (assuming \$1.50/litre for petrol) for bus trips of different distances. Assuming you pay an adult bus fare (currently \$2.70 per trip when using a multi-trip ticket), short trips are cheaper by car than by bus. However, if you have to pay any more than \$3 for parking, then the bus will beat the car even on a short return trip! Also, if you are able to avoid the cost of registering and insuring at least one car, then the savings are much more than just the cost of the petrol. Please note that if you can manage your entire return journey within about 2 hours, then you will save the cost of the return bus trip (the ticket is valid for 2 hours) so it will be \$2.70 in total.

#### *Campaigning for better public transport*

Unfortunately, from outer towns such as Nairne, the bus service has not yet become a convenient alternative to driving. For those with the luxury of car transport, the “Park and Ride” facilities in Mt Barker are useful. For people who have to get by without a car, a bus that comes every 2 hours (and not at all on weekends) is hopeless. Without a frequent, reliable bus service, many people will simply choose to pay for petrol and drive. Then the bus companies (and the government funding authority) assume people prefer to drive and reduce funding to buses! We need to “put the horse before the cart” here, and provide the buses for people to use. With fuel costs going the way they are, investing in public transport is a pretty safe bet. The public can and must lobby the government and the bus company to invest in reliable transport, and we must assure them that we will use the buses if they invest in them.

### Option 4. Bicycle transport

Many trips we make by car are of such a short distance that the cost-effectiveness of bus travel is either marginal or non-existent. However, fortunately for most people these short journeys are often easily achievable by bicycle. Actually, when dedicated cycling lanes are available (or separate routes like the “Linear Parks” in Adelaide),

cycling can be faster than any other form of transport, and parking is easy and free! Apart from being the perfect way to beat petrol prices, further advantages of cycling include improved fitness and cleaner air.

Most households have at least an old bike in the shed, and if not they are available new for a couple of hundred dollars or in decent condition secondhand for less than \$100 (try the Trading Post, newspaper classified ads, “eBay” or look on most community noticeboards). Even if cycling doesn’t appeal very much today, it’s a good idea to make sure you have a bike in working order in case you find you need it in the future! It’s a good investment and a great way to stay fit.

Table 3 (in the appendix) shows the fuel savings you could make if you start cycling regularly. Even if you already drive an efficient small car, it doesn’t take much riding for a bicycle to “pay itself off” in fuel savings alone. If you have a large car and are able to regularly leave it at home and use a bike instead, **you can literally save thousands of dollars**. Plus, if you’re cycling 100+ km each week, you might as well throw away your gym membership and save another few hundred dollars a year!

#### *Campaigning for dedicated cycling pathways*

Imagine being able to hop on your bike in Nairne and ride safely into Mount Barker without encountering a car or truck. Dedicated cycling routes might sound unrealistic at first, but cycling infrastructure is many times cheaper for governments to invest in than roads. Given the multitude of advantages bicycles can offer in terms of fuel savings, fitness and environmental benefits, it is imperative that we encourage people to use bikes. Safety is the #1 concern of all cyclists on roads so we must press our leaders to seek innovative ways to provide safe cycling routes.

Here are some great local organisations advocating safe bike transport:

- [www.bisa.asn.au](http://www.bisa.asn.au) – Bicycle Institute of SA, “Advocating for a safe and pleasant environment for cyclists in South Australia since 1974”
- [www.bikesa.asn.au](http://www.bikesa.asn.au) – Bicycle SA website, including general information about recreational cycling and events, as well as maps of cycle routes around Adelaide
- [www.AdelaideTouringCyclists.org](http://www.AdelaideTouringCyclists.org) – Groups that travel interstate (some trips up to 2000km), providing fuel free holidays by bike. After Peak Oil, overseas holidays may be increasingly difficult (perhaps impossible) and local cycling holidays may be the only affordable option!

### Option 5. Powered bicycles / mopeds

Powered bikes (aka “mopeds”) are more fuel-efficient than motorscooters and motorbikes, mainly because they operate at low speeds (therefore less wind resistance) and have human-power (pedalling) to take some of the load off the motor. An advantage of mopeds is that they can be bought as quite inexpensive “Do-It-Yourself” (DIY) kits you can attach to your existing bike, and are available in electric or petrol form.

A partial list of moped suppliers is provided at the end of this section. After many hours of exhaustive research, I have concluded that the most practical solution currently

available is a petrol-powered kit from Staton-Inc in the USA ([www.staton-inc.com](http://www.staton-inc.com)). The kit has a 35cc Honda 4-stroke motor with a continuously variable “NuVinci” transmission incorporated into the rear hub (note: requires spoke modification best done by a professional – so factor in a few hundred dollars for fitting). The rider adjusts the gearing with a lever on the handle-bars (like changing gears normally), which allows the motor to propel the bike slowly up very steep hills *or* travel fast (35+ kph) along the flat open road. The rider’s pedal input goes through the same transmission. Average fuel consumption from this model would be typically around 1L/100km, and with shipping to Australia the kit costs around \$1250 plus fitting.

**Please note** that these are not cheap (most kits cost more than AU\$1,000), so you need to make sure you get one that matches your distance and terrain. For instance, petrol-powered kits are well suited to continuous long-distance riding, while the electric kits are well suited to shorter distance, stop-start city riding. If you have a lot of hilly terrain (such as in the Adelaide Hills) you also need to be extra cautious in choosing the model to ensure it is geared appropriately. Electric-powered bikes are quiet and cost less to run (electric motors being more efficient than petrol engines), but current battery technology means that you typically only get 25-50km before needing to recharge (which takes several hours), and the batteries themselves need to be replaced every few years. Meanwhile, 2 kilograms of fuel carried in an on-board container can provide 200km of riding on a petrol-powered bike and can be re-filled in minutes at a petrol station.

*Also note that Australian regulations state a maximum power of 200 watts, and there are many models on the market that exceed this (including the one just mentioned). 200 watts is an impractical limit and we must lobby governments to classify these vehicles more intelligently (without compromising safety).*

Table 4 (in the appendix) looks at how long it would take for a \$1500 moped to “pay for itself” in fuel savings. The quickest payback occurs when you ride it lots and leave the car at home! Also, if you’re starting out with a large car you will save a lot more fuel than if you had a small, efficient car to begin with. Still, if you leave that small car at home and ride the moped even just 40km a week, the initial investment is paid off in 8 years. That’s as good as putting the money in a high-yielding investment, plus it is helping you with fitness and is better for the environment than the car!

There are numerous ready-to-ride electric mopeds available:

- [www.showandgo.com.au/ebikes/ebike1.htm](http://www.showandgo.com.au/ebikes/ebike1.htm) – Team Show & Go Australia, retailers of electric bikes and scooters, as well as conventional motorbikes and motor-scooters. Located at 236 Brighton Rd, Somerton Park SA.
- [www.greenstreets-sue.com.au](http://www.greenstreets-sue.com.au) – Greenstreets Sustainable Urban Environments, offering electric bicycles. Located at 662-664 Goodwood Rd, Daw Park SA.

- [www.moped.com.au](http://www.moped.com.au) – retailers of petrol-powered bicycles (\$2000 - \$3000) and DIY kits (\$1300 - \$2000)
- [www.electricbicycle.com.au](http://www.electricbicycle.com.au) retailers of electric bikes (\$1400 - \$1500)

DIY kits (to attach to your existing bike)

- [www.staton-inc.com](http://www.staton-inc.com) – home of the NuVinci 35cc kit mentioned above, as well as a large variety of parts including gearboxes, sprockets etc. Based in the US so shipping may be costly.
- [www.phantompower.com.au](http://www.phantompower.com.au) – electrical kits that the company will fit to your mountain bike (\$800). Located at 55 West Thebarton Rd, Thebarton SA 5031. Ph 8234 1183
- [www.bicyclestore.com.au](http://www.bicyclestore.com.au) – variety of petrol-powered kits (from \$700) and electric kits (from \$1200), and ready-made bikes with kits attached (from \$1300).
- [www.evehicle.com.au](http://www.evehicle.com.au) – retailers of electric bikes and EVO hub-motor conversion kits (\$995 with lead-acid battery, \$1695 with Lithium battery).
- [www.elationbikes.com.au](http://www.elationbikes.com.au) – (\$1195 with NiMH battery). The “e-Lation” bike motor that connects at the pedal shaft and utilises the rear gears, giving good hill-climbing ability (low gear) and good level-ground cruising (high gear). (as seen on ABC’s “New Inventors”).
- [www.epacpower.com.au](http://www.epacpower.com.au) – (\$750). The “Epac-power” bike motor that connects at the pedal shaft and utilises the rear gears, giving good hill-climbing ability (low gear) and good level-ground cruising (high gear).
- [www.rotarybike.com](http://www.rotarybike.com) – DIY petrol engine kits (\$1500) and ready-made bikes (\$2100). Authorised dealers: SOUTH COAST CYCLES, 90 Beach Rd, CHRISTIES BEACH 5165; and BERNIE JONES CYCLES, 239 Diagonal Rd, WARRADALE SA 5046.

## Option 6. Electric motorscooters

Electricity can come from a diverse range of energy sources (e.g. coal, gas, oil, wind, hydro, solar, biomass, geothermal). It therefore represents a potentially more “secure” source of transport energy than petrol or diesel, which come almost exclusively from crude oil. Electric motors are more efficient than combustion engines, so they can also make better use of the energy. Electric scooters are relatively inexpensive (\$3000 brand new) compared with the most fuel-efficient cars, and can represent a useful vehicle for short-distance (eg city) commuting. The main limitations are the distance they can travel per battery-charge (typically 50km or less) and the time taken to charge the battery (typically 4+ hours). The cost of battery replacement (and how regularly it needs to be done) should be investigated before buying an electric scooter. The following company has electric scooters for sale:

- [www.evtaustralia.com.au](http://www.evtaustralia.com.au) – distributors of several models of electric scooters

## Option 7. A motorbike or motorscooter

A simple 50cc scooter can be bought new for around \$2000, and should reliably deliver around 2L/100km commuting at low speeds (up to about 50kph). The major advantages of these small scooters include their ease in riding (no gears – just a throttle and a brake), plus the fact that you do only need a car license (up to 50cc). With bike licenses now costing around \$500 in SA, this may be a significant consideration. Small motorbikes (eg 100cc-200cc) cost closer to \$4000 and should deliver 2.5-3L/100km cruising at less than 80kph on the open road. A cheap alternative is the Honda “Postie bike” (110cc). This is the most common motorbike in Australia and can be bought ex- Australia Post at auctions (or in the Trading Post, eBay, etc) typically for under \$1000. These bikes achieve around 2.5L/100km and can cruise up to about 70kph.

**A word of caution:** Most motorbikes on the market in Australia do not deliver anything approaching the above fuel economy, despite their widespread reputation for “running on the smell of an oily rag”! Because of their small fuel tanks they are usually cheap to fill up, but they do not necessarily get very far on a tank of petrol...

Many bikes on the road in Australia consume around 5 to 7 litres per 100km and are therefore even *worse* than some small cars (and remember, when you put two or more people in a car, the ‘per-person’ fuel consumption is lower than many motorbikes any way). The reason bikes are so inefficient is mainly that they have a lot of wind drag. Also, bikes sold in Australia are more commonly engineered for high performance, not fuel economy. If you want fuel efficiency on two wheels, you need to go for the smaller models (preferably less than 250cc, and probably *not* a sports bike) and you need to ride slowly (fuel efficiency gets worse the faster you ride – staying under 80kph is essential for the best fuel economy). Of course, even thirsty bikes that consume 7L/100km is far better than a large family car or 4WD, so it all depends where you are viewing it from.

Tables 5 and 6 (in the appendix) show the payback times for a new 50cc scooter and a new 250cc motorbike, respectively. If you already drive an efficient small car, the advantage is less – so it takes longer to pay off – but still, if it allows you to regularly leave the car at home and ride the scooter or motorbike instead, then it can still be a really good investment.

When choosing a model, think about how you intend to use the vehicle (e.g. if you intend to use it for shopping, will you easily be able to carry parcels? Many bikes don’t come with a baggage rack).

- [www.showandgo.com.au](http://www.showandgo.com.au) – Team Show & Go Australia, retailers of motorscooters and motorbikes. Located at 236 Brighton Rd, Somerton Park SA.
- [www.scootersales.com.au](http://www.scootersales.com.au) – website with links to scooter dealers around Australia.

- [www.pickles.com.au](http://www.pickles.com.au) – auctioneers of ex- Australia Post Honda CT110 motorbikes (cruising speed up to 70kph, fuel consumption 2.5-3L/100km, typically \$600 - \$1000 at auction).
- [www.indiabikes.com](http://www.indiabikes.com) – India-based exporter of restored classic Royal Enfield motorbikes converted to diesel engines (claiming 1.5-2L/100km, approx \$5000 delivered to Australia).

## Option 8. A smaller car

Fuel consumption is related to vehicle weight (increases friction) and vehicle size (increases wind resistance). Cars that are small, aerodynamic and light are inherently more fuel efficient than cars that are large, non-aerodynamic and heavy (think of a rounded hatchback compared with a big square 4WD).

Table 7 (in the appendix) shows how long it might take to pay off a \$10,000 secondhand car that achieves 7L/100km, compared with a medium car, a large car and a large 4WD (eg Ford F250). New cars are more expensive and therefore take longer to pay for themselves in fuel savings. If you have long driving distances that are unavoidable and you currently use an inefficient car, it makes sense to “downsize” as the fuel savings will pay for the car in just a few years.

*Please note that due to the method of testing, the standard fuel consumption figures stated by manufacturers will not accurately portray fuel consumption in real-life driving conditions. These figures are really only provided so as to compare different cars, relatively speaking. You should generally assume that a vehicle will consume more than the claimed rating. Manual transmissions incur less power losses than automatic transmissions and are therefore more efficient, however under real-world driving conditions the difference may be almost negligible.*

If you hardly drive at all, it will take a long time to offset the cost of buying a smaller car – unless you are currently driving a huge 4WD and don’t need to be!

The Green Vehicle Guide is a good start for finding out how well different cars perform relative to each other:

- [www.greenvehicleguide.gov.au](http://www.greenvehicleguide.gov.au) – The Australian Federal Government Greenhouse Office’s fuel consumption comparison database. A useful starting point when comparing various vehicle options. Main page is for new cars but has a link to a database for older cars.

Here are a few relatively inexpensive new cars that don’t consume much fuel at all:

- [www.smartaustralia.com.au](http://www.smartaustralia.com.au) – Smart fortwo (4.8L/100km, \$19,900)
- [www.mitsubishi-motors.com.au](http://www.mitsubishi-motors.com.au) – Mitsubishi Colt (5.6L/100km CVT version, \$21,990)
- [www.toyota.com.au](http://www.toyota.com.au) – Toyota Yaris YR 2-door hatchback (6.0L/100km manual, \$15,190)

## Hybrid petrol-electric vehicles

Hybrid cars are only really effective in stop-start traffic and lose their advantage in highway driving conditions.

When your car stops in traffic, all the motion energy is usually lost (as heat on the brake pads). Hybrid cars recapture the car's motion energy when braking and store it in batteries so it can be used to re-accelerate the car when needed, using an electric motor. Hybrid vehicles are able to switch the petrol engine off whilst sitting in traffic, and accelerate just using the electric motor – this reduces fuel consumed while idling in traffic queues. A hybrid car's computer system decides when to use the petrol motor and when to use the electric motor and tries to get the optimal fuel consumption under all conditions. *The major advantages of hybrid cars (over conventional cars) result*

*from their ability to (a) re-capture energy in stop-start driving and (b) minimise fuel losses when idling in traffic. Therefore, a hybrid car loses its advantage in highway conditions.*

- **Please give careful thought to the life-cycle (eg cost and frequency of replacement, as well as recycling and disposal) of the batteries in a hybrid car.**
  - [www.honda.com.au](http://www.honda.com.au) – Honda Civic Hybrid (4.6L/100km, \$32,990)
  - [www.toyota.com.au](http://www.toyota.com.au) – Toyota Prius (4.4L/100km, \$37,400)

## Longer-term considerations

### Transport and your lifestyle

As well as day-to-day commuting, there are lifestyle choices we all make that can place us at greater risk to future oil shocks. For instance, are you living a long distance from your close friends and family? If so, do you depend on air travel (or long-distance car travel) to see them? How easy do you think this will be in the future? Can you substitute rail and/or bus travel to avoid dependence on flying and driving (trains and buses are much more fuel efficient per person than planes and cars), and what would this do to your lifestyle? Do you need to consider moving closer to friends and family?

It makes sense to support your local butcher, baker, candlestick-maker, etc. This helps to keep them in business, which will be important when fuel costs prohibit the use of shops that are further away. Small local shops may also be more inclined to source their goods locally whereas large chain supermarkets may not deal with the limited volume offered by local producers.

Try to ensure that any trip in the car has more than one purpose – e.g. not just driving to the shops to buy a litre of milk, but also going to the green-grocer and butcher, and if you do it all on the way home from the bus station you're laughing!

### Watch this space – transport in the future

- [www.bev.com.au](http://www.bev.com.au) – The “Blade Runner”, a.k.a. Hyundai Getz converted to all-electric. Built in Australia, expected to cost \$24,000 drive-away. Charge the batteries for \$2.50 (on Green Power) and travel 100km!
- [www.loremo.com/index\\_en.php](http://www.loremo.com/index_en.php) – The “Loremo”: a small, light and aerodynamic 4-person diesel car being developed in Germany, using just 1.5L/100km and due on the market for around €12000 (approx AUS20,000) in 2009
- [www.smart.com](http://www.smart.com) – The 2-seater Smart car is already available in Europe as a diesel (3L/100km) and there are rumours of an all-electric version
- [www.revaindia.com](http://www.revaindia.com) – small, affordable all-electric city commuter built in India, already on the market in India and Europe.
- [www.teslamotors.com](http://www.teslamotors.com) – high performance all-electric sports car
- [www.hdtusa.com](http://www.hdtusa.com) – manufacturer of the world's only current production diesel motorcycle, at present only for military use (but intending to produce a civilian model in the future). Claims a top speed of over 140km/h and boasts a real-life fuel consumption of approx. 2.5L/100km at 90km/hr

### Buy groceries online

Apart from the enormous amounts of energy required to keep supermarkets well-lit and climate-controlled, a large amount of oil energy is burned in each car driving to the supermarket. Walking, cycling or catching a bus to the shops severely limits the amount of groceries that can be carried. When you buy groceries over the internet, a single delivery van that services a large number of households on its delivery run is far more efficient than a car going to and from each household. Once you are acquainted with the shopping website, the convenience of shopping from home is a very significant plus.

- [www.bananablue.com.au](http://www.bananablue.com.au) – online supermarket, affiliated with IGA supermarkets

### Buy clothes and other goods online or by mail order

Mail-order catalogues (and now, extensive online stores) can provide a way to obtain goods conveniently without investing the fuel of a car trip in driving to the store. (A postal van stacked full of parcels is more fuel efficient than a single parcel sitting in the boot of every 1500kg car!).

### “Shopping Miles”

By buying a whole fortnight (or more) worth of food at the same time, you can reduce the number of trips to the shops. Having several months worth of long-life food and goods stored up (e.g. dried beans and pulses, tinned food, essential sanitary items) means that if there is a major oil shock and driving becomes impossible for a period of weeks, you will be able to draw on this store.

### Growing your own food

The best way to minimise your Shopping Miles, and generally reduce the amount of fossil-fuel inputs supporting your diet, is to grow some (or even all) of your own food. Creating a greater degree of self-sufficiency, while personally fulfilling in its own right, can also improve food security as other living costs begin to rise. The future after Peak Oil is uncertain at best, and generating some extra

security in your food supply is an excellent insurance policy.

Growing food itself takes time, and it takes even longer if you don't know how to do it. There could also be a sudden rush for gardening supplies if everyone decides to start at the same time (e.g. in response to a crisis) – preparing ahead and buying the necessary equipment is sure to be a worthwhile investment.

Perhaps the greatest Aussie innovation, Permaculture (**permanent agriculture**), is essentially a set of design principles and ethics to enable a positive negotiation through a low-energy future. Permaculture design principles form the basis of any number of immensely productive, sustainable, integrated organic food growing systems (including plants and animals) that have been adopted worldwide. Permaculture principles can be applied on almost any scale, from balcony and rooftop gardens to vast orchards. In Havana, Cuba, some 50% of all food is produced within the city itself.

- [www.permaculturesa.org.au](http://www.permaculturesa.org.au) – Permaculture Association of SA
- [www.permaculture.org.au](http://www.permaculture.org.au) – Permaculture Research Institute of Australia, offering Permaculture Design Courses.
- [foodforest.com.au](http://foodforest.com.au) – Permaculture farm located at Gawler, also offering numerous workshops and courses including permaculture design and building with strawbales.
- [www.holmgren.com.au](http://www.holmgren.com.au) – website of David Holmgren (co-founder of the permaculture concept), including books and videos and free documents for download
- [www.communitysolution.org](http://www.communitysolution.org) – The Community Solution has a great DVD (“The Power of Community”) on Cuba’s adaptation to reduced oil supply, mainly using permaculture.

## Advocacy

Peak Oil will sound the beginning of a transition from our current unsustainable, high-energy lifestyle to one that is sustainable and low-energy. This change has the potential to be enormously disruptive to society and our economy so the more people who are aware and preparing ahead of time, the better.

## Participate in democracy – write to your MP

Most politicians are aware of Peak Oil. Many do not believe it to be a problem, while others are probably concerned about it but feel trapped between a voting public (and general economy) that expects unlimited growth, and a finite resource base that cannot provide the desired growth forever. Why not write a letter to your local member that (a) outlines your concerns, and (b) encourages them to “do what it takes” to help steer the country towards sustainability? The following might provide some assistance:

- [www.aph.gov.au/senate/committee/rrat\\_ctte/oil\\_supply/report/index.htm](http://www.aph.gov.au/senate/committee/rrat_ctte/oil_supply/report/index.htm)

Senate Inquiry into “Australia’s future oil supply and alternative transport fuels” that confirms that Peak Oil is a major concern to government.

- [www.portlandonline.com/osd/index.cfm?c=42894&](http://www.portlandonline.com/osd/index.cfm?c=42894&)

The City of Portland, Oregon, has a “Peak Oil Taskforce” and has produced an 86-page handbook entitled “Descending the Oil Peak: Navigating the Transition from Oil and Natural Gas”.

## Spread the word

Tackling the Peak Oil problem can be lonely. Much better to do it in the company (and with the support) of friends and family. It’s also nice to know that loved ones are getting themselves prepared for potential difficulties ahead. **It’s not your responsibility to force everyone you know to install a permaculture garden and aquaponics system in their backyard and buy electric scooters.** However, the more people who are aware of, for example, the *reasons* behind spiking petrol prices, the better. If Peak Oil brings major disruption, then the better informed people are, the better chance we have of minimising social upheaval. DVDs are a great way to introduce friends and family to the Peak Oil concept, as they can view them and contemplate the issue in their own time.

- [www.endofsuburbia.com](http://www.endofsuburbia.com) – “The End of Suburbia: Oil Depletion and the Collapse of the American Dream”. This documentary focuses on the fact that America’s suburban lifestyle is utterly dependent on the private car and is quite applicable to Australia’s sprawling suburbs.
- [www.crudeimpact.com](http://www.crudeimpact.com) – “Crude Impact”. This documentary looks more at the oil industry and related humanitarian and environmental crises than Peak Oil, but the issues it raises create a compelling set of reasons to “kick the oil habit” (quite apart from Peak Oil).
- [www.communitysolution.org](http://www.communitysolution.org) – “The Power of Community” is a documentary looking at how Cuba experienced a permanent oil crash when the Soviet Union collapsed. Strategies included emergency deployment of bicycles and widespread adoption of organic agriculture and permaculture (including urban and rooftop gardens). It provides a positive example of how human quality of life need not depend on high petroleum use.

## Local action groups

There is an increasing number of people with an awareness of issues like Peak Oil. If you know of people in your local area who might be interested in forming local action groups to help with strategies (eg car-pooling, cooperative food-growing, land-sharing), then it is a great idea to organise meetings where you can all share ideas and offer help.

- [www.relocalize.net](http://www.relocalize.net) –Join (or start) a post carbon action group in your local area today!

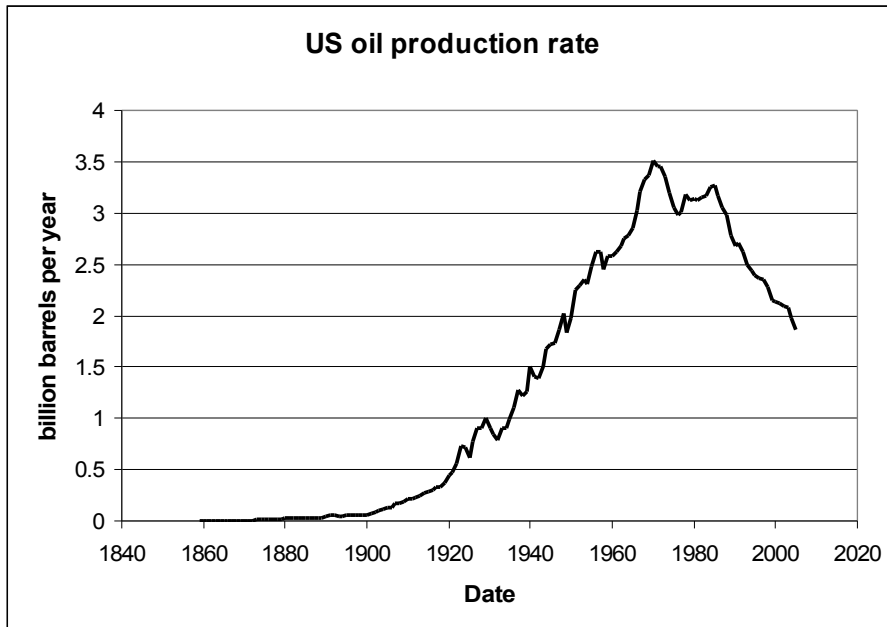
## Online discussion communities & mailing lists

There are countless discussion groups relating to Peak Oil on the internet, and many more relating to specific activities (not *necessarily* making the peak oil connection) e.g. cycling, growing food, aquaponics. An online forum or mailing list can provide a useful network for exchanging ideas and notifying people in your area of upcoming events.

- Beyond Oil SA emails a newsletter (approximately weekly) on issues connected to Peak Oil, sustainability, and limits to growth. Contact either

- The Association for the Study of Peak Oil has a Young Professionals Working Group that includes an online forum.

## Appendix A – What is “Hubbert’s Peak”?



“Hubbert’s Peak” is a term that is often used interchangeably with “Peak Oil”. However, strictly speaking, it relates to the work of the late Dr M. King Hubbert, who is credited with the revelation that the extraction of any non-renewable resource must rise, peak and then decline in something vaguely approaching a bell-shaped curve.

Consider this analogy. A team of rowers is in a boat. They decide to see how fast they can make their boat go. They all start rowing faster and faster, and the boat gains speed. They keep rowing faster and faster, and the boat continues to speed up. After a while though, one of the rowers becomes too tired to keep up. However, the others keep rowing faster and for a while the boat continues to increase its speed. But eventually, other rowers grow weary. There comes a point where even the strongest rowers cannot

continue to accelerate the boat. The boat gradually slows down. That, in essence, is Hubbert’s Peak.

Relating it to petroleum, the world is producing oil from many different oil fields. Over time, oil fields get “tired” and the rate of oil being pumped out starts to decrease (just like a rower getting tired). It is then up to the other oil fields to increase their production to make up for the loss. Eventually, too many oil fields will be tired and there won’t be enough fresh strong fields to make up the gap – that point is Peak Oil.

Since Hubbert began publishing work on this phenomenon in the 1950s, we have had access to computers and can now make better predictions. We have also seen the phenomenon occur on the local and national scales as many countries (including the US, the UK and Australia) have already passed their peak. Predicting the timing of the global peak is very difficult as it is never certain how much oil will flow from an oil well – or for how long. With the complexity of the global oil market, Hubbert’s original symmetrical bell-curve is only useful to illustrate the basic concept (such as on the front cover of this document).

Today’s most credible estimates, taking advantage of modern computing power to consider the heterogeneous distribution of global oil supply, place the peak somewhere between 2006 and 2015.

In short, there is no “silver bullet” alternative fuel that can be scaled up in time to offset the decline after peak oil. We must therefore plan now for a descent into a lower energy world that may begin as early as this year.

## Appendix B – Useful tables

Table 1 – converting “litres per 100km” to “miles per gallon”

The standard units for measuring fuel consumption today is “litres per 100km”, i.e. how many litres of fuel does it take to move a vehicle 100km. Unfortunately, this is different to the old standard of “miles per gallon”, and actually motorbikes are frequently quoted in “kilometres per litre”! The simple table below allows some conversion (assuming 1 Australian gallon = 4.5 litres):

litres per 100km	km per litre	miles per gallon
2	50.0	141
3	33.3	94
4	25.0	70
5	20.0	56
7	14.3	40
10	10.0	28
13	7.7	22
15	6.7	19
20	5.0	14
25	4.0	11

Table 2 – Fuel costs versus bus ticket

Trip distance (return)	Bus (2 trips from a 10- trip ticket)	Motorbike (4L/100km)	Small car (7L/100km)	Medium car (10L/100km)	Large car (13L/100km)
25km	2x\$2.70 = \$5.40	\$1.50	\$2.63	\$3.75	\$4.88
50km	2x\$2.70 = \$5.40	\$3.00	\$5.25	\$7.50	\$9.75
75km	2x\$2.70 = \$5.40	\$4.50	\$7.88	\$11.25	\$14.63
100km	2x\$2.70 = \$5.40	\$6.00	\$10.50	\$15.00	\$19.50

Table 3 – Annual fuel cost savings (based on \$1.50/litre) for various rates of regular cycling, comparing against various vehicles.

Distance cycled each week	Fuel savings over a full year, compared with:		
	A small car (7L/100km)	A medium car (10L/100km)	A large car (13L/100km)
10km	\$55	\$78	\$101
20km	\$109	\$156	\$203
40km	\$218	\$312	\$406
100km	\$546	\$780	\$1014
200km	\$1092	\$1560	\$2028



Table 4 – Payback period for a moped compared with various sized cars. This assumes the moped achieves 1L/100km and fuel costs \$1.50/litre.

	<b>Time to payback – powered bike compared with:</b>		
<b>Weekly distance ridden</b>	<b>A small car (7L/100km)</b>	<b>A medium car (10L/100km)</b>	<b>A large car (13L/100km)</b>
10km	32 yrs	21 yrs	16 yrs
20km	16 yrs	10 yrs	8 yrs
40km	8 yrs	5 yrs 4 mths	4 yrs
100km	3 yrs 2 mths	2 yrs 1 mths	1 yr 7 mths
200km	1 yr 7 mths	1 yr	9 mths

Table 5 – Time taken for a 50cc scooter to pay itself off in fuel savings (assuming the scooter costs \$2000, achieves 2L/100km and fuel costs \$1.50 per litre)

	<b>Time to payback – 50cc scooter compared with:</b>		
<b>Weekly distance ridden</b>	<b>A small car (7L/100km)</b>	<b>A medium car (10L/100km)</b>	<b>A large car (13L/100km)</b>
50km	10 yrs 3 mths	6 yrs 4 mths	4 yrs 7 mths
100km	5 yrs 1 mth	3 yrs 2 mths	2 yrs 3 mths
150km	3 yrs 5 mths	2 yrs 1 mth	1 yr 6 mths
200km	2 yrs 6 mths	1 yr 7 mths	1 yr 1 mth
250km	2 yrs	1 yr 3 mths	11 mths

Table 6 – Time taken for a 250cc motorbike to pay itself off in fuel savings (assuming the bike costs \$4000, achieves 3L/100km and fuel costs \$1.50 per litre)

	<b>Time to payback – 250cc motorbike compared with:</b>		
<b>Weekly distance ridden</b>	<b>A small car (7L/100km)</b>	<b>A medium car (10L/100km)</b>	<b>A large car (13L/100km)</b>
50km	25 yrs 7 mths	14 yrs 7 mths	10 yrs 3 mths
100km	12 yrs 9 mths	7 yrs 3 mths	5 yrs 1 mth
150km	8 yrs 6 mths	4 yrs 10 mths	3 yrs 5 mths
200km	6 yrs 4 mths	3 yrs 7 mths	2 yrs 6 mths
250km	5 yrs 1 mth	2 yrs 11 mths	2 yrs

Table 7 – Payback period for a \$10,000 small car achieving 7L/100km

	<b>Time to payback – compared with:</b>		
<b>Weekly distance driven</b>	<b>A medium car (10L/100km)</b>	<b>A large car (13L/100km)</b>	<b>A large 4WD (20L/100km)</b>
100km	42 yrs 8 mths	21 yrs 4 mths	9 yrs 10 mths
200km	21 yrs 4 mths	10 yrs 8 mths	4 yrs 11 mths
300km	14 yrs 2 mths	7 yrs 1 mth	3 yrs 3 mths
500km	8 yrs 6 mths	4 yrs 3 mths	1 yr 11 mths
1000km	4 yrs 3 mths	2 yrs 1 mth	11 mths