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# REMAKING SETTLEMENTS

THE POTENTIAL COST REDUCTIONS ENABLED BY THE SIMPLER WAY

Ted Trainer

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# REMAKING SETTLEMENTS: THE POTENTIAL COST REDUCTIONS ENABLED BY THE SIMPLER WAY

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This is an attempt to estimate the very low dollar, footprint and energy costs The Simpler Way might achieve. It uses data on typical Australian consumption rates, food production yields, suburban geographies, etc. to estimate possible reductions in dollar, resource and ecological costs that might be achieved if suburbs and towns were radically transformed according to Simpler Way principles.

This is a first attempt and the intention is to work towards more confident estimates over time. However it seems that dollar, energy and footprint costs could be cut to around 10% of the present Australian averages, while improving the quality of life. However this assumes firstly that the limits to growth require such enormous reductions in current rich-world “living standards” and secondly it assumes a change to radically different economic, political and cultural systems.

## THE CONTEXT

The Limits to Growth analysis shows that we must develop ways of life whereby we can live well on *far* lower per capita resource consumption rates than we have now, in a zero-growth economy. (TSW: The Limit to Growth.) The Simpler Way argument is that we can do this, but only if we achieve enormous change away from the structures, systems and values of consumer-capitalist society. (TSW: The Simpler Way Perspective.)

The conclusion the present analysis generally indicates is that *we could live well on something like 5 - 10% of present Australian per capita dollar, energy and footprint cost*, while greatly improving the quality of life and eliminating most global problems. However this would require huge change in the geography of settlements, economic and social systems, and attitudes and values. In my firm view the lifestyles and systems discussed below are highly attractive, and I would opt for them whether or not they were necessary. However they would be far more frugal than those which most people would be willing to accept today. They might be more austere than resource limits will force us to accept in future, so the following discussion might best be seen as exploring how resource-cheaply we could live well if we had to.

It is important not to think in terms of simply reducing consumption or making existing systems more efficient. The Simpler Way is about new means to new goals in new systems, and therefore about a quite different conception of the good life, of the good society and of “development”. For instance conventional thinking about Third World development is locked into the conviction that development has to involve increasing investment of capital, to be able to sell more, to be able to buy more and to spend on developing more capacity to sell, buy and invest. Thus there is thought to be only one dimension underlying development, essentially to do with increasing business turnover or GDP, incomes and “living standards”. However the concept of *appropriate* development scraps this whole way of thinking and simply focuses on enabling people to use the resources around them to produce for themselves the basic things most likely to solve their problems and raise their

quality of life, mostly in cooperative ways, and as far as possible independently of the national monetary economy. Above all it rejects affluence as a desirable or achievable development goal.

This different approach immediately liberates communities to achieve miracles, especially in avoiding the astronomical levels of waste, work, unemployment, insecurity, debt, interest payments, worry, exploitation and overheads (advertising, packaging, consultants, bank fees, insurance, rent...) that the consumer-capitalist way inflicts. In the conventional economy corporations constantly strive to increase the amount you must purchase from them, to add on services, to make you dependent on them, to then raise prices, to commercialise things that we once did for ourselves, to create needs you didn't realize you had. The alternative way eliminates all that and much more.

It hardly needs to be said that the changes assumed in the following settlement restructuring could not be made in the present economy. They would only be possible in the radically different new economy of The Simpler Way. (See TSW: The New Economy.)

At the end of each section there is an attempt to estimate the dollar and energy cost of an average Australian household of 2.4 people living in the frugal and self-sufficient style and circumstances I would choose and regard as quite sufficient. This yields the above estimate that 90% reductions might be achievable. The assumption is a fairly normal Sydney outer suburb. The proposals would be much more easily implemented in rural areas. Several of the figures are first estimates and are quite uncertain. The intention is to improve them in later drafts of this document.

Reference is occasionally made to a study of a particular Sydney suburb, East Hills, which provided figures on aspects such as road areas that could be dug up for gardens.

## **FOOD**

Most and possibly almost all food could come from within settlements, that is from home gardens, community gardens, neighbourhood commons, and very small farms, even in the dense suburbs of large cities, at a very low dollar cost and at almost no energy cost. However it is likely that some grain, dairy, oils, fruit and nuts would need to be brought in, ideally in bulk from nearby farms.

### **A summary of principles**

- Home gardens, extensive planting of perennials and annuals over most of the block.
- Community gardens.
- Community co-ops, e.g., looking after poultry, fish, orchards...
- Commons; planting of public space and retrieved road space, converted to gardens, orchards, woodlots, fish ponds, processing and storage sheds, cool rooms, "edible landscapes" and "food forests" providing free fruit, nuts, mulch, timber, honey, poultry, reeds, herbs, fish. Nutrient recycling, perennial vegetables, bush tucker. Commons developed and maintained by voluntary working bees and committees.
- Farms; from very small to tiny, in backyards, vacant blocks, on commons, producing for local use, some in the form of co-operatives, including small animal production, and some field crops such as soybeans and grains. Many households able to sell or barter small quantities, reducing the need to earn money to purchase food.

- Towns might own farms as close as possible, producing their bulk grain, dairy, soy, sugar beet, fruits and nuts for supply of these more area-expensive items. These farms would also be sites for holidays.
- Considerable use of Permaculture design principles, such as “edible landscapes”, recycling, multiple functions, trees and perennials, almost all niches crammed with productive plants, minimal use of non-renewable resources, and design to have many functions automatically carried out.
- Systems which reverse “soil mining” and improve soils and ecosystems.
- Long term research and trials to find the varieties that thrive in local conditions, most pest resistant, tasty, nutritious, storable, drought tolerant. Finding varieties that ripen over a period to enable continuous supply (as distinct from commercial varieties whereby a whole field can be harvested at one point in time.)
- Seed saving, grafting, reproduction of the best varieties for the area.
- Much reduced consumption of meat, to come mostly from small animals, especially poultry, fish, rabbits. No big animal production, except some pigs, sheep and goats, (and horses for ploughing and transport use.)
- Small animals, especially poultry, fed by kitchen and garden scraps and free ranging on commons, orchards, woodlots etc.
- Planting on flat rooftops, especially in the commercial areas, and use of vertical spaces for vines and espaliers.
- All “wastes” including human, animal, food scraps garden and farm, returned to local soils via compost heaps, animal feed and garbage gas units. Therefore no need for artificial and imported fertilizers (or pesticides.) The suburb should be thought of as constantly recycling a more or less stable quantity of nutrients through kitchens, toilets and animal pens back to soils producing the food taken to the kitchens.
- Much reduced demand for dairy products, mainly via replacement by soy products. (The protein content of soy yield per ha for dairy substitute products is actually around four times as high as for dairy per ha. The Aust. Yearbook 2012 states a ratio of c. 17/1 for soy protein yield to beef protein per ha.)
- Seed saving, grafting, nursery propagation.
- Low energy storage, e.g., fruit drying, bottling, cool rooms.
- No packaging, “marketing”, transport energy costs, corporation profits or bank interest payments adding to the cost of produce.
- Mostly hand tools and labour-intensive gardening, with little or no use of machinery, except on the mini farms where equipment can be shared.
- Complex, multi-function, integrated landscapes, forest gardens, with built-in redundancy and resilience, as distinct from unstable monocultures dependent on imported inputs.
- Advantage can be taken of overlaps, e.g., bees pollinate crops as well as produce honey, complex landscapes provide habitat for pest eating birds, dams provide water, fish, reeds and leisure facilities, forests provide fuel wood, mulch, honey, fruit, timber, understory food crop habitat, water retention, windbreaks, leisure resources.
- Few dog and cat pets but many small animals in the neighbourhood, including sheep and goats, and some horses/donkeys for cartage, ploughing and leisure.
- Multi-cropping; the small scale enables new seeds to be planted immediately an area becomes vacant, keeping the whole area in continual use.
- Use of imperfect produce that cannot be marketed, and recycling “wastes” to animals.
- Home and community gardening as a major source of leisure activity and exercise, creating diverse thriving, enjoyable landscapes.
- Almost no food should be imported into the country. Only short transport distance for a few items.

- Only use of fresh foods in season locally, eliminating use of energy on freight and refrigeration of produce from long distances away.
- There would be many desirable spin-off implications outside the food system, e.g., for health, community, leisure and education. Gardening increases fitness and for many it would be a major leisure activity. It makes landscapes beautiful and inspiring, especially when much of the effort is going into public spaces. In addition the field days, shows, talks and research activities would provide sources of learning, entertainment and community bonding.

### **Area and yield figures**

This section attempts to establish estimates of the amount of land needed to provide for one person. The provisional conclusions cannot be regarded as precise or confident, but they are encouraging regarding the cope for local self-sufficiency because they are mostly drawn from conventional agricultural yields and these can be greatly exceeded by alternative processes (below.) Future work will attempt to arrive at more confident figures.

### **Vegetables**

Australian consumption is 112 kg/pp/y. This (along with fruit) should be greatly increased, via reduction in meat consumption. If 75% of the 111 kg/pp/y of meat consumption was shifted to vegetables, increasing vegetable consumption to 194 kg/pp/y, and vegetable production was 15 t/ha/y, then vegetable growing area would have to be (much higher output seems possible; below), only 130 m<sup>2</sup> per person. (The suburb East Hills has around 82 ha that could be used for food production, i.e., 270 m<sup>2</sup> per person.)

### **Grain**

Australian consumption is reported as 135 kg/pp/y. From my domestic situation this seems much too high; one 800 g loaf of bread per person per week would be only 42 kg/y. Add biscuits, cake, flour, breakfast cereal and a plausible assumption here might be 90 kg/pp/y.

Australian grain farms average only around 3 t/ha/y, from less than ideal land. However Pitzer (2009, p. 13) says backyard grain production can be 13+ t/ha/y. Assuming village grain land would eventually be of high quality due mostly to nutrient recycling, an average yield of 10 t/ha/y might be reasonable (but might be optimistic.). Per capita land area would therefore be 90 m<sup>2</sup>.

### **Dairy**

Australian consumption of milk in dairy products is 118 kg/pp/y. It will be assumed that 50% of this demand could be shifted to soy milk, adding that area to vegetable land area required. Milk yield is c. 9 t/ha/y, indicating the need for 59 m<sup>2</sup> per person. To produce 59 kg/y of soy might require c. 16 m<sup>2</sup>, assuming soy yield of 3 t/ha, and soy milk 10 l/kg of soy beans. Therefore for dairy produce (i.e., not including soy) 75 m<sup>2</sup>/pp will be assumed.

### **Fruit**

Australian consumption is 62 kg/pp/y. At commercial yields of 10 – 20 t/ha/y this indicates a need for 40 m<sup>2</sup> per person, but many fruit trees can be mixed with timber and other plants within dense home gardens, forest gardens, on the commons and parks. In addition use of dwarf varieties, pots, and espaliers along walls and fences would reduce the area needed.

## **Meat**

Australian meat consumption is 111kg/pp/y, (incl. 47 kg of chicken, but not including fish.) Beef is an especially inefficient use of land, averaging about 0.4 kg/y per ha, and requires a large amount of water. It will be assumed that present meat consumption is reduced by 75% (and vegetable consumption is increased accordingly, noted above.) Most meat would be poultry plus other small animals, e.g., rabbits, pigeons, guinea pigs. Fish consumption is assumed below to be doubled to 30 kg/pp/y, (all via tanks, ponds, lakes and dams within settlements.)

Thus meat consumption would be 28 kg/pp/y, one-quarter of the present figure, made up by 13 kg/pp/y poultry (plus rabbits, possibly pigs etc.) and an increase of 15 kg/person/y of fish (making that 30 kg/pp/y). (This assumes large reduction in poultry consumption, from the present 42 kg/pp/y so there is scope for a greater use of poultry if necessary.)

Edible/dressed chicken weight might be 1.4 kg per bird. If eaten at 15 weeks of age the number of birds being fed to maintain this rate of harvest per household (2.7 people in East Hills) might be 5. (Obviously not all households would need to keep poultry etc. as there would be production from co-ops and small farms.) Poultry meat production would be integrated with egg production as birds beyond egg producing age would be eaten; see below.

These poultry meat figures are uncertain and might be unrealistically low. Note that eggs are being regarded as additional to meat consumption. Some sheep and pigs, also providing wool and leather, might be included instead of some of the poultry, but this item has not been accounted separately here. Most sheep and pigs might be located on farms close by, owned by the town. Pigs are good consumers of scraps, effective at preparing ground for cultivation, and they take little area. They would best be cared for by co-ops or local mini farmers.

Areas for poultry and fish are difficult to estimate due to significant overlaps in uses, and nutrient recycling. For instance much/most poultry food would come from kitchen scraps and free ranging through orchards and forests, while ducks, geese and fish would feed from fields, forests and ponds. (See below.)

The area for fish production would be very low, partly because much would come from recreational ponds on commons and from very small tanks (two or three cubic metres) in backyards and fish farms. Carp can yield 13 tonnes/ha from natural ponds, without added feed, 30 times the meat yield per ha.

The major source of animal food would be recycled nutrients from households, especially via the large volume of kitchen scraps, and the feed for ducks and fish growing naturally in ponds to which grey and black water from households is recycled (e.g. down wetland chains, which can completely purify water.) Thus the area assumed for animal feed would mostly be for supplementary inputs. (See below).

## **Eggs**

Australian consumption is 180 per person p.a., which at 50 g per egg is 9 kg/y. Household consumption would average only 8.4 per week, so these might be produced by a long-term average of less than 2 chickens per household, or 0.4 per person. (ABC, 2014.)

Almost no area would be needed specially for poultry apart from sheds, because birds would be fed food scraps, would free range on much of the dairy, orchard, forest, nut and oil (e.g., olive grove)

area, and they would be rotated around vegetable patches to clean up, fertilise and cultivate. Some food supplements are accounted under the “animal feed” category below.

The probably surprising (and possibly mistaken) implication of these figures for meat, fish, poultry and eggs is that it would seem to be possible for a settlement to meet its (considerably reduced) meat demand from within its borders. This would free vast rangeland areas for reforestation, and the establishment of eco-villages.

### **Animal feed**

Poultry feed per dressed weight can be very low, down to a ratio of 1.5/1, (and it is even lower for fish than poultry.) A ratio of 2 for poultry will be assumed here. A chicken eats c. 0.5 kg per day so the 0.4 birds per person would need 70 kg/y. If it is assumed that free ranging provides 50% of the food needed and kitchen etc. scraps provide 25%, then feed to be provided for poultry meat production would be very low, in the region of 18 kg/pp/y. (Free ranging can provide up to 100%; a small US compost firm has chickens foraging on the heaps, producing eggs without any need for grain inputs.) Kitchen scraps etc. needed could be 28 kg per person p.a., or 0.5 kg per week, so there would be plenty left for fish and other animals.

These figures are very low compared with the present nutrient waste streams. About 50% of Australian household garbage collected is biodegradable, most of it from the kitchen. A large amount of food is wasted. In addition to crops not sent to market because of appearance or damage at supermarkets, huge amounts are thrown out from kitchens. The Transpacific Industries Group, (2015), estimates the amount at 414 kg/pp/y, which is only slightly less than the weight of food eaten! Wise (2014) says Australian households throw out \$616 worth of food pa. Even more impressive, the amount of nutrient rich material moving from toilets and grey water outlets to gardens would equal the weight of food entering the kitchen.

Fish in ponds, lakes and dams would feed themselves. Duckweeds, worms and grubs, can be grown specially for animal feed, along with Azolla to skim off as a nitrogen source for gardens. However some of the suburban nutrient flow, e.g., in grey and black waters, would go through biological filtering and harvesting pond systems to produce edible plants and fish feed.

The uncertain indication from these figures is that the area needed to produce about 18 kg/pp/y, in addition to the above “automatic” sources would be only around 18 m<sup>2</sup>/pp/y.

### **Nuts**

The recommended consumption is 42 g/pp/d, or 15.3 kg/pp/year. Almond kernel yield is around 1.3 t/ha and hazelnuts, macadamias and walnuts can be c. 2 t/ha, indicating 76 m<sup>2</sup>/pp might be needed. Some of the trees would be within gardens and commons but most nut production but might best be located on the farm areas used outside the suburb.

### **Cooking oils**

Average Australian cooking oil plus spread consumption is, 27 kg/pp/y. Sunflower oil yield is c. 10 t/ha/y, and olive oil 2.3 t/ha/y. The former figure indicates the need for 27 m<sup>2</sup> per person, but 50 m<sup>2</sup>/y will be assumed here.

## **Sugar/honey**

Australian per capita sugar consumption is high, c. 42 kg/pp/year. Ideally this would be reduced considerably as processed/packaged foods were replaced. There would be considerable capacity to reduce cane sugar importation from NE Australia by production of sugar beet and corn fructose on farmland as near as possible to suburbs.

Much sweetening could be via honey. Areas and possible imports needed for honey are difficult to estimate as claims vary considerably. Bees would range across the suburb so little or no separate area needs to be assumed for honey production. There might be 8 hives per ha in densely planted suburbs, and yield might be 30 kg honey per hive p.a. This would provide 260 kg/ha/year, or 21 tonnes p.a. for the East Hills suburb, i.e., around 7 kg/person p.a. (for the 3000 people within the suburb.) Thus significant sugar and/or honey importation might have to be assumed.

Sugar derived from sugar beet (in California) is 7.5 t/ha/y, indicating that 56 m<sup>2</sup> would be needed to provide 42 kg/pp. Assuming sugar consumption is halved and honey provides 7 kg/pp/y, sugar beet land would need to be 19 m<sup>2</sup>/pp/y.

## **Beverages**

This category is difficult to deal with. Australian has high consumption of beer, wine and spirits, soft drinks, tea, coffee and fruit juices. Most of this is undesirable, having high cost in health effects. Ideally there would be consumption of only small quantities of locally brewed alcoholic beverages (especially fruit wines and cider), larger quantities of unsweetened fruit and vegetable juices, and as far as possible tea and coffee substitutes. Area and dollar estimates will not be attempted here.

## **Sweets, confectionary, chocolate**

This is another area that is difficult to deal with. These are all undesirable items and there might be little interest in them in a rich local food culture.

## **Food conclusions**

Table1 summaries the above area figures (m<sup>2</sup> per person)

Vegetables	130
Grain	90
Dairy	75 for milk + soy milk products
Fruit	40
Meat	? ...very low, due to waste recycling to animals.
Animal feed	18
Nuts	76
Oils, spreads	50
Sugar/honey	19 (?)

**Total: 498 m<sup>2</sup>**

About half this (initially estimated) area would probably have to be located outside the town; again the area available for food production in the (low density) suburb of East Hills was estimated at 270 m<sup>2</sup>/pp.



## **Rough comparisons with the present conventional system**

- Australian cropland (i.e., not including pasture, grain lands, sugar fields, fish, poultry) is c. 24 million ha, or c. 10,000+ m<sup>2</sup> per person.
- US. Agricultural land area is around 5,000 m<sup>2</sup> per person.

Even assuming most Australian production is exported, and addition of area for imported items, the area per capita required to provide for one person via conventional agriculture would be many times the 498 m<sup>2</sup> derived above.

## **Reasons why the figure derived is probably much too high**

The yield figures used above have been mostly from national statistics on commercial agribusiness production, which is very inefficient in several ways. (See appendix 1.) Following are important facts and reasons making it clear that home and local food production could achieve far better yield and area figures.

Much higher yields are possible than in conventional agriculture. Urban agriculture in Havana Cuba is reported to produce 21 t/y of vegetables per ha. (Koont, 2009.) The figures from about 5 cases found on the Web are, average yield 27.7 tonnes per ha, and average value of \$125, 600/ha/y. (c. 2007 prices.) Dioron (2015) provides detailed itemised information adding to 17.6 tonnes per ha and \$167,000 ha/y. As this is for Maine with only a 6 months growing season much better yields should be possible in Australia. Aliades (2011) reports that his (not fully functioning) 64 m<sup>2</sup> home garden yielded 202 kg of food in its second year, equivalent to 12.8 tonnes /ha/y, on only 2 hours “work” per week. This does not include the produce given away, such as an estimated \$1000 worth of berry plants.

Compare these yield figures with the Australian wheat production average of around 3 t/ha. Watson (2015) reminds us that the “Victory Gardens” planted by ordinary people in England during World War 2 achieved on average 10 times the typical agricultural yield. The surprisingly high dollar values might be partly due to production of high value crops for the restaurant trade.

Diggers Seeds, (Blazey, 1999) claims that their trials using intensive home gardening, multi-cropping and heirloom seed varieties show that “...it only takes 60 m<sup>2</sup> of space to grow the 242 kg of fruit and vegetables we consume each year.” This includes 10 m<sup>2</sup> for vegetables, 8 m<sup>2</sup> for potatoes and 42 m<sup>2</sup> for fruit, for each person. The figure corresponds to c. 40 t/ha/y, and suggests that the weight of food one person consumes could be provided from c. 90 m<sup>2</sup>, which is 18% of the above 498 m<sup>2</sup> area conclusion (i.e., if the food was all in the form of fruit and vegetables.) Wise (2014, p 11) says that the average lawn area on a suburban block could produce 800 – 1,100 kg of food p.a., enough fruit and vegetables for a family.

Joe Dervaes (2014) operates a remarkable “urban agriculture” in Pasadena where he claims to produce 2,727 kg of food p.a. from his 0.04 ha house block. This corresponds to a barely credible 68 t/ha. His output would be even higher if the family was not also keeping chickens, ducks and goats on the block.

The mini-farms would be run by people who delight in their craft, as distinct from agribusiness managers and workers, therefore conscientiousness and innovation etc. would be high. There is little incentive in agribusiness to recycle diligently and look for overlaps. Small mixed farms enable synergies and multiple functions to be identified, e.g., bee hives in the garden improve yields while

providing honey. Orchards provide honey, shade, mulch, fire breaks, wind breaks and grazing area, as well as fruit.

The figures used above probably do not assume maximum use of multi-cropping. Fields can be left unplanted for periods, and orchard lands usually produce only one crop each year. Home gardening and mini-farm production enable seeds to be planted in patches just harvested and cleared, down to the level of individual plants such as cucumber vines. The new plants might already be well established in pots. Thus it is misleading to add area needed for each separate crop because the one area might produce many crops in a year.

Roof areas have not been taken into account. These can be used for shallow vegetable plantings in containers, and as space for vines to trellis over. Nor has use of walls for espalier fruit growing in restricted spaces been included.

No production has been included from greenhouses, which can greatly increase yields, provide summer crops in winter, and include space for fish tanks, and warm roosting space for chickens (which contribute CO<sub>2</sub> for plant growth.)

Some of the above Australian consumption figures would include the large quantities going into pet food. In the early 2000s Australian expenditure on pet food and care was \$1,500 million p.a. and 83% of veterinary income was for pet care.

Present consumption rates include very large amounts of food waste, such as damaged or imperfect fruit the farmer would discard or the supermarket would dump. All of this waste could be eliminated through home and local production because imperfect fruit can still be used or fed to animals and all household “wastes” would become animal food. As noted above the amount of food wasted in Australia is huge, estimated at around 164 kg/pp/y by one source and 414kg/pp/y by the Transpacific Industries Group (2015), and valued at \$5.3 billion. (Morgan, 2007; The ABC Aug., 2014 reported \$8 billion p.a.) The figure corresponds to around 30% of food weight required (!) so just eliminating this one factor would in effect reduce the required production area by 30%.

There would be many more overlapping functions than have been mentioned. Complex, integrated local systems make it possible for different domains to augment each other. For instance ducks eliminate the need to purchase snail poisons, and their pest removal effort reduces the amount of duck feed that needs to be provided. Azolla growing on ponds fixes nitrogen from the atmosphere and can be skimmed off for fertilizer (via composting.) Agribusiness locates the duck production a long way from the fish production so cannot take advantage of such effects; outputs from one domain become wastes, not inputs to another, and energy has to be used to deal with both problems. Fruit and nut trees can be planted in parks, provide shade and wind rows, and woodlots and forest gardens provide many other services.

Settlements and surrounding woodlands would be planted to provide many foods in the form of “weeds” and bush tucker, growing beside roads and in parks while contributing to the suburban landscape.

Changing consumption habits could shift demand to the more easily grown plants and prolific “weeds” and away from exotic and resource-expensive items. Simple basic vegetable, fruit and poultry sources can provide all meals. Our village agriculture committee would research interesting but ecologically friendly and very low cost recipes using local inputs.

The figures do not include use of aquaponics, which would dramatically reduce area needed, due to very high yield rates for fish and vegetables. Many small greenhouses and open ponds in backyards and on neighbourhood commons could be producing fish and recycling nutrient rich water to trays containing vegetables all year round. In one set up an 18 square metre fishpond produces 150 kg of fish p.a., plus 1,300 kg of tomatoes from trays the water is circulated through. This is 1/555 of one ha for the fish, corresponding to 82 tonnes of fish per ha per year. (www.synaptoman.Wordpress.) A thorough analysis would take in fish food inputs, and the area taken for the tomato growing.

Application of these principles could considerably reduce the total land area needed from the above interim figure of 498 m<sup>2</sup> per person. Consider this crude cross check. If we assume the c. 20 t/ha food yield achieved in Havana gardens and a per capita food consumption of 500 kg/y, the per capita area needed would be 250 m<sup>2</sup> (and much less if we add multi-cropping, feeding small animals on wastes, and aquaponics.) Again the area available in East Hills was estimated to be 270 m<sup>2</sup>/pp.

It is commonly assumed that home gardening and small-scale farming is far less efficient in terms of labour time compared with agribusiness. (It is undoubtedly far superior to conventional agriculture on all other dimensions; see Appendix 1.) Unfortunately there are few figures on time spent gardening per kg or dollar of produce but the common assumption might not be valid. The National Gardeners Association survey (2009) reports that the average US home gardening time input is 5 person-hours a week, but information on output is not given. The time figure given by Aliades above indicates that he produced 128 kg of food per hour of "work", which might loosely correspond to a weekly income of 128 kg x \$3 x 40 = \$15.360 (!) Hopefully reliable data will enable a more confident conclusion before long.

### **Estimated dollar costs**

If we assume extensive home gardening plus chickens, free food from commons, bartering or gifting of surpluses, then only a small amount of food should need to be bought. This would probably include dairy, soy and grain products, cooking oil, and some fruit and nuts. Much of this should be low cost as it could be produced by town businesses and co-ops using bulk supply from local farms and orchards, and would not involve the many normal middleman costs and overheads added by global supermarketing. My very rough guess at this stage would be \$2-3/pp/day for the purchased items. The 2013 average Australian household (i.e., excluding dining out) weekly food expenditure was \$100/person, or \$14.5/day (Langley, 2013.) Note that in terms of sustainability it is not so important to achieve very low household dollar outlays on food, so long as the purchasing is from local sources with their low resource costs.

### **Estimated energy costs**

For home gardens and commons there would be almost no running/operational energy cost, apart from 12 volt irrigation pump electricity, which would come from local PV etc. Estimation is uncertain but if 20 minutes watering a day by a 72 W pump is assumed, the annual household total would be 8.7 kWh, or 3.6 kWh/pp/y = 13 MJ/pp/y.

Embodied energy costs would include production of garden tools, wire netting, baskets, preserving containers and equipment, sheds built from earth, saplings and tin, cement tanks, earthen dam and pond construction, poly pipe irrigation plus taps, 12 volt pumps ... most of these assumed to last 20-50 years on average. An initial crude estimate of the lifecycle embodied energy cost of a probable set of equipment for home gardening (not including farms outside the village) is 13.3 MJ/person/y.

(See, Local economy energy and materials inventory.) Thus the total embodied plus running cost for home gardening might be 26.3 MJ/pp/y.

Farm energy costs would include shared small tractors, electric irrigation pumps, fencing, tank and small dam construction, sheds, simple processing machinery, almost no transport cost (horse and cart) or fertilizer or pesticide cost, (carts and slurry pipes take nutrient wastes back to the farms). There would be energy running costs for irrigation, tractor and processing machinery. There would probably be considerable use of poly-pipe. Tasks requiring electricity would be carried out when the sun is shining or the wind was blowing. Vehicle fuel might all come from methane digesters and biomass ethanol but quantities have not been explored at this stage.

All home gardening and possibly most small farm production would be carried out using hand tools. In the radically restructured economy we could move to most people would have most of the week to do the “work” pottering in gardens etc. (See below.)

The total for home, commons and farm production will be assumed to be 50 MJ/pp/y.

The comparison with conventional agribusiness is stark. In 2007 US food production takes 16 times as much energy as the food contains, and the amount has been claimed by Garza (2013) to be as great as all energy going into gasoline for cars. In 2007 the US food supply system was taking around 16% of national, energy, i.e., around 15 EJ/y, or 47 GJ/pp/y. (Canning, et al., 2010.) The energy needed to produce a kg of wheat in New Zealand has been estimated at 2 kWh (! Derived from Safa, undated.) These uncertain figures indicate that the energy required to produce one kg of food in the US agribusiness system would be 880 times as great as the above figure for local production.

The above figures and derivations are not at all confident, but they show that enormous savings in energy costs can be made by localizing food production and taking most of it out of the market sphere.

## **BUILDINGS**

### **Houses, sheds, small business premises, community centres and facilities:**

Over time retrofitting of houses with insulation and solar passive design (e.g., automatic solar heat storage and cooling) should greatly reduce space heating and cooling energy demand.

All new buildings would be made of earth, local stone, wood, straw bale, at negligible dollar and resource cost, and built to last hundreds of years. Floors can be made from rammed earth surfaced, e.g., with turpentine and beeswax. Some roofing would be earth (sod) over timber supports, or domes and vaults from mud bricks surfaced by a thin layer of cement. Most roofing would eventually be ceramic tiles made from local clay and wood-fueled kilns. Research would go into the production of durable sealers and paints from local plant and animal sources. For instance earth walls can be sealed with a whitewash made from lime and milk. Earthen colours, (white, grey, brown, yellow, ochre, oxide, dull red) would be commonly used, although in general there would be much less painted surface and more natural wood, earth and stone.

People would have much more time for home-making, and therefore for cooking on (well designed high tech) wood stoves, with hot water jackets and tanks. A more vegetable based diet would

reduce the amount of cooking needed. Rugs mostly made from wool would replace most carpets, eliminating the need for vacuum cleaning. (Rugs can be taken out and shaken and floors swept and mopped.) Matting, seating and screens, as well as baskets and hats, can be woven from local reeds, rushes and willows.

Small, earth built houses can be extremely dollar, materials and energy low cost, as well as very attractive.

### **My Dream House**

Following is an indication of the kind of house I would be delighted to live in, although most people would probably see it as quite unacceptably small and frugal. A couple or small family might need a house about two times as big in floor area. Keep in mind the question, what kind of housing could a world of 10 billion afford?

I do not live IN my house all the time; I live in my patch, in and out of the house, garden, workshop, animal pens, forest, wetland, all day long. Thus I don't have much need for space inside the house. I have a workshop, storage areas and craft areas in surrounding sheds.

It would be a quite small house. This minimises space heating and lighting, and housework ... and big houses are morally ugly, and wasteful, taking up resources others need. The floor area would be only 8x3 m<sup>2</sup> for the single main room, plus a 3 m<sup>2</sup> toilet+ shower room, with a 5x4 m<sup>2</sup> sleeping loft in the attic above the main room ceiling. (Thus the house area will be accounted as 30 m<sup>2</sup>.) Made from mud brick or rammed earth, including floor (surface hardened.) Low ceilings, 2.10 - 2.20 m.) Wood burning stove for cooking and heating, with a hot water jacket. Corrugated iron roof, to be replaced by hand-made clay tiles someday. No fridge, but cold water and evaporative cooling. No carpets; rugs. Most space for workshop, crafts, storage and clothes washing would be in simple sheds close by. A ladder or tiny stair way would lead to the sleeping area in the triangular attic, which would also provide some storage space. There would be a tiny veranda to catch morning sun in winter. Water tanks. (I make tanks from cement plastered over chicken wire against a form, for about 1.5 c/litre (excluding labour cost) whereas plastic tanks cost about 20 c/litre. Not included in this accounting are a PV panel plus battery...\$500?

Walls: 27 cm thick, 13 cubic metres of earth = 240 barrow loads, i.e., 10 a day over 24 days. Forms borrowed. The pit the earth is dug from becomes a fish pond.

Dollar cost estimated 2014 ...very approximately \$5,500 (not including "labour" and some other items, such as toilet, sink, stove. These items will be considered in the Local Economy Inventory document.) The 2015 cost to build a smaller than average "normal" house (maybe three times as big) might be \$150,000, but in the region of \$400,000 when bank interest and tax on income are added. The all up cost to build a house in Sydney would therefore be about 73 times the cost of my ideal house. (This assumes that my ideal house involves no loan or interest, and an income below the tax threshold.) The average house being built in Australia was recently assessed as the biggest in the world, with an area of 220 square metres, 7+ times the size of the above house.

Use of recycled materials would lower the cost of this house considerably. Labour cost? In effect, around zero dollars. The house would be home-made using hand tools as an enjoyable creative activity, partly assisted by local friends and experienced builders. These debts could be paid

without money, by contributing labour to their ventures. Some dollar costs, e.g., for materials, could be paid by labour given to builders who buy materials in bulk. Build at a leisurely pace; move in when the roof is on and fit out slowly.

The average cost of a house plus land in Sydney is expected to exceed \$1 million by 2016. Ideally governments would buy up bankrupt farms at a very low purchase price and enable establishment of new rural villages made up mostly of ultra-cheap dwellings.

This breakdown is for a fairly “Tiny House”, (an increasingly popular theme) which would suit many singles and young couples. However the house type we should focus on would be the quite small house suitable for a small family, which might be three to four times the size of the above tiny example.

Premises for most local firms, shops and community facilities such as libraries and community centres, could be much the same; mostly tiny, simple, built from mud or straw bale or rammed earth etc. plus locally grown and milled timber. Buildings would be one to three stories in height, eliminating the need for lifts. In general finishes would be rough/rustic, not slick, e.g., barked saplings, mud walls, unpainted wood, with few metal or plastic surfaces.

This does not have to imply drab or impoverished appearances. These simple structures can be beautiful, decorated in a wild variety of styles. The resulting landscapes can be unique and interesting leisure resources, enabling enjoyable ramblings. Compare the boring sameness throughout a typical McMansions estate. Our community buildings could be inspiring, our home-made cathedrals, tributes to the power of our imagination and cooperative power, built by our own hands from our forests, clay pits and eager labour. Such projects are much too precious to be given to a contractor.

Remember that we are talking about a stable economic situation, in which construction only takes the form of maintenance and replacement, not increasing the housing, office or factory stock. In other words most of the present construction industry would not exist and most of the building that was needed could be carried out slowly by hand tools, because this is more enjoyable. For many people, slowly designing and building their own home, helped by friends and with the advice of local experts, would be one of life’s most satisfying adventures. No one would want a house and not be able to have one. At present maybe 100,000 Australians are waiting to get a house, and large numbers will never own one because the only kind the market provides are absurdly big, expensive and ecologically unsatisfactory (no eaves, not solar passive, badly insulated, using aluminium and plastic and brick...and in my view often shoddily built.)

### **Items not included in the above accounting**

Gutters, plumbing (steel plus poly pipes, taps), sink, toilet bowl and cistern, cabinet wood, furniture, electric lights wires and switches, insulation for roof only (earth walls), bolts etc., 12 volt pump, drum for high tank for shower etc. pressure, paint.

The above costs have been for construction. Running costs are dealt with below under energy in general.

## Estimated dollar cost

Earth houses can last hundreds of years. If we assume 100 years the per capita dollar cost for a house twice the size assumed above would be  $\$11,000 / (100 \text{ year lifetime} \times 52 \text{ weeks for 4 people}) = \$55 \text{ c/week}$ , or  $\$28.60$  a year. Many home buyers are paying more than one-third of their income for housing repayments, or rent. The Aust. Bureau of Stats. Reports the average weekly household expenditure for housing is  $\$223$ , i.e.,  $\$11,600/\text{y}$ . (ABS 6350.) This probably includes council rates but if they are assumed to be c.  $\$1000/\text{y}$ , per capita housing costs excluding rates would be  $(\$11,600/2.4 = \$4,831/\text{y}$  or  $\$93/\text{w}$ , in the order of 170 times the above figure for the alternative house.

However the ABS weekly figure is a national average that includes the many houses paid for long ago. The cost of building an average "normal" house in 2014, perhaps four times the size of the above small alternative, might be  $\$150,000$ . But when bank interest and tax on earnings are added the outlay would be in the region of  $\$400,000$ . This is perhaps 35 times as much as a house twice as big as my ideal. (This is making the implausible assumption that a normal house would last 100 years. There are many earth built houses still in use in Britain and Europe after hundreds of years.)

Compare the 2015 cost of renting a one bedroom apartment in (non-central) Sydney,  $\$20,000$  according to Numbeo (2015.) This is 700 times the annual cost of the above house (assuming the apartment lasts 100 years.) The purchase cost for this apartment averages  $\$7,950$  per square metre, perhaps  $(\$7,950 / (\$5,500/30) = 442$  times the above cost.

## Estimated energy cost

### Foundations:

Little cement; broken pavement slabs set in trenches = 0.75 GJ (?)

### Wood:

(Attic flooring,  $20 \text{ m}^2 \times 2.5 \text{ cm thick} = 0.5 \text{ m}^3$ ) + (roof frames  $80 \text{ m} \times 50 \text{ mm} \times 65 \text{ mm hardwood} = 0.3 \text{ m}^3$ ) =  $0.8 \text{ M}^3$ .

Assume  $1 \text{ m}^3 \text{ hardwood} = 0.7 \text{ tonne}$ , and embodied energy cost of wood =  $18 \text{ GJ/tonne}$ . (Softwood would be much less.) So  $0.8 \text{ m}^3 = 10 \text{ GJ}$ .

### Walls: Rammed earth

<u>Floor:</u> Rammed and surfaced earth.	0.25 GJ(?)
<u>Roof tin:</u> $40 \text{ m}^2$ (including wall thickness plus eaves) = $160 \text{ kg} \times 38 \text{ MJ/kg}$	6.0 GJ
<u>Glass:</u> $18 \text{ m}^2 \times 200 \text{ MJ/m}^2$	3.6 GJ
Tank; 8000 litre or $6 \text{ m}^3$ concrete + reinforcing rods and chicken wire	2.1 GJ
<u>Total:</u>	19.6 GJ

Items not included, above; assume these bring the energy cost to

25 GJ

This energy total would be an average of 104 MJ/pp/y, assuming 2.4 people per house and a 100 year house life. The embodied energy cost of the materials in a normal/conventional house today (not including energy to construct) has been estimated at 1000 GJ, which is about 3.7 GJ per person per year assuming a 100 year life. This is 36 times the figure for the above alternative house. If a house three times as big as the above alternative, i.e., 150 m<sup>2</sup> floor area, is assumed, the ratio is 12/1.

Community buildings: This is difficult to estimate but a rough assumption might be that the East Hills suburb of 941 households would require buildings equivalent to 25 houses for things like the community workshops, library, craft rooms, sheds, school, premises for firms, co-ops and aged care. Many of these need not be as elaborate as dwellings. Embodied energy might therefore be c.  $(25 \times 104 \text{ MJ})/3000\text{pp} = \text{only } 0.87 \text{ MJ/pp/y}$ . Estimates for some running costs are included below, e.g., for lighting and cooking.

## **TOOLS, APPLIANCES, HARDWARE**

I would want to work mostly with hand tools, including for house building, furniture and clothes making and food production but some use of power tools makes sense. (My workshop runs on 12 volt solar electricity.) Local firms and farms would need some small engines, motors and machinery such as saw benches. Regional factories would make simple robust, repairable, durable, mostly small... stoves, fridges, radios, heaters, pumps, tanks, furniture (although much of this would be home made) cutlery, crockery, pots, pans, brooms (I would vote for no vacuum cleaner production; use of rugs and small carpet pieces that can be shaken outside...little or no wall to wall carpet), garden tools, and bulk materials such as cloth, timber and roof tiles.

The national steel works would supply mostly small strip, rod, tube and angle, galvanized iron, fencing wires and chicken wire netting, plus inputs to hardware stores and tool factories (nails, bolts...). In other words there would be very little production of heavy steel beams, pipes, plate, or castings, because there would be little heavy industry or construction.

Larger tools, such as lathes and drill presses would be available for anyone to use in regional factories, community workshops and small firms.

Thus the scale of manufacture and building would be enormously reduced, and therefore the need for heavy machinery would be much reduced. We would need to produce very few if any skyscrapers, big bridges, tunnels, silos, freeways, aircraft and airports, trucks, cars, ships, cranes, forklifts and bulldozers. Remember there would be very little need to transport things into highly self-sufficient towns and regions, and very little need to travel far to work or leisure; see below. We would have some buses, a good national and regional rail system, and many bikes (and use of horses for short distance cartage), but very few cars, and fewer aircraft and ships. Because economies would be stable, construction would only be for maintenance and replacement buildings, windmills, roads etc.

### **Estimated dollar costs**

Assuming stable settlements there would be low annual replacement and repair demand for appliances and hardware. Most good hand tools can last a lifetime. A very uncertain guess at an



annual per capita steel, glass, cement, consumption averaged over a stable settlement might be 10 kg, with a dollar cost of \$100. This would not include infrequent major remakes after storm or fire damage.

### **Estimated energy costs**

Appliances such as sinks, toilet bowls and cisterns, showers, (no bath tubs), stoves, and washing tubs would be made to last 50 - 100 years, and to be repaired. There would be few washing machines or fridges. Household washing can mostly be done by hand or bicycle powered devices (more good exercise), given that most of the time we would be wearing the same old "work" clothes around the house and town, as distinct from needing pressed suits for daily fashion parades to city offices. Many households would use evaporative food coolers but would have access to a community fridge close by. Art and craft hardware/materials would involve very low energy costs. Again conclusions can only be very uncertain, but an attempt to estimate the embodied energy cost of appliances, tools and equipment will be detailed in TSW: The Local Economy Equipment Inventory.

## **MATERIALS**

Most buildings would be made from earth, straw bales, stone, bamboo and wood. There would be little use of energy-intensive metals and plastics. The reduced quantities of glass, steel, cement (little use of aluminium) might be produced regionally by solar and wind generated electricity in those periods when there is surplus supply. There would be intensive research into local plant sources for chemicals, adhesives, medicines, paints, lubricants, fibres and fabrics. Most of the dangerous and pollution generating synthetic chemicals in use today would not be necessary. Design would focus on minimising problematic materials. For instance most furniture can be made without metal fasteners, by use of dowelled and pegged wooden joints.

Timber would be a major material, replacing most metals and plastics. It could all be produced by neighbourhood mini-saw mills within and close by settlements, (e.g., old car engines running on methane or ethanol.) Timber needs would be low in a stable economy, called on only to maintain stocks of housing and furniture. Some combined heating and cooking would be by high-tech wood fires, in well-insulated solar-passive houses.

Some materials would be produced in bulk in big regional or national factories, such as fabrics, metals, irrigation pipe and chemicals, and distributed to many small factories, hardware stores and workshops. Demand for paper would be greatly reduced and might be met from local forests and recycling. Little high quality paper would be needed given the general concern to have standards that are as low as possible but sufficient. Eventually roofing iron would have been slowly replaced by ceramic tiles made from local clay and wood-fired kilns.

Cement would be a problem, given that it is such a valuable material enabling permanent structures, especially water tanks, yet it is energy-intensive. However the quantities needed would be small in view of the stable infrastructure stock that only needed maintaining, not expanding. When a stable settlement's infrastructure of water tanks and methane digesters had been established there would be little further need to use cement. Little or no cement would be used in the construction of high-rise buildings, big dams, bridges, airports, sewers, shipping terminals, roads or freeways. Water can be stored in many small earthen dams along watercourses, with grassed spillways. These dams would also enable pumped storage for electricity generation.

Leather might also set difficulties, in view of the quantity of this valuable material that might be required in relation to the much-reduced use of large animals for meat consumption.

Where meat from medium sized animals such as pigs is eaten hides would be tanned for local use.

Fibres for clothing and bedding are considered below under clothing.

### **Estimated dollar & energy costs**

These would be very low per capita and would add little to the above estimates for appliances, tools and hardware. An interim assumption might be 10 kg/person/y, or 200 MJ/person/y.

## **CLOTHING**

Almost all the clothes we wear could be simple, tough, cheap and durable, old and much repaired. Few if any of us would need to work in a suit or tie, let alone new clothes. One of my hobbies is darning and repairing the old clothes I wear. (My best jumper lasted 35 years, until a bushfire got it.) We might have a few "nice" things for special occasions, but these need not be expensive. I have one pair of "good" shoes, never wear a tie, haven't worn a suit for about four decades, and can wear the same old pair of mud and paint stained trousers for weeks. Those who were more interested than I am in "nice" clothes could of course make or buy them as they wish but hopefully we would have the sense to scrap any notion of fashion. Some people could specialise in dress making and tailoring as a small business.

Old and worn out clothing items would be recycled, sold via second hand shops or given away. Clothes making and repairing would be much-enjoyed hobbies. A few small local firms might mass-produce some basic clothing items using wool and cotton fibres from more distant farms, and some basic footwear. Factories would supply local hardware shops and clothing makers with rolls of cloth, mostly of the basic kinds needed to make tough every-day work clothes. Our overall energy budgets would hopefully also allow production of less essential materials for use by those interested in dressmaking etc., along with the many materials hobbyists would wish to use. Some footwear can be made at home via hobby production, especially slippers, sandals and winter Ugh boots. There would be a great deal of that miraculous art form, knitting, using wool spun from the local sheep.

It is possible that much of the bulk material needed could be produced locally. Firstly it is important to keep in mind that most clothes would be few in number, tough and much repaired. If my 35-year-old jumper is any guide, per capita wool need would be a small fraction of 1 kg/person/y, which might take 150 m<sup>2</sup> of land (...assuming 25 sheep/ha and 3.2 kg clean wool/sheep/year, on typically poor soil.). Sheep would graze on commons, orchards and in forest gardens. Cotton would require far less area. Given 2-t/ha/y production and assuming 2 kg use per person per year (?), only 10 m<sup>2</sup> per person would be needed. Other fibres including flax, hemp and sisal would add a little to this area, and some of this would be imported from more distant farms.

Research is needed into the yields of many possible products from integrated, multi-functional uses of land. For instance what yields might be derived from a food forest producing fruit, vegetables, timber, fuel wood, honey, animal grazing, poultry, sheep/wool, nuts, water retention, medicines, windbreaks, coolness, mulch, and leisure? What savings could be made in the production of water, fertilizer, labour, and pesticides? How would the total yield/ha compare with production of these outputs from separate, distant areas under conventional agriculture?

## **FURNITURE**

Furniture would be simple, cheap, robust and durable, made from local materials, mostly wood. It would be repairable, and most would be homemade by ordinary people. Some would come from local craft businesses in which people could enjoy making good solid furniture. These pieces might be relatively expensive, but they would last for generations, and cost would not matter since we could in general cover our monetary needs with two days work a week.

Various other items, notably toys, baskets, garden and storage sheds, wheelbarrows, animal houses, carts, and boats would also be mostly made from wood, either via backyard or small firm production. There would be little use of plastics and aluminium although in the longer term use of cellulose based plastics might be common. Matting, seating and screens, baskets and hats, can be woven from local reeds, rushes and willows. There would be much use of hand tools because craft production is enjoyable, but light machinery would also be used.

## **MANUFACTURED GOODS**

Most manufactured items would be produced in households, neighbourhood workshops and small local firms, and they would be produced in craft ways, not via industrial factories. Crockery provides a good example. It should all be produced by hand within suburbs or towns, from local clay, fired by wood grown there, and made by people who love making pottery. How many new plates does a household need each year to replace those broken? Again when a stable population and economy are assumed relatively small volumes of replacement production would suffice.

Because people will not need to go out to work for money more than two days a week there would be much time for interesting home and neighbourhood craft productive activity. Being able to see local use of goods one has produced adds to the sense of making a worthwhile and appreciated contribution.

Small regional factories (e.g., within 5 – 10 km) would produce bicycles, cutlery, pots and pans, roof tiles, containers (although baskets would be made at the neighbourhood level from rushes, willows and vines), nails, bolts, buckles, hacksaw blades, plate glass, preserving jars, ladders, barrows, needles, tools, brushes, paint (from vegetable and fish oils, milk, lime, earthen colours), beverages (juices, fruit wines, beers and ciders), string and rope from yuccas and sisal, etc. and basic appliances such as stoves, radios and fridges. There would be intensive recycling, and items would be made to last and to be repaired. Only small quantities of items such as electronic devices would need to be imported from the national economy.

Attention would go into developing excellent designs for all things, especially models that would last a long time, be easily repaired and save resources. Research would go into studying the effectiveness of designs in use and improvements would be cumulative. At present much design is shoddy, deliberately flimsy and unrepairable. There is too much innovation, for instance of gimmicky trashy novelty products. Things are often designed to look attractive but not be functional. New products often fail to benefit from experience with older models.

Estimates of the energy cost of some manufactured items such as stoves and furniture will be included in TSW: Local Economy Equipment Inventory.

## **DISTANT IMPORTS?**

The above discussion of materials, building, tools, manufacturing, furniture and clothing indicates that some but few items and materials would need to be produced at large and more centralized locations and moved into the regions close to towns. These would include metals, (mostly steel but a little aluminium, copper and zinc for galvanizing, bulk cloth, maybe grains, and some chemical inputs. The very few items imported long distances or internationally might include high-tech equipment for health, research, electronics, communications, IT, some manufactured products, but very little of these would be needed in everyday life around a suburb or town.

The few sophisticated, specialized and possibly big/centralized factories, e.g., to produce lathes and drill presses, cloth, cement and steel, would be distributed throughout the nation to enable all towns to contribute to national needs and earn the income they would need to import basic necessities from other regions. International trade would be kept as low as possible and confined to items that could only be produced within the nation at great difficulty or cost. Even in a non-predatory global economy trade is problematic because it involves high-energy costs and loss of national independence, self-sufficiency and resilience.

Some/many manufactured items might cost much more than at present, given that they would be produced mostly in craft ways, and that at present imports from the Third World are dollar cheap. This would not be important as not much money would be needed to live well in The Simpler Way, and dollar costs would not be overriding considerations.

Many productive enterprises would be community owned cooperatives. A town or suburb that found it needed more eggs or preserves or overalls might simply set up a non-profit operation to meet this need. As is explained below things like this will be routine within the new Economy B being built below the normal market economy, geared to meeting needs with no concern whatsoever as to whether or not the activity could compete successfully within the market economy. The town is simply organizing its available productive capacity to produce things it needs.

## **WATER**

Because the new agriculture would rely heavily on permanent crops, especially trees, and relatively little meat would be consumed, and all domestic water would be recycled to gardens, the water demand associated with annual crops would be greatly reduced. Water would be scrupulously harvested locally, from rooftops, catchments and creeks, there would be intensive mulching, and all household water use would be recycled to food production. There would therefore be little need for big dams, mains, large pumping stations, and the bureaucracies to run them. Windmills and small electric pumps would do most of the pumping of fresh and wastewater.

Because all “sewage” would be dealt with at the neighbourhood level, recycling all water and nutrients back to local soils, there would be no need for large systems of mains and pumping stations to deal with sewage. Composting toilets would cut water use and garbage gas units would produce methane for use while both returned nutrients to gardens. Settlements would be landscaped to retain rainfall via earthen bunds, swales and ponds, eliminating the need for concrete sewer and storm water drains and pipes. Storm runoff would be channeled above ground to ponds and soak-in areas, where trees were planted. Few if any underground pipes, mains or concrete works would be needed. Above ground systems are easily monitored and repaired, unlike

underground systems. “Keyline” swales running just below contour lines would carry water away from gullies to storage and soak-in areas. The change to more vegetable and less meat consumption would help as it can take 2,000 times as much water to produce a kilo of meat as it does to produce a kilo of vegetables. (Diggers Seeds, undated, p. 32.) Where possible redesign of settlements would catch water on the higher ground, feed it by gravity to houses, then take nutrient-rich waste water further down to orchards, pasture, ponds and farms, reducing the need for pumping energy. Runoff that could not be stored would operate water wheels along gullies, performing functions that can be carried out occasionally, such as mixing clay, shredding paper for paper making, and sawing firewood.

The East Hills average annual rainfall is 780 mm, meaning roofs catch  $0.78 \times 941 \times 160 \text{ m}^2/\text{y} = 117,000 \text{ m}^3/\text{y}$ , or  $39 \text{ m}^3 \text{ person}/\text{y}$  or  $107 \text{ litres}/\text{person}/\text{day}$ . This is far more than is needed for frugal within-house, plus garden use. Diggers Seeds estimates that their house roof collects three+ times as much water as the  $34 \text{ m}^3$  per person p.a. the vegetable and fruit garden needs. They estimate toilet, bathroom and washing “waste” water from the typical Australian household is  $54 \text{ m}^3$  per person p.a. My per capita within-house use is c. 35-40 l/d, or  $13+ \text{ m}^3/\text{y}$ , and much of this (toilet flush) is garden water pumped from a swamp, not drinking water.

So theoretically little water would need to be transported into the suburb. (Even during the 2007 drought only 1 – 4% of Sydney’s rainfall was collected and used.) The main problem would be storage rather than quantity available. Storage would theoretically only need to be sufficient to hold the amount used by the time the next fall occurred to refill storages. If top-up occurred four times a year, storage would need to be  $117,000/4 = 29,200 \text{ m}^3$ , or  $31 \text{ m}^3$  per house. If half of this was stored in community ponds, household cement tanks would need to hold only c.  $15 \text{ m}^3$ , i.e., one tank 3 m high and 3 m in diameter. However from my household experience considerably larger storage would be desirable for security through the quite variable climate patterns in this locality. Annual climate variability can change Australian biomass growth by a factor of 3. Evaporation would need to be taken into account, as it would make a significant difference to retrievable pond storage.

An estimate of operational energy costs for pumping based on my homestead might be (2 hours  $\times 75\text{W}$ )/d for house plus garden water for three, so .05 kWh/pp/d, or under 0.2 MJ/d.

There would be significant costs involved in restructuring local water systems, such as for cement, reinforcing rods, pipes and small pumps, especially for the construction of household and community tanks and ponds. However most of this could be done gradually by working bees, without machinery if necessary.

## **TRANSPORT AND TRAVEL**

In the new economy of The Simpler Way there would be little need for transport to get people to work, because much less work in offices and factories would be done, and most work places would be localised and accessible by bicycle or on foot. The few large factories would be close to towns and railway stations.

A few cars, trucks and bulldozers would be needed. The vehicles in most use would be bicycles, with some but relatively little use of buses and trains. Horses could be used for some transport, especially carting goods the mostly short distances required, for instance from local farms. They consume no oil, refuel themselves, reproduce themselves and do not need spare parts or expensive

roads, but they do need the occasional vet. Most roads and freeways would be dug up and the space used for gardens. The concrete chunks can be recycled as building stone and bitumen lumps can stack as animal pen fences. Railway and bus production would be one of the few activities to take place in large centralised heavier industrial centres.

Very few ships, large trucks or aircraft would be produced because there would be little need for the transport of goods or people over long distances. There would be little international travel, partly because the fuel for that will in future be extremely scarce, and secondly because there would be relatively little need for it. We might ration international travel primarily for educational and cultural exchange purposes, so that you might get one overseas trip in a lifetime. However we could bring back wind ships, so you might study for your degree while on a leisurely trip around the world.

Would the lack of leisure travel be an intolerable deprivation? At present many would think so, given the taken for granted amount of that supremely luxurious self-indulgence that five billion people can't engage in -- tourism. (Eight million trips out of Australia every year.) But if and when petroleum becomes very scarce people will be jolted into understanding the unsustainability of the present levels of travel, transport, trade and tourism.

The main reason why we would not travel much for holidays is because there would be many interesting things to do around the town or neighbourhood, or not far away. Our living places will be enriched as places for spending entertainment, leisure and holiday time. (See Leisure below.)

Many would be content to go to the town centre by bicycle, visit city centres very occasionally by public transport, and not travel for leisure or holiday purposes, probably resulting in a negligible dollar expenditure. The average Australian weekly per capita transport outlay at present is \$71.

### **Estimated energy costs**

As most of the small amount of travel would be by walking, cycling and use of horse/donkey and cart, one 20 km round trip per week by rail or bus to a larger town will be assumed. Train or bus efficiency is about twice the 11 km/l of a car, about a litre or 44 MJ/pp/w would be needed, or 6 MJ/pp/d.

The transport of goods into town, assuming 10 kg per household per week moving 20 km, would have a negligible energy cost, perhaps c. 2 MJ/pp/week or 0.3 MJ/pp/d. (?)

The total 2.4 GJ/pp/y does not include many significant items in the wider economy such as producing and running hospitals and universities, national imports or government operations. However these would add little, compared with the present Australian average per capita transport energy consumption of c. 60 GJ/pp/y.

These figures are uncertain but they do suggest that per capita transport energy use could be cut to the region of under 5% of their present values. Transport energy demand is the category which renewable energy sources will have their greatest difficulty meeting.

### **“WORK”**

Because in a Simpler Way society people would be content to consume only what is sufficient, and because many goods and services could be acquired without money from commons and via

swapping and gifting arrangements people would need to go to work for money only one or two days a week. They would enjoy working with friends, in control of their contribution to meeting local needs, or running their own little shop or farm, knowing they were helping to maintain a happy community. (This assumes considerable collective control over the economy to make sure there is no growth, no significant inequality, no unemployment, no poverty, that all have a worthwhile and respected livelihood, and above all that top priority is given to meeting individual and social needs. (For the detail see TSW: [The New Economy](#).) These conditions are not possible in competitive, winner-take-all consumer-capitalist society.

On the other five days a week people would be producing important things, for themselves in their gardens and hobbies (e.g., knitting, pottery), in craft groups, and for the community via the working bees, committees, volunteering at schools and hospitals, organizing concerts, leisure activities and festivals. Thus much of their work time would also be enjoyable leisure time, and the work/leisure distinction would largely disappear.

## **PETS**

At present large volumes of resources and energy are devoured by pets. They consume a lot of food that humans can eat and take up many of the resources going into veterinary science and services. In our new neighbourhoods there will be many useful animals that can be pets, but there will be fewer cats and dogs.

However cats and dogs do add greatly to leisure etc. resources and some could be among the luxuries our wealth enables. They would not be fed on imported, tinned etc. food. One way to cut the pets per capita ratio is to have community pets, e.g., a dog cared for and enjoyed by a group of households.

## **CHILDREN**

...are expensive! There are two ways to cut down on this huge outlay of dollars and resources. The first is to have less of them. A stable world population requires an average of about 2 per family, but in the long run we need to reduce world population significantly.

The second strategy is as for pets above: share them! Seriously. In competitive, individualistic winner take all consumer-capitalist society many people live in isolated circumstances and do not have much access to others or to social activity and support. There is little community so a family is the main source of support, but the only way to enjoy the benefits of family experience is take on the huge task of setting up your own. Many people do not want to take on the full load but would like to be a part-time granny or aunt or parent. In a stable supportive and cooperative community we would work out various ways in which people could be informally involved in the lives of the children of other people, sharing the work and the ups and downs. This would be much better for children, and for parents who would have others to help out. In addition there are the community bonding benefits; remember that it takes a village to raise a child.

## **HEALTH AND MEDICINE**

The far more healthy circumstances in Simpler Way settlements would dramatically reduce the incidence of mental and physical illness, and so the resources that would have to be put into health.

There would be far less need for personnel, time, training, equipment and buildings, saving a lot of energy and environmental impacts and freeing productive capacity for other purposes.

To begin with, most people would be much healthier than they are now due to the more labour-intensive lifestyles and the high quality food. Even more important would be the psychological factors, the elimination of insecurity, unemployment, poverty, loneliness and stress, long work and travel times and the worry about housing loan interest rates. (For a detailed account of the Simpler Way alternative society see TSW: [The Simpler Way Alternative Society](#).) Everyone would experience a supportive and cooperative community, a stress free and relaxed pace, interesting projects, having a sense of purpose and being valued for making a worthwhile contribution. Caring communities would sense when someone was having difficulties and would seek to assist and head off crises. This is what happens in Ladakh, and some Eco-villages have “village elders” with whom one can discuss problems. How high would be the incidence of drug and alcohol abuse, crime, depression, domestic violence, car accidents, eating disorders and random violence? There would be little or none of the mindless drunken pub violence by young people who lack worthwhile interests and purposes. There would be few of these problems on indigenous settlements if people there had purposes, productive activities and hobbies, and self-respect deriving from participating in the running of a thriving, supportive and admirable community.

Health and medical services would be mostly localised, but there would be a few centralised and specialised teaching hospitals. Drugs and medical equipment might be among the items still mostly produced far away and transported into regions. Much of the increased R and D effort (below) would go into medical research. Satisfactory health provision by professionals would be organised primarily as a public service, paid for generously by taxation, and geared primarily to prevention, rather than cure.

One of the many town committees would oversee health, keeping an eye on practices, providing dietary and fitness advice, educating, and thinking about preventative measures and what maximises good physical and mental health. Central on the agenda would be social health; concern with indices of solidarity, crime, conflict, morale, conscientiousness, readiness to help and turn up for working bees and concerts. (Can you leave your bike unlocked in the street?)

So, for a number of reasons overall health costs would surely be a tiny fraction of today’s figure.

## **MEDIA AND COMMUNICATIONS**

These too should be largely localised, i.e., providing important local information and facilitating discussion of local issues, while also relaying national and international news and information from a few more centralised sources. The suburb, town and region should be our cognitive centre of gravity, not the distant national or international arena, let alone the trivia provided by the global corporate media networks. A local community cannot run well unless there is a great deal of discussion, sharing of ideas, sorting out of the best options and awareness of how arrangements are working out. When difficult decisions have to be made all this contributes to the gradual movement towards consensus on what’s best for the town. Much of this communication, clarification and learning will take place informally but good local media, especially locally made radio programs, will be important in facilitating the awareness that is crucial for collective decision making and in reinforcing social cohesion. Media would also be powerful educational instruments, constantly presenting informative material on ideas, technical ways and innovations.



Much program material would come from citizens, as distinct from being prepared by a few professionals. Many talks and interviews would come from local gardeners, craftspeople, experts and scholars. We would elect the voluntary boards of directors, and be able to observe and feedback on their deliberations. There would be no advertisements, but there would be elaborate ways of conveying information on new ideas, products, events etc. Much of the “work” would be voluntary. Polished presentations would not be important because as with most things the concern would be what is sufficient, good enough, not what is the best, most slick and polished.

The significance of TV and IT would decline markedly. People would find much more worthwhile and interesting things to do with the time they now spend watching TV. (The Australian per capita average is three hours a day.) Radio would be the main medium. It is relatively cheap to produce and can be listened to while doing other things. Yet TV could have an important educational function and elaborate programs on other countries and cultures would help to satisfy some of the present desire for travel.

Use of papers and magazines could be cut dramatically, replaced by electronic sources. Many people could be engaged in providing entertainment, arts, documentaries, reports, etc., whereas at present global corporations send a relatively few programs worldwide, employing a relatively few super-stars and creative people. Global media send the same news and information material out to everyone, so can't deal with the issues that are only of interest to your suburb or town.

All important media would be publicly owned and run, mostly via local cooperatives, as distinct from being privately owned. Media provide possibly the most important public services; everything depends on how well informed, thoughtful and caring publics are, and on how well issues are analysed and understood. It is therefore crucial that media should be seen as our agencies for providing these vital public services, and be regulated carefully by us, be fully visible and accountable, and ultimately under the oversight of town committees and meetings. It is not acceptable that they be owned by a distant corporation and operated to maximize its profits and political influence.

What about the IT realm? Doesn't a sophisticated modern society have to be heavily dependent on computers, complex communications systems, satellites, highly trained scientists and wizard technologists? The Simpler Way would make whatever use of this realm was appropriate, and it would be of importance for many functions, but it would not have anything like the centrality it has today. It would have an important role in research, medicine, data storage, access to information, education, etc. but the need for it in business, accounting, media, leisure and everyday life would be greatly reduced. Most systems would not be large and complex. No IT would be needed for most household and local production and small firms and farms probably would not even need a computer. Relatively little leisure time would be spent in front of one. There would be IT available in neighbourhood workshops. IT is very energy expensive, takes a lot of talent that could be doing other things, and a high proportion of it produces trivial rubbish. If the worst came to the worst and the satellites could not be kept up there or the computer factories could not be maintained, we could get by well without computers. Just reflect on how good life could have been with 1960s technologies, assuming a rational and caring economy. Most of the above listed productive activities such as food and furniture production could take place quite well without any IT. We were able to make beautiful dinners, houses, clothes, furniture, festivals, public buildings, communities and concerts in the 1960s without it, indeed were able to do those things well in the 1760s!

Thus there would be far less demand for computers and similar complicated devices. These would still be made in high tech factories, located in a few places in the world and would be among the relatively few things that would need to be traded internationally.

## **CAPITAL & BANKING**

Nowhere are the implications of a zero growth and de-developed economy more profound than for the finance industry, because there would hardly be one. In a stable or zero-growth economy the only reason for investment would be to maintain a stable productive capacity as old premises and equipment needed replacing, or converting to different purposes. This could include developing new and better bakeries to replace old ones, and it could involve increasing the number of bakeries while reducing the number of dairies, but the aggregate volume of capital invested would not change over time. This could not possibly be done well by a free market. It can only be the result of rational community decision-making.

So, there goes almost the whole of the finance industry, presently taking up a huge amount of personnel, premises, equipment, paper etc. that could be saved and/or allocated to better uses. (For the detail see TSW: [The Economic System: 3. Money.](#))

The role of banks would be limited to providing a safe deposit site for savings, and making available small amounts of capital for development limited to renewing or revising infrastructures. The bank should be a core public institution within the town, owned by the town and run by elected boards with open public meetings on all important issues, including formation of policy and making particular loan proposals. (The Spanish Mondragon bank provides the classic example.) Town banks would decide what socially desirable purposes the town's capital would be lent for, referring the important cases to town meetings. By contrast the present financial system allows the town's money to be lent only to those purposes which distant private banks expect to maximise their global profits.

In a sane and just zero growth economy loans would be repaid without any interest. It would not be regarded as acceptable that people who are rich can receive money just by lending money at interest, when most people cannot do that and have to work for their incomes, producing things the rich consume without having to work. Many have insisted that money should not be a commodity, something that can be hired for a fee, that is lent to be repaid with interest. Thus it would be clearly understood that when the community bank offers a loan to build a house the money is only a way of recording the fact that the community is allowing the use some of its forests, mud, labour and skills to build the house, (and some of its accumulated capacity to purchase inputs into the town, built up by town exports). The understanding would be that the borrower will repay this value and no more from his contributions and earnings in future. Obviously the bank must be a community-owned and run institution because when it grants loans it is determining what will be done, built, developed in the community using the community's resources. At present that power is in the hands of distant, predatory banks with no interest in developing what's best for your community.

The finance industry presently imposes an enormous cost drain on society. Interest for instance feeds into, and compounds, the cost of everything we buy. Decades ago Kennedy claimed that on average interest makes up 40% of every price we pay; it would probably be a higher figure now. (Kennedy, 1988.) In The Simpler Way most of the goods and services we receive would not involve money, and those that did would not involve an interest payment. Our very small earth-built houses would involve almost no loans or thirty year worries about being able to repay them. Bank

charges and fees would only need to meet the cost of providing the services; they would not be opportunities for banks to load up fees and charges to the maximum. (On average Australians pay \$1000 p.a. each in bank profits alone.) Some bank personnel would be employees but many could be voluntary. Members of the board, and of the town business incubator, would be elected volunteers.

Similar considerations would apply to insurance. This too should be a community controlled public service, organised to provide security at minimal cost and not to make profits. Insurance payments would be much lower because property would be less expensive. (Houses built of earth have low fire risk.) Far less paid work, especially in dangerous situations like steel works, mining, agribusiness and multi-story building construction, would need to be insured. The main source of insurance would be, as in any tribe, community solidarity. If the wind blows your roof off everyone will be around immediately to help fix it.

Thus most of the present huge expenditure associated with finance could easily be eliminated.

## **RETIREMENT AND OLD AGE**

Older, experienced people would be highly valued contributors to production and more importantly to social functioning, given their wisdom and their knowledge of local people, conditions and history. There would be no compulsory retirement age, and few would retire in the normal sense. People could slowly phase down their level of activity as they wished. Most would want to remain active contributors, rather than cease “working”. This would ensure that the community continued to benefit from that great deal of productive time, expertise and experience that is now wasted, especially the wisdom of the elders who know the town and its history and can provide good advice.

Much of the care of older people would be carried out by the community via the committees, working bees, rosters and the informal involvement of people. With five days a week to spare many people would drop in frequently to chat and help out. Old people would be able to remain in their homes much longer, there would be little need for retirement “homes” and specialised staff. There would be small local hospitals and nursing facilities close to where people had lived, set within the busiest parts of settlements so people could drop in and so that residents could see and be involved in activities around them. Much of the ordinary work and care would be provided “free” via the community working bees. We might pay some of our town taxes by signing up for extra rosters.

The experience of old, infirm, mentally and physically disadvantaged, and mentally ill people would be far better than it is now. They would be cared for by familiar people right in the middle of their communities, able to observe and be involved in the everyday activities going on around them. There are many valued contributions they can make, such as feeding the chickens. Visitors would be wandering in to hospitals and nursing homes from the town, especially at morning and afternoon tea time. Compare the way present society isolates these people in expensive institutions with nothing to do or to be involved in or contribute to. “Inmates” are often intensely bored, lonely and convinced they are worthless burdens. Then expensive professional staff have to be paid for to deal with the consequences. As with “health” the corporations have pounced on abundant opportunities for lucrative business. In a good community many functions are carried out automatically and without monetary cost, but in consumer-capitalist society these are no longer provided by ordinary people and are commodified and commercialized, generating sales and siphoning the savings of aged people into pockets of shareholders in health-provider corporations.

Old people would have watertight guarantees of lifetime security, unlike today where one's fate depends on the skill (and honesty) of one's retirement fund manager in a predatory financial world that can collapse and eliminate one's retirement savings overnight. Communities would have most of the responsibility for looking after all their members, including young, ill, handicapped, mentally unwell, old and infirm. (This was the arrangement in Medieval Europe, before the advent of individualism and market society.) This is not to say that the remnant state would have no responsibilities in this area but state resources for such functions will be limited, and states can't do the job as well as we can. More importantly, as has been explained, in a zero-growth economy provision for old age cannot come from interest on superannuation investments.

A problem to be worked out would be provision for people who have not lived in the town for long and have not yet accumulated much respect, appreciation and "spiritual credit". However settlements would be more stable than at present, with less mobility in and out, reducing the problem somewhat. Some arrangements for national accounting and transfers of resources between settlements and "superannuation" arrangements making savings transferrable would be needed.

## LAW

There would be very little need for legal work compared with present society which is riddled with struggles and disputes generated by competition for markets, development approvals, property, rights, and wealth. The climate would be cooperative, not adversarial. Wealth and property would not be so important to people. The stability of the economy would mean that many legal problems that presently derive from competition for development opportunities would not arise. Above all it would be a far less complex society, requiring far less bureaucracy, economic transactions, formal arrangements, disputes, accidents and bungles. (A good society has little bureaucracy, law or charity.)

Most important is the fact that because all would be provided for, i.e. all would have a livelihood and a productive role, and because there would be no unemployment, exclusion, poverty or disadvantage, then most of the forces generating crime in the present callous winner-take-all society would have been eliminated. For large numbers of people today it is extremely difficult or impossible to get a livelihood, a job or a small business. It is no wonder therefore that many end up stealing cars or mugging people, or selling shonky products, or that many give up hope and take to alcohol or drugs. Large numbers are "excluded". A civilized society would have as a top priority making sure everyone was provided for, which includes having a livelihood, a worthwhile, enjoyable contribution to make.

Each town would establish systems of mediation and "village elders", so that if conflicts began to emerge experienced people could informally help to sort them out (without any fees!) If you have a problem you might go to some of them to chat it over. These are the practices in many Eco-villages and tribal societies.

The savings The Simpler Way would produce in the legal domain would be astronomical. How many police, courts, prisons, judges, barristers or parole officers would we need if all people had a role, a worthwhile and respected contribution to make in caring communities? How much collateral damage and self-destruction would be avoided? Would we need as much as 5% of the legal industry we have today?

## **EDUCATION**

In The Simpler Way education has very different goals and procedures compared with consumer society. (See TSW: [Education; A Radically Critical View.](#) and TSW: [Education in the Alternative Society.](#)) Education would not be about competing for the credentials that might guarantee jobs and privileges in consumer society. It would be about enabling an enjoyable, meaningful life as a citizen contributing to a good community. The main implication for the present discussion is that there would be a greatly reduced dollar cost, deriving from the fact that most education would take place in the community as children worked with adults performing the important every-day tasks needed to keep the community functioning well. Although much attention would be given to the educational progress of each individual child, involving (a small number of) professional "teachers", there might not need to be any schools. The whole community would continually be teachers, (and learners) and the town would be the "classroom". There would probably be important roles for some professional educators, but ordinary citizens would do most of the educating.

Education has little to do with training, which is what mostly takes place in schools and universities today. The training of trades and professional people is important and might take place in much the same way that it does today, but far fewer such people would be needed. With much simpler systems many trade level tasks would be carried out by ordinary handymen (I do all my own plumbing, machinery maintenance, metal work, fencing, painting, carpentry and building, plant propagation, electrical installation and maintenance, etc.) In an economy with mostly simple technologies and nowhere near as much production or heavy industry nor as many sophisticated global systems, there would be far less need for highly sophisticated technocrats (let alone lawyers, financial consultants, accountants, security analysts, marketing experts, IT experts, CEOs...)

Our educational institutions could then focus on Education (as distinct from mere training), but this can be organized effectively without expensive plant or systems of professional experts; think Wikipedia plus discussion groups, visits, field days, well-read citizens and access to local gurus and art and craft wizards, overseen by the town's culture, leisure and wisdom committee. (Again see the detailed discussion in TSW; [Education in the Alternative Society.](#))

## **WELFARE**

Because there would be little or no crime, stress, depression, unemployment or poverty, the incidence of social breakdown and therefore the need for "welfare" services would be greatly reduced. In healthy communities most of the needs of those people who do run into difficulties are met or headed off spontaneously by ordinary citizens, as distinct from by expensive professionals and institutions.

## **LEISURE**

Leisure is a major dollar and resource cost item in consumer society, and a major source of savings in The Simpler Way. It has been partly dealt with above, in terms of having leisure-rich communities and a lot of time to pursue leisure interests within them. At present leisure time is mostly spent in the passive consumption of momentary experience provided by corporations or professionals, especially via TV and IT, in travel or consuming goods and services. The quality of most of this material is "spiritually" negligible if not negative, evident in the mindless TV soap operas, game shows and crime dramas, and especially the violence and destruction in computer "games". Much leisure time and expenditure at present goes into purchasing; shopping is a form of

entertainment, including the purchase of expensive luxuries, clothes, tickets to rock concerts and gladiatorial sporting events.

Simpler Way settlements and lifestyles are very rich in resource-cheap leisure activities. Any town or suburb includes many very talented musicians, singers, storytellers, actors, comedians and playwrights, presently unable to do their thing because the globalised entertainment industry only needs a few super-stars. These people will thrive, having several days a week to practise their art and being appreciated for their (largely unpaid) contributions to the many local gatherings, concerts and festivals. The corporate entertainment industry has taken all the entertaining business (just as the supermarkets have killed off most of the little community-reinforcing shops), and can provide access to the world's best performers at the flick of a switch. This debauches; people come to be dissatisfied with anything but the very best, and expect immediate inconvenience-free access. Long ago you would undertake a difficult pilgrimage to experience great art, and then really appreciate it.

Much more leisure time will be spent in creative and social activities, as distinct from the increasingly private involvement in computerised leisure pursuits today. In addition much leisure time will be spent in productive activities, such as gardening, making things and arts and crafts. And much will be spent reading, thinking and learning, and doing formal courses. We will have the time to work on the issues that are important in our personal development.

The community would be a spontaneous leisure resource. A walk around the town would involve one in conversation, observations of activities in familiar firms, farms and mini-factories, and the enjoyment of a beautifully gardened landscape. Contributing to working bees would be enjoyable. Then there would be the festivals, celebrations, concerts, visits, dances and field days. The local media (mostly radio) would further enhance leisure resources.

In these new enriched physical and cultural landscapes there would be far less interest in the purchase of leisure or entertainment services. People would be busy with interesting tasks and projects, especially gardening, arts and crafts, and would be involved in many community activities.

We would have leisure and cultural committees organizing a rich variety of interesting activities. They would surprise us with novel adventures and mystery tours. They would work out low-cost options, such as hiring a gypsy carriage and a horse to go on a plodding tour following a map of a scenic route, stopping at quaint old inns, craft centres, galleries and wildlife-rich camping spots. Thus it is likely that there would be far less desire than there is now to purchase leisure and entertainment.

These many sources of local leisure interest would make it possible to drastically reduce travel for holidays, and especially to more or less eliminate the astronomical sums of energy and resources going into overseas travel and the tourism industry. This will strike most people today as unacceptable and unrealistic but remember that tourism is an extreme luxury that can be indulged in by only about one-fifth of the world's people while they rip through far more than their fair share of world petroleum. Although I have no access to a leisure rich locality my leisure, sport, recreation and holiday expenditure is virtually zero; I do not leave home for holidays and I regard all the "work" I do every day around the homestead as enjoyable "leisure" activity.

Thus for many people the dollar, energy and resource costs of leisure could be reduced to negligible amounts. It would be difficult to estimate because much leisure activity could also be accounted under "work" or productive activity which is using resources but is also contributing to the supply

of necessities. Australian per capita expenditure on leisure (not including holidays) is around \$70/pp/week, and for sport, recreation and holidays it is \$100/w. (ABS. 6530. 2015.)

### **WORKING BEE LABOUR AVAILABLE**

In the suburb of East Hills there are probably 2,500 adults plus children old enough to contribute to voluntary working bees. If 80% of them turned up to a one hour working bee each week, then 2,000 person-hours per week could be going into community production, maintenance, services, development and activities. This is equal to having 50 people working full time, or one for each three hectares. At present Council labour going into maintenance within the suburb is a tiny fraction of this amount.

If many people moved to part-time paid work, and if informal “drop-in and help-out” activity was included, the total work time for community operation, maintenance and development could be many times this total. In a well-established alternative economy, as on many Eco-villages today, the per capita time that could be comfortably given to community maintenance and production could be several days a week.

Some of this time would be spent on committees, such as for agriculture, youth affairs, care of aged and disabled, leisure activities, infrastructure maintenance and working bee coordination. Within some of these domains there would be specialist sub-committees, such as for fruit and nuts, water supply and recycling, food preserving, recipe development, bee keeping, fish production, poultry, forestry and especially for research into many topics such as the best local plant varieties to grow.

These working bee and committee functions would be crucial not just for achieving technical goals such as ensuring good food supply, but for the maintenance of high levels of solidarity, mutuality, social consciousness and responsibility, and morale, pride and empowerment. They are central within the procedures which require and reinforce the sense that we are taking control of our fate and running our town to provide well for all, and we are proud of our town and how we run it to look after everyone well. These understandings and attitudes would be strongly reinforced by our realisation that our welfare depends primarily on how well we do these things. If we do not all think about the welfare of the town and turn up to working bees then things will not work so well and our own welfare as individuals will suffer.

### **QUALITY OF LIFE & COMMUNITY**

East Hills is a typical dormitory suburb, with almost no discernible community. Few people living there today would have any association or interaction with any others in the suburb. There is a hotel, only about six shops, a garage, and a dentist, but there is no shopping centre enabling informal contact and familiarity. Team sports are played on the main park area but this is on an edge of the suburb and much of its activity seems to be hired use by distant clubs. There is a Scout hall but there seem to be no sporting or other clubs or associations based within the suburb. The streets are almost completely deserted almost all the time, apart from the people walking to and from the railway station. Many roads serve only as driveways between houses and through roads.

The suburb provides a classic example of the damage “development” does to millions of villages around the world. The extension of the railway some decades ago involved bulldozing the whole of the main street, obliterating the town centre including perhaps fifteen shops. The few remaining businesses illustrate the typical pathetic wreckage left by “the death of the high street”, the

struggling two dollar junk shop, the boarded up shops, the garage frequently unable to afford petrol to sell, the hair dresser, the mall with only two shops open. Apart from the garage, the small take away shop, and the dentist, none of the businesses provide basic services such as vegetables, groceries, butcher or hardware. In Britain the typical high street now contains many betting shops, op-shops, beauty salons, small fast food outlets, boarded up bankrupt premises ...and so many coffee shops that they employ more people than there are in the British army!

Community is a much neglected and little understood phenomenon. It is an extremely important factor in the quality of life, and the viability of a society. It cannot be given, purchased, or imposed. It cannot be artificially created, either by external planners or officials, or by enthusiastic social workers out to stimulate community. There's no point trying to whip it up by publicity campaigns or street parties. It can only emerge as a consequence of the economic, geographical and social conditions and forces people experience, conditions which throw people together and generate interaction, familiarity, sharing, cooperation, helping, trust, pride, giving and receiving, social debts, gratitude, reciprocity, mutual concern, feelings of security and connection, and thinking about the welfare of the locality. The revised suburb described above would subject people to experiences, forces, obligations, conditions, delights etc. which would automatically produce these "spiritual" effects. These would be the most important elements in the high quality of life the new suburb would extend to all.

## **ENERGY**

Far less energy would be required compared with the present society. This would firstly be because there would be far less producing and consuming going on, and because much of what remained would be carried out without heavy industry, ships, aircraft, trucks, storage, marketing, machinery, and especially with nowhere near as much transport. We would be living in solar passive mud brick houses, recycling, getting to work on a bike, with close access to local sport, cultural and leisure facilities and therefore not traveling much for leisure. Most of our economy would be localised, eliminating most travel to work and most transportation of goods. The reasons why the agricultural sector would use little energy have been explained above.

Heating and cooling is the biggest item in the household energy budget, taking about 38%, or under 7.7 GJ/pp/y. In new dwellings good solar passive design of buildings made from earth should eliminate almost all demand for heating and cooling in the region of Sydney latitudes, apart from special needs such as in hospitals and aged care facilities. Existing dwellings should be insulated well and people should be much more prepared to rug up for cold weather and to put up with hot weather. Shaded cool green areas such as ferneries fitted with simple sprinklers can be resorted to on extremely hot days. The much reduced "work" week would enable activities to be postponed during very hot and cold spells. My poorly insulated house uses no energy for cooling and space is heated by about 250 kg of firewood per person per winter, i.e., c. 4.5 GJ. (Note that this is "primary" energy, so it corresponds to about 1.25 GJ of "final" energy compared with that 7.7 GJ/pp above.) Space heating fires can also be used for cooking and to heat water for showers and washing up. Electricity powered heat pumps can deliver about four times the energy in the form of heat that they consume, so would have a valuable role, including reducing smoke from use of wood for heating. Heat can be stored in tanks so could be accumulated during sunny periods. In view of these considerations it will be assumed that heating and cooling energy could at least be reduced to the 4.5 GJ/y typical of my house, and probably much less given good insulation.



Much of our energy would be produced locally, from windmills, watermills, garbage gas digesters, solar panels, and biomass sources of fuel and ethanol for vehicles. These sources would be augmented by some larger scale regional wind farms, PV and solar thermal fields, etc., via (much reduced) grids. Horses and donkeys, mainly used for the small amount of ploughing and local carrying, in a society where the pace was much more relaxed, and would also provide some recreational functions,. Cooking might make considerable use of wood and Of biogas fuel from methane digesters taking wastes on their way to the gardens.

A significant proportion of the small quantity of energy needed would come from porridge. That is human energy would power many functions now performed by machinery, notably food production, construction, travel and transport (bicycles), manufacture (craft), and various infrastructure works (working bees with shovels rather than bulldozers.) There would be “negative costs” in terms of enjoyment, social interaction, and especially physical exercise.

Solar passive earth-made buildings would eliminate most of the energy presently needed for space heating and cooling and therefore for air-conditioning at this latitude. Stirling heat engines driven by solar reflectors or wood fuel would power some machinery (e.g., saw mills), and generate electricity. Most of the woodcutting, pumping, electric welding and freezer boosting would be carried out when the sun or the wind was high. The many small local dams, and possibly hydrogen tanks, might enable most of the (much reduced) electricity storage required.

Extensive forests would surround and permeate our settlements, providing some energy including wood-fired electricity and small quantities of ethanol or methanol for transport. Candles and lanterns using bees wax and vegetable oils would meet some lighting needs. (Candles can be good reading lights when backed by parabolic reflectors made from pieces of broken mirror. Gas light candles can be fuelled by methane digesters.)

## **ELECTRICITY**

It is difficult at this stage to estimate the amount of electricity that would need to be imported to the town from the national grid. Space heating and cooling and refrigeration are the main problems. (Cooking only takes 4% of household energy.) I use about 8.3 W, or 0.2 kWh/pp of electricity a day, for all purposes including lights, computer, workshop machinery, water pumps (and could also run a small TV for another 0.05 kWh/d.). Many of these functions, for instance lighting could serve several people in the house at the one time, so the per capita household average could be well below the 0.2 kWh/d that will be assumed. This assumption corresponds to an annual total of 73 kWh/pp. The present Australian household electricity consumption is 2,760 kWh/pp/y, i.e., around 16 times as much, but includes cooking, refrigeration, heating and cooling, and many appliances I do not use such as iron, TV, vacuum cleaner, floor polisher, or normal washing machine (mine is powered by a 72 W car fan motor), space heating, and electronic gadgets (apart from laptop and radio.) My power figure does not include cooking or refrigeration.

Refrigeration is problematic, being quite energy intensive. The easy access to fresh local produce will greatly reduce the need for preservation, especially by cooling and refrigeration. Some use would be made of evaporative cooling cabinets (“Koolgardie safes”) and community refrigerators located close by within house clusters. An uncertain estimate based on a 12-volt fridge is 3 amp x15 hrs/d for 5 people, i.e., 39 kWh/pp/y or 140 MJ/pp/y.

In the town, sawmilling, water pumping and boosting of community freezers would be carried out when the sun or wind was high. Local solar panels and windmills might be able to provide most/all electricity needed, if local pumped storage and maybe hydrogen storage could deal with intermittency. Hydrogen storage is very inefficient but avoids battery problems, especially their need for scarce materials. Electric heat pumps would be used extensively. However some use of renewable energy coming in to the town via the old grid is likely.

Cooking is not a major problem as it only uses 4% of present household energy. A significant amount of cooking might be done by wood stoves fitted with water jackets and contributing to space heating. A small quantity of methane for quick kettle boiling could come from community digesters taking biomass and wastes. Communal wood-fuelled earth ovens would be used for the bi-weekly community bake-up, especially making bread. There are cooking stoves that use solar heated oil but materials costs etc. have not been explored here. Reduced meat consumption and increased use of fresh fruit, vegetables and salads would reduce cooking energy and refrigeration demand. Open-fire and slow combustion space heating stoves can also be used for some cooking.

Hydrogen produced from surplus wind and solar energy seems not to be an affordable option for very large scale energy supply in energy-intensive societies. However for the settlements we are considering it might be effective (though very energy-inefficient), again keeping in mind the very low need for liquid or gaseous fuel for transport or need for energy storage, and the scarcity of wood fuel.

It is important to keep in mind that the following conclusions apply only to the household level and this is misleading because most of the savings from the settlement restructuring discussed would occur at the regional national and international levels, not at the household level. For instance the reduction in household expenditure on transport does not take into account the huge reductions there would be in national road and rail infrastructure and maintenance, accidents, insurance, and freight carrying.

## **ENERGY COST CONCLUSIONS**

The uncertain interim conclusions arrived at from the above estimates for a limited number of the main quantifiable items, for per capita energy use, are:

<b>Food production.</b>	50MJ/y(?)*
<b>House/Buildings:</b>	
Construction.	
Dwellings.	125 MJ/y
Community buildings.	0.87 MJ/y
Running costs	
Electricity	
Household Lighting etc.,	96 MJ/y
Refrigeration.	140 MJ/y
Cooking (current Australian electricity plus gas; should reduce with more use of wood.)	30 MJ/y
Heating and cooling	4,500 MJ/y
<b>Travel</b>	2,400 MJ/y

<b>Materials (Embodied energy)</b>	200 MJ/y(?)
<b>Tools, appliances, hardware.</b>	N/A
<b>Furniture</b>	N/A
<b>Manufactured goods</b>	N/A
<b>Water</b>	N/A
<b>Total for items listed:</b>	7,500 MJ/pp/y.**
<b>Australia Per Capita Energy Consumption</b>	46,000 GJ (ABS 2012, Item 4102).

\* This estimate includes 13.3 MJ/pp/y for home gardening running costs plus 13 MJ/pp/y for embodied costs, and energy used on commons and farms.

\*\*But note again there are many large energy costs incurred outside the typical household that would have been eliminated in the restructured settlement; i.e., most of the savings from the restructure such as transport in of food do not show up in this household budget.

### **DOLLAR COST CONCLUSIONS**

At this stage an annual per capita dollar cost can't be given at all satisfactorily but the main items estimated above are,

	<b>Restructured Suburb</b>	<b>Present Australian Average (ABS: 2009, Cat.6520.)</b>
<b>Food</b>	\$3(?)/d = \$1,095/y	\$4,264
<b>Housing</b>	\$23/y	\$4,628
<b>Tools, appliances, hardware</b>	\$100/y	N/A
<b>Clothing and footwear</b>	Very little	\$730
<b>Materials</b>	N/A	N/A
<b>Transport</b>	Very little	\$4,004
<b>Leisure</b>	Very little	\$.3432*
<b>Energy</b>	\$100/pp/y (uncertain)**	\$780
<b>Total for items listed</b>	<b>\$1,318***</b>	<b>\$26,780/y. (ABS 2009 - 10 Survey, 6530.)</b>

\*i.e. Sport, recreation, and holidays. ABS. 6530. 2015.)

\*\*7.5 GJ/pp/y, corresponds to 2,000 kWh, but 60% of this is wood which might have little or no dollar cost. Also most of the electricity would cost c. 8c/kWh to produce, and would have little distribution cost.

\*\*\* In a thorough accounting several significant items would have to be added to the list above for the restructured settlement, (... although these make up a very small proportion of the total given by the ABS.)

## CONCLUSIONS

The Simpler Way would make possible enormous reductions in resource consumption. Consider:

The industries we could phase out completely, including sports cars, speed boats, florists (we will live in thriving gardens), advertising, bottled water, the fashion industry, car racing, gladiatorial sport, and precious metals and gems. There would also be no need for military expenditure, because we will be living in ways that do not require the force to take more than our fair share of world resources, or defend against others seeking to do this.

The industries we could greatly reduce. There would be little or no need for shipping, aircraft, lawn mowers, pesticides, fertilizers, the finance industry, tourism, a fashion industry, packaging, agribusiness, trucks, insurance, IT, heavy machinery, roads and freeways, courts, prisons, police, counseling and psychiatric services, drug and alcohol and eating disorder treatment, road accident emergency hospital wards etc. There would be far less need for commercial media, entertainment, IT, insurance, “welfare” services or lawyers.

The savings from reorganizing, e.g., when food is produced locally we do not need trucks and ships to bring it to us. When people are active citizens rather than sitting in front of a TV or computer screen, many “services” are performed fairly automatically without expensive corporate or professional suppliers.

The reduced need for effort to fix the damage caused by rampant consumer society, including the physical deterioration of vast infrastructures but more importantly including the ecological and social breakdown. There would be reduced need for law, health care, ambulances, courts and prisons, care for mental illness and depression etc., or weapons given that there would be no need for war to secure your empire.

The overhead costs presently loaded on everything purchased, for example in the form of advertising, insurance, outrageous CEO salaries, consultancies, bank fees, products not made to last, lawyers fees... and especially interest on borrowed capital.

The bureaucracy, systems, professionals, offices, consultancies, computers, suits, we would not need if local networks informally and voluntarily organized provision of many local goods and services, including much food, aged care, nursing, maintenance of energy and water etc. infrastructure, entertainment, and R and D.

Again remember that the alternative ways discussed would have their greatest reduction effects not at the household level but on the national and international energy and dollar budgets, for instance by eliminating global food transportation.

Also, consider the greatly increased “spiritual” productive capacity that The Simpler Way releases, the enthusiasm, time, energy, conscientiousness, thinking and innovation that comes from happy, secure, cooperative citizens proud of their communities and in control of their situation, eager to join working bees. The members of an Eco-village are pro-active, always on the look out for things

that need fixing or improving and ways they can contribute to the welfare of their community. Again compare with the apathy and TV-watching stupification that goes with stressed, competitive individuals isolated in their private houses and having little or nothing to do with their community. Much development, administration, fixing, giving, innovating and cohesion-building would take place with no dollar or resource cost, as committees, working bees and spontaneous discussion and action attended to local tasks, getting a lot of “work” done by human energy.

**So there is considerable support for the claim that we could enjoy idyllic living conditions on around 10% or less of present per capita dollar costs, footprint area, and energy costs...but only if we accepted transition to very different systems, ways and values.**

But is this too austere a vision? It should be stated again that the assumption underlying this exploration is that the limits to growth require extreme reductions in consumption. However it might not be necessary to reduce consumption and costs by the amounts indicated above. The level of “austerity” described here would not be acceptable to most people today but it is important to emphasise that it does not involve hardship or deprivation. It represents the way I and many Eco-villagers choose to live and find fulfilling. If we raised children in communities of the kind described they would grow up finding these new ways and activities to be sources of interest and enjoyment. A major task for us in the transition period is to show that these ways are more rewarding than those the consumer-capitalist rat race can offer.

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## **APPENDIX 1**

### **Alternative vs conventional food production**

- Normal agribusiness provision of food is one of the most faulty systems in consumer-capitalist society. Consider the following comparisons with the approach assumed above.
- Agribusiness involves huge quantities of energy use, in machinery, fertilizers, refrigeration, transport, warehouses, packaging, “marketing”, pesticides, supermarket floodlighting and air conditioning, bureaucracies, and dealing with wastes. Much food is transported half way around the world, (...to where local fruit trees are being pulled out.) Agribusiness creates vast waste, which are rich and valuable nutrients but they cannot be recycled (the feedlots are a long way from the fields, the consumers are on another continent) and thus needs to be dealt with via energy-intensive systems, and the wastes damage ecosystems.
- Artificial fertilizers are applied, damaging soils and ecosystems. Acidification and nitrogen flows are major global problems, and soil carbon levels are depleted by ploughing. Because nutrients are not returned to the soils agriculture is well described as “soil mining.”
- There is large-scale abuse of animals, e.g., in battery egg production, intensive pig raising, live animal exporting.
- Many chemical additives are needed, e.g., to keep disease levels down in cramped battery hen sheds and piggeries, to preserve foods for long shelf life, to colour and augment taste.
- Profit is maximized by growing only the few highest yield varieties, resulting in the massive loss of plant biodiversity.

- Nutritional quality is of no concern to agribusiness. Values that maximize profit include appearance, toughness to survive long transportation and packaging, big water-bloated but tasteless strawberries, and absence of blemishes meaning that specked fruit can't be marketed. The result is dramatic reduction in quality, evident in tasteless supermarket fruit of dubious nutritional value, especially tomatoes.
- Conventional food supply involves huge numbers of expensive people in suits with degrees, sitting at computer screens, with expertise in finance, personal relations, logistics, engineering, and bio-chemistry. Home gardening and small local farming avoids just about all of that, and enables ordinary people to be excellent food producers.
- Agribusiness involves borrowed capital and thus interest payments at all levels. Costs at one level include interest payments at the previous level, compounding to perhaps 40% of the price paid by purchasers being made up of interest.
- Agribusiness destroys rural life. Big corporations undercut local costs and farmers and rural towns are eliminated, especially in the Third World.
- Home gardening, community gardening, commons and local small farming provide all participants with satisfying and enjoyable activity. Most people engaged in agribusiness merely work for wages in specialised jobs that are often boring, insecure and low paid.

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