

## **QUICK AND SIMPLE ANSWERS!**

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### **Crisis = Opportunity**

Let's get the problem simple, real quick. There aren't all the different crises that seem to be crashing around in our faces. Only one. Global warming, peak oil, financial collapse are all facets of one simple thing. We've left a world of easy access to cheap energy, where the successful paradigm is growth. We're moving into a world of stability, for-the-good-of-all, where the rules for success are very different, and we haven't adjusted yet. It's not a bad world. Quite the converse - it's a wonderful world and we will all breathe a huge sigh of relief when we catch on and adapt.

### **Four pieces of really good news:**

- It's way easier to adapt our homes, communities, and industry this direction than it was the other direction.
- The economics we're used to is fraudulent - meant to support corporate concentration of wealth. Truthful economics leads to 10 times the productivity, and shows there really is enough for everyone in the world to live comfortably.
- There are some really easy ways to get off the energy habit.
- The faster we act, the better off we will be.

### **Sustainabull - "green" doesn't do it**

Oil production has peaked globally. Natural gas in the US peaked in 1973, and we are currently consuming 50% of Canada's production. U.S. has major coal reserves, but like all natural resources, we've used the cheap and accessible first. It takes energy to get energy, and more energy and dollars to get remaining lower quality and less accessible resources. The energy content of coal burned peaked in 1998. The price of uranium soared eight-fold in 2007. Holders of energy resources have inflated estimates of remaining reserves. As demand exceeds supply, the market, prices, and politics shift from a buyer's market to a seller's market. The world may run out of economically recoverable reserves of coal and other energy resources much earlier than claimed, and the economic, political, and military cost of access is likely to soar beyond expectations. The current and increasing levels of use of all energy sources is accelerating global warming over a "fail-point". The per-capita sustainable level of CO<sub>2</sub> emissions is one-quarter of current world averages and one-twentieth of current U.S. levels.<sup>1</sup>

### **Techno-fix/techno-fantasy**

We're inundated today with "possible lifesavers". Every headline claims this or that new technology that could "save us" and let us continue in our accustomed extravagant patterns. Electric cars, alternate fuels, solar cells, wind energy, LNG imports - to name just a few of the saner ones. We're throwing money everywhere, such as into ethanol production that is destroying world food sources and our local dairy industries, without realizing that these sources are either unproved or take more energy to obtain than they produce.

Let's say it bluntly: **there is no sound evidence of new basic technologies we can rely on to avoid the issue of depleting fossil fuels.** Pat Murphy reminds us:

The **fuel cell** was invented in 1839. Money has been poured into fuel-cells/**hydrogen** economy since 1980. After 160 years and spending more than \$15 billion, there is only one fuel cell with any significant potential for commercial sales. Like nuclear power's "to cheap to meter" energy, there is no actual evidence that the energy and dollar cost of obtaining the hydrogen is low.

**Electric cars** - just plug them in and forget any problems? Don't even consider they would triple our entire demand for electricity, with no new resources in sight to produce that energy. Again, we seem to conveniently ignore the use of fossil fuels to produce electricity, and that 65% of the energy is lost in that process. Electric and hybrid vehicles have not, to date, even met the real mileage standards of gasoline cars available in the U.S. and other countries.

The first selenium solar cell was built in 1877. **Solar PV cells** are over a century old in implementation, and now sell \$20 billion/year. They remain costly, costs are now increasing rather than decreasing, and vaunted efficiency improvements have turned out to be marginal.

U.S. government support of **wind energy** began in the mid 1970s. The total number of gigawatts installed is impressive, but only about 2% of world electrical capacity. Efficiency / cost improvements are reaching diminishing returns, best sites have been taken first, and costs of turbines have actually increased 58% since 2002. With their low capacity factors and dispatchability issues, the most likely projection is that wind and solar can replace about 20% of current fossil fuel electric generation (without adding electric cars), and that will take decades to achieve.

Replacing the current 85 quads of fossil fuel electricity with wind would require 12 million wind turbines, at a cost of \$19 trillion. Triple that if we have electric cars, then factor in for population growth, and remember that wind only blows part of the time and we have to have back-up fossil fuel generation.

**Coal** remains our primary conventional energy source in the near future, but its environmental costs and global warming impacts are immense and unaffordable.

**While some new technologies might develop, there is no basis for assuming they will, or that they have any assured capacity to save our current patterns.**<sup>2</sup> It's essential that we act from the realities of our position.

**We need to quickly reduce our fossil fuel energy use by 80-90%.** If some new discoveries do appear, consider them a bonus to a secure position.

### **Factor-10 economics**

**So, the good news.** First, what we've called economics is not a science, as claimed. Present economics could more appropriately be called a fraud - an intentional intellectual structure constructed to deceive us into compliance with practices that appear cheaper, but actually are hugely more expensive. Their intention, and proven success, is to siphon wealth from individuals, land, and water throughout the world into corporate coffers. Using truthful economics, we can find and shift to institutional structures, home construction, transportation, food, and other systems that can actually *improve* our quality of life, while reducing energy use by vast amounts.<sup>3</sup>

## Can we really reduce energy use 90%?

Does this sound impossible? Is it true we've done everything so well that only marginal improvements are possible? I don't think so. For starts, think about things in your own home. New toilets only use one gallon of water to flush - **an 80% improvement** over the 5-gallon flushers of 20 years ago. Similarly, compact fluorescent light bulbs **save 75%** of the energy used for incandescent bulbs. Refrigerators **reduced their energy use by 86%** from 1972 to 1997.<sup>4</sup> High-speed-spin clothes washers **reduce dryer energy use 90%**. Laptop computers **use 90% less energy** than older desktops.

Europeans live on **half the energy** use we do. Their just-as-good cars average 42mpg vs. our 21 mpg. Their homes average 1,000 sq.ft. rather than 2400, but they live well. By approaching change systemically and creatively, we can do much more. **Big changes ARE possible**, particularly getting free of an economics that kept us from thinking of such things.

Economics is not a science, nor an end in itself. It is a tool for helping evaluate options of actions to best achieve our goals in life. It's time to stop assuming that accumulating material goods is the central goal of life. Ask what we really want and need. There are some surprising answers with amazing savings! What we really want is to feel loved, of value, and having achieved some success in life. Material goods are not the most effective way of achieving these things.

**A greed/growth society and the sustainable one we need to become operate on totally different principles and values.**<sup>5</sup> They also generate fundamentally different kinds of costs and rewards as well as immensely different effectiveness in meeting life's needs. Looked at seriously, a sustainable society offers some exciting surprises compared to our present one.

### Let's start with VALUES:

Asking a few questions about our present patterns suggests that **alternatives might be easier than expected:**<sup>6</sup>

- **How much of our work and resources are we spending right now just to pay the costs of growth?**

We currently invest immense amounts of our work, energy, and resources to accommodate growth. Every generation we double the number of our houses, cement plants, electrical generating plants, coal mines, cities, roads, and water systems - and prematurely demolish existing ones - to accommodate more people and more "things". And we spend even more educating and feeding those extra people. What do we gain, anyhow, from more people?

**Stabilizing growth can totally avoid somewhere between 33% and 40% of our total work.** Avoiding that is equivalent to a gift of 2-3 hours a day, 13-16 hours a week, or 16-21 weeks a year of free time to every person - just for saying NO to more crowding and to jostling for belongings.

- **How much of our work and resources go to pay for inequity?**

Another significant share of our resources is used to support inequity in our society. The enormous concentration of wealth by a few in our society consumes vast amounts of resources to benefit only those few. The median US household income for wage-earners is currently \$31,000, with more than 13% of households

under the monetary poverty level of \$15,000. A fully equitable distribution of personal income would amount to \$59,000 per household.

*An equitable society could totally eliminate poverty and support EVERYONE at the current median income, using 47% less work, and equivalently fewer resources than our current society uses to maintain poverty and inequality!*

*Without growth and inequity, every American could live as well as the average American family does now. At the same time, we would save TWO-THIRDS (67%) of the resources, energy, work, and ecological damage involved. And this is without investing a dime in energy efficiency, improved industrial processes, institutional change, or change in the kind of rewards we get from life!*

- **What would we save just by living on income instead of in debt?**

To pay for growth, we have become trapped into paying for personal expenditures, corporate expansion, and governmental infrastructure consistently through debt purchasing. Our federal government is sinking ever deeper under a massive and growing public debt and imbalance of trade. Just the interest on this debt alone - not even to begin repaying the debt itself - represents a 25% surcharge on other government expenditures. State and local governments finance virtually all capital improvements through selling public bonds. These result in our ultimately paying double or triple the apparent cost of those improvements. These costs never appear, of course, in discussion of how much is being borrowed.

Our personal finance situations are as bad. Interest costs on home purchases double and triple the actual cost of a home. We finance 13 cars in our lifetimes - one automobile after another for 40 or 50 years, gaining nothing out of the process beyond the first purchase. Interest on continuing credit card balances amounts to over \$300 billion per year. We can't *buy* any more on credit. We just end up *paying* more for what we buy - up to 20% more. Here again, consumer debt represents 20% of disposable income. Corporate debt loads represent a similar 25% surcharge. **Overall, debt costs represent more than 20% of our cost of living - a cost which can be drastically reduced.**

**TOGETHER, THESE QUADRUPLE OUR COST OF LIVING!'**

Oh, but this is talking dollars, not energy, right? Wrong. **Every dollar we spend represents an energy expenditure** - if not for the product or service we purchase, then for what happens when that dollar lands in someone else's pocket. There's variation in the amount of energy, but often more importance in doing less and causing fewer dollars and less energy to fly around. And there are huge benefits from working less.<sup>8</sup>

What this also says is that our values are whacko. **Easiest and cheapest way to get sustainable is to change our values.**<sup>9</sup> **It's values, not technology, that is the root problem.**<sup>10</sup>

Then let's add in one more value - "**DURABILITY**". A home that lasts 200 years rather than 20 years really only costs one-tenth as much. A car or light bulb or roof on a house that lasts twice as long only costs half as much. A whole big hunk of our GDP, and its energy consumption, is producing things that don't last, break down, and aren't repairable. Durable products mean less work and energy to replace, with a positive impact on quality of life in the process.

### What can WE do?

**Various studies indicate that an 80-90% reduction in our energy consumption is required - for global warming, because of depletion of fossil fuels, and to allow the rest of the world to live as well as we do.** Factor-10 economics is an approach that uses systems, ecology, energy, the sacred, and life-force energy perspectives to find those order-of-magnitude opportunities.

**The three "value questions" above show potential for 75% savings before even looking at the potential for 90% reductions (below) in HOW we do things.**

For now let's just look "big-brush-stroke" to see what's possible "energy-efficiency wise", before we decide what different choices each of us wants to make. **Let's look at what we can affect directly with our own lives**, with local community action and changes in regulations, to achieve 90% reduction in major areas. **Housing, personal travel, and food together constitute 67% of our national energy consumption**, and drives energy use in other areas. Let's look at those big three:

**HOUSING:** Green building programs such as Energy Star, LEED, and Zero Energy have done little to address the scope of need for energy reduction in homes. Energy Star homes are only required to be 15% more efficient than code. LEED buildings are only a tiny fraction of construction, and achieve reduced energy use of only 25-30%. Zero Energy homes have a more impressive reduction of 51%, but minuscule number of homes. We showed how to do far better, back in 1973.<sup>1112</sup> Here's how to achieve real change:

- **Smaller size - Cutting our excessive space use in half cuts our energy use in half.** Average new home size in 1968 was 1200 sq.ft. vs today's 2400 sq.ft. We've demonstrated how, with minimal effort, to convert the standard 3-bedroom ranch house into a comfortable duplex, while upgrading energy efficiency.<sup>13</sup> IKEA has demo homes in their stores showing how to live comfortably in 590, 375, and even 235 sq.ft.
- **Two-story - 1.5 or 2-story construction reduces construction costs and energy use by 20%.**
- **Super-insulated/passive solar - Heating constitutes a third of home energy use.** European Passivhaus homes are insulated to levels that need no heating systems, thus **eliminating 33% of home energy use.**
- **Appliance load reduction - Eliminating TV; using cool-boxes and under-counter freezers instead of self-defrosting mega-refrigerators; demand, solar, and heat-pump water heaters; CFL light bulbs instead of incandescent; gas rather than electric stoves; and high-spin speed clothes washers to reduce drying loads can cut appliance primary energy use roughly in half.**

- **Stairstep electrical tax** - Doubling electrical rates for large users, investing those funds in efficiency improvements and renewable electricity, can save even more.
- **Solar PV** - Reducing home electrical use to non-heat appliance loads, and reducing those loads makes sensible-sized rooftop solar PV electrical panels a reasonable way to further reduce total fossil fuel energy use.

**In sum, these options can approach net zero energy homes<sup>14</sup>, and 80% reduction of energy use in retrofitted homes.<sup>1516</sup>** They also make our homes secure during power outages and other disruptions.

**TRANSPORTATION:** We still love cars, and available options can give us massive improvements in both efficiency and amenity:

- **More efficient cars** - This doesn't mean fancy hybrids. The 55 mpg Honda Civic VX, sold in the U.S. in 1992, or the 74 mpg VW Polo now available in Europe, or the high-efficiency cars sold in other countries can make this possible quickly. Feebates are one of the best and fastest strategies to get there.<sup>17</sup> **A 66 mpg car (VW Polo) vs. a 22mpg car reduces energy use by two-thirds.** Already, high-efficiency cars match the energy efficiency of mass transit without the capital costs of constructing new transit systems. Higher occupancy and changed ownership patterns (below) offer creative ways of adapting what we have, rather than starting over.
- **45 MPH speed limit - can reduce energy use by 25%.**
- **European workweek** - Adopting the European 32 hr workweek would **lower our transportation energy use by 20%.**<sup>18</sup>
- **CarShare** - CarShare systems avoid car ownership, storage space, maintenance, insurance costs. Each car-sharing vehicle replaces as many as 7 private cars or more. A compact automobile costs \$5,000 a year for insurance, taxes and finance charges, and depreciation. The average CarShare member, in contrast, spends \$540 and drives 435 miles per year, vs. 10,000 miles.<sup>19</sup> CarShare also gives access to different kinds of vehicles - vans, pickups, convertibles, hybrids - for different needs, and when you need sole use of a vehicle for more than a single trip. **Adjusting for transit use, this probably represents an 80% reduction in mileage/energy use.**
- **Smart Jitney** - Jitneys, popular in other parts of the world, are shared taxis - cars and other small vehicles that carry multiple passengers over a regular or flexible route on a flexible schedule. They can provide anywhere - anytime - anyplace pick up and drop off service, with no parking problems. *Smart jitneys* add a GPS cell phone for efficient accessing and routing plus assurance of security and safety.<sup>20</sup> Some forms of this are already in development in Britain and Germany. **Tripling occupancy cuts energy use threefold.**
- **Live where you work, walk and bicycle** - These options obviously are simple ways of reducing transport energy use.

**Together, these reduce personal transportation energy use by 70-90%, with some increase in convenience and amenities.**

**FOOD:** U.S. agriculture currently consumes 10 times the energy that it produces in the food. We can:

- **Switch to organic food** - A 2007 UN study showed **organic production using an average of 50% less energy than conventional**, while producing more nutritious food.<sup>21</sup>
- **Eat less** - Americans consume 3,600 calories per day vs. need of about 2,500. **Stopping overeating and ending obesity can reduce energy use by one-third.**
- **Buy local** - **40% of energy use in food goes into processing, packaging and distribution.** Buying direct from local producers, or from your own garden, avoids such costs.<sup>22</sup>

**Bio-intensive home gardens reduce energy use by 90%**<sup>23</sup>, provide fresh food under your own control. The smallest U.S. farms, under 27 acres, are 10 times more productive than the largest, over 6000 acres.<sup>24</sup> Standard U.S. agricultural practice today requires at least 45,000 square feet of land to feed a person on a high-meat diet, or about 10,000 square feet for a vegetarian. Bio-intensive gardening can provide for a vegetarian's entire diet, plus the compost crops needed to sustain the system, on only 4,000 square feet.<sup>25</sup> This means that you can produce 40% of your food needs around your house on a standard 50'x100' urban lot.

- **Eat lower on the food chain** - An industrial meat-based diet consumes twice the energy as a plant-based one. **Cutting meat consumption in half reduces diet energy by 25%.**

**Just these four measures can reduce food energy expenditures by 85%.**

**Factor-10 economics applies also to industry, recreation, education, and all parts of our lives.** My *Learning to Count What REALLY Counts*<sup>26</sup>, and Hawkins and Lovins' *Natural Capitalism* give many examples. A couple - to give a sense of potentials:

**INDUSTRY - FORESTRY:** Proper long-rotation forestry, with cut cycles extended from today's 40 years to 180-240 years, can provide dramatic increases in timber and financial yields, while restoring the ecological health of the forest system. The non-timber economic value of other uses of the mature and healthy forests resulting from such cut cycles can also significantly exceed the timber value, adding even more to the economic benefit of these forest management practices. With today's short rotations, during almost half of the rotation time the trees don't even intercept full solar input to a site.

- **Timber sustainable yields possible with long rotations can double current yields, while providing an amazing nine-fold increase in net economic returns from timber production.**
- **Fisheries restoration possible with long rotation harvesting can produce annual revenues in the order of seven to twenty times current timber revenues.**
- **Recreation development possible with long rotation harvesting can produce annual revenues in the order of five to ten times current timber revenues.**

- **Special Forest Products** such as mushrooms and medicinals, possible with long rotation harvesting, **can produce significant annual revenues.**
- **TOTAL net economic value of long rotation forest management thus appears to be roughly *twenty to thirty times* that of present management practices!**<sup>27</sup>

And just a note here that with most of our industry shifted to China and elsewhere, a global meltdown won't leave us with empty industrial capacity of obsolete technology. It gives us a chance to rebuild our industry for local needs with new technology focused on the new economics and energy.

#### **WORK - BUY LESS, WORK LESS:**

- If Americans chose to take advantage of their high level of productivity by shortening the workweek or taking longer vacations rather than producing more, there would follow a number of benefits.<sup>28</sup> Specifically, if the U.S. followed the European Union-15 in terms of work hours:
  - Employed workers would find themselves with seven additional weeks of time off.
  - **The United States would consume some 20 percent less energy.**<sup>29</sup>

#### **INSTITUTIONS - HIGHER EDUCATION:**

- The simple measure of recording college lectures and making them available electronically so they don't need to be repeated can release huge resources.<sup>30</sup> The U.S. has over 4000 2 and 4-year colleges, with many courses offered more than once a year or once a term. **This alone can reduce staff, institutional, commuting, and building energy use by a minimum of 50% for just one university.** How about 4000? Along with separation of accreditation of academic learning achievement and job competency certification from residency college courses, this can provide open, learner-initiated learning at far lower cost and energy use.<sup>31</sup>

#### **INSTITUTIONS - HEALTH CARE:**

- **Single payer health insurance, by eliminating insurance company middle-men selling identical products, cuts health care costs in half in a single stroke.**<sup>32</sup> Medicare spends less than 2% on administrative costs, vs. 20% for private insurance. The U.S. spends two and a half times the industrialized world's median on health care. We spend a thousand dollars per person per year just on paperwork and administration, while Canada spends only about three hundred dollars per capita.

These examples, coupled with the huge impacts possible through the value changes connected with growth, inequity, and debt, suggest that there is huge opportunity for change. Opportunity for easily reducing our energy use by 90%, with alternatives and flexibility to adapt to the different wants and needs of different individuals and communities.

## The REALLY good news - values and quality of life

Our work and personal lives, our communities, our economy, and our environment will come alive again as we move out of the overstressed, failure-inherent culture centered on institutions of materialism and greed. Those changes run deep inside us and our world, causing our communities to become very different places to live.<sup>33</sup>

Like a forest changing from high-growth colonizers such as alder to mature and long-lived conifers, we have today two cultures occupying the same place - a new and enduring one coming into maturity, the other reaching its end. A change from focusing on the unraveling of the old to bringing forth and seeing the wonders emerging with the new can fill our lives with new purpose and joy.

**FOND FAREWELLS:** Many things will be as striking in their absence as in their presence. Urban skylines of towering office buildings will become less common as sedentary and unrewarding office work is replaced by more active involvement with real and rewarding local production of needed goods and services. Billboards and advertising will virtually vanish as we come to see them as invasive, expensive, and wasteful goads to excessive consumption. We may find only remnants of the large-scale institutions such as the prisons, schools, hospitals, shopping centers, power stations, and airports that have today replaced direct dealing with our needs.

**MOBILITY:** Being hypnotized by mobility and its attendant freeways, ubiquitous automobiles, and ceaseless aircraft takeoffs and landings will be a thing of the past. In part because of the depletion of cheap fossil fuels, but more importantly a realization that mobility makes all places alike, destroying its own value. People will still be moving, living, and traveling around the world. But they are likely to be on slower *pilgrimages* more deeply involved in absorbing from and sharing with others instead of fast and superficial travel.

**QUALITY:** Communities will likely be smaller, with longtime residents, as the importance of intimacy in interaction with people and place becomes felt and as the higher effectiveness of local production for local needs becomes vital. There will be time for quality time, and for being real parents and real family and real community. Timelessness will open a true intimacy between us and others and between us and the places we inhabit. We will experience an interest in quality and inner meaning, instead of quantity and "appearances". Instead of only perceiving our world through rational and literate processes, we will join that to the integral non-causal psychic and open-heart consciousness that joins us to all of creation. We will have the security of seeing our food growing around us, our energy needs reduced to a pittance, the causes of our fears erased. We may even discover that we can have *fun* doing things.

**WORK:** There will be a quiet, unhurried air to the patterns of life, as the walls between work and leisure are removed and the immense costs in time and production needed for today's growth are eliminated. Work will occur with leisure and unstressed joy, feeling a fullness that comes out of connectedness and awareness of the gifts we give and receive through it. Healthful and nurturing work will both enhance our skills and feeling of being of value, while producing the goods and services needed for a healthy existence.

**MEDIA:** Radio, TV, sports, music, and other cultural media will be transformed, as we rediscover that *doing* is far more rewarding than passively watching others perform. Paradoxically, the interest in and attention to professional performances will be more intense and involved as more people observe out of their own competence rather than as

just couch potatoes. Soap operas will be replaced by the real dramas of helping each other with the ever-deepening growing and maturing in our lives.

**SUPPORT:** We will find people on the street connecting with us, interested in us, and interesting *to us* in turn. We will feel support from others and from community, instead of having everything on our own shoulders. That support, manifested through "living-wage" retirement for everyone, will replace the fears that have filled even the retirement homes for the wealthy. We may discover that these small and apparently isolated communities are even more deeply and intensively interconnected in global and interest communities. We will be pleased to find that the level of well-being, satisfaction, security, as well as our physical, spiritual and emotional health, far exceed those of today.

**ARCHITECTURE:** These profound changes in the *what, where, and how* of our activities will likely be equaled by the changes in architecture, landscape, interior, and urban design. Instead of being segregated as today, an intimate interweaving of work place, living place, leisure and learning will be more common - eliminating much of today's demand for daily mobility. Restoration and enhancement of the beauty and power of communities and natural places will be actively sought, as people work to "make where they *are* paradise" rather than needing to escape to "recreate" in better places. While new building activity will dramatically lessen as our population stabilizes, the modification, replacement, and upgrading of existing facilities will result in architecture and communities with distinctive regional character, which are able to touch our hearts. Local materials, local climate responses, daylighting, solar heating, night cooling, and native landscaping will produce remarkable character changes from one region to another.

**VALUES:** The reworking of our existing urban fabric from a new value base will transform our communities, and imbue them with positive characteristics virtually absent in today's cities. There will be more places that evoke community intimacy. We will have places filled with the powerful in-breath of silence. Our communities will have places to nurture the soul as well as shelter the body. They will reflect the values of giving, caring, equity, durability, and respect for all creation, and will hold all of that creation sacred. They will create space so the spirits of our air, land, and waters may flow free again. And most of all they will express the gift of love going into the making of places, and the passion of that uninhibited giving of love.

All these are nice words. **But experiencing the reality of a culture which is integral with these values is amazing and heart-opening.** It is our future to unfurl. We have discovered already that this new operative vision *does* produce a new architecture, a new landscape, and new communities. It *does* produce places with souls, ones that can move our hearts, and ones that honor and accommodate all of Creation. And it does this while enriching rather than destroying our planet and our souls in the process. With that in our hearts, a wonderful healing and a new era of our world can begin.

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<sup>1</sup> See *Plan C*, Pat Murphy, 2008, for an excellent discussion of many of these topics.

<sup>2</sup> Again, see *Plan C*, Pat Murphy, 2008, for details and references.

<sup>3</sup> See my *Learning to Count What REALLY Counts: The Economics of Wholeness*, and summary of its main points: "Economics of Wholeness" <<http://www.tombender.org/factor10econarticles/econofwhole.html>>

<sup>4</sup> *Factor Four*, Weissäcker, Lovins & Lovins 1997

<sup>5</sup> "Sharing Smaller Pies" <<http://www.tombender.org/societyworthlivingforarticles/smallerpies.html>>.

<sup>6</sup> "Some Questions We Haven't Asked"

<<http://www.tombender.org/societyworthlivingforarticles/somequestions.html>>

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<sup>7</sup> See "Some Questions We Haven't Asked" for more details and examples.  
<[www.tombender.org/societyworthlivingforarticles/somequestions.html](http://www.tombender.org/societyworthlivingforarticles/somequestions.html)>

<sup>8</sup> "Ban Billboards, Buy Less, Work Less" <<http://www.tombender.org/columns/BAN BILLBOARDS .pdf>>

<sup>9</sup> See "Unexpected Gifts" <[www.tombender.org/societyworthlivingforarticles/gifts.html](http://www.tombender.org/societyworthlivingforarticles/gifts.html)>

<sup>10</sup> See also "Building Real Wealth" 1993.  
<<http://www.tombender.org/societyworthlivingforarticles/realwealth.html>>

<sup>11</sup> "Ouroboros", Tom Bender, 1973. <<http://www.tombender.org/sustdesignarticles/livinglightly.html>>

<sup>12</sup> "Ouroboros Project." <http://www.tombender.org/archprojects/ouroboros.jpg>

<sup>13</sup> "Two for One" 2006. <<http://www.tombender.org/factor10econarticles/REDWING.pdf>>

<sup>14</sup> "Zero-Energy Homes" <<http://www.tombender.org/sustdesignarticles/ZERO2.htm>>

<sup>15</sup> See <<http://www.affordablecomfort.org/index.php>>

<sup>16</sup> <[http://www.affordablecomfort.org/event/aci\\_home\\_performance\\_conference\\_2008/courses\\_details/1057](http://www.affordablecomfort.org/event/aci_home_performance_conference_2008/courses_details/1057)>

<sup>17</sup> "Double Vehicle Gas Mileage NOW" <[www.tombender.org/columns/DOUBLE VEHICLE MILEAGE.pdf](http://www.tombender.org/columns/DOUBLE VEHICLE MILEAGE.pdf)>

<sup>18</sup> "Are Shorter Work Hours Good for the Environment?" David Rosnick and Mark Weisbrot, December 2006, Center for Economic and Policy Research.  
<<http://www.neahcasa.org/transportation.htm>>

<sup>19</sup> <<http://www.neahcasa.org/transportation.htm>>

<sup>20</sup> See Plan C, Pat Murphy, Chapter 10. <Zipcar.com> has internet scheduling and GPS proposed for Smart Jitneys. <[liftshare.org](http://liftshare.org)> in the UK administers a ride-match program for 200,000 members. <[Mitfahrzentrale.de](http://Mitfahrzentrale.de)> based in Germany offers ride-share throughout Europe for 675,000 members.

<sup>21</sup> "Energy Use in Organic Food Systems" Jodi Ziesemer, Food and Agriculture Organization of the United Nations, August 2007.

<sup>22</sup> "Energy use in organic farming systems." MAFF. 2000. Report number OF0182.  
<[http://www2.defra.gov.uk/research/project\\_data/More.asp?I=OF0182](http://www2.defra.gov.uk/research/project_data/More.asp?I=OF0182)>

<sup>23</sup> Fritz Schumacher reminded me years ago that suburbs aren't really a problem. "TLC - Tender-Loving-Care" gardening in all that yard area is hugely more productive than standard agriculture systems.

<sup>24</sup> "Energy and Sustainable Agriculture" L. Hunter Lovins. <[www.wallacechair.iastate.edu/PDF/Hunter-Booklet.pdf](http://www.wallacechair.iastate.edu/PDF/Hunter-Booklet.pdf)>

<sup>25</sup> The Land Institute, 1993 Annual Report; E.U. von Weizsacker, *Earth Politics*, 1994; and Ecology Action annual report, 1993.

<sup>26</sup> See summary of its main points: <<http://www.tombender.org/factor10econarticles/econofwhole.html>>

<sup>27</sup> See my "Fixing Failed Forests" <<http://www.tombender.org/factor10econarticles/forestry.pdf>> and "Improving the Economic Value of Coastal Public Forest Lands" <<http://www.tombender.org/factor10econarticles/forestlands.html>>

<sup>28</sup> "Ban Billboards, Buy Less, Work Less" <<http://www.tombender.org/columns/BAN BILLBOARDS .pdf>>

<sup>29</sup> "Are Shorter Work Hours Good for the Environment?" David Rosnick and Mark Weisbrot, December 2006. Center for Economic and Policy Research.

<sup>30</sup> "Vitality and Affordability of Higher Education", 1993.  
<<http://www.tombender.org/factor10econarticles/highered.html>> Also "Building Real Wealth" <<http://www.tombender.org/societyworthlivingforarticles/realwealth.html>>

<sup>31</sup> See also "Terminal Ed: Our Schools Are Dead" <<http://www.tombender.org/societyworthlivingforarticles/terminald.html>>

<sup>32</sup> See "Real Health Care" <<http://www.tombender.org/columns/healthcare.pdf>>

<sup>33</sup> See my *Silence, Song, and Shadows*, 2000, and "Shedding A Skin That No Longer Fits" <<http://www.tombender.org/societyworthlivingforarticles/shedskin.html>>