ISSN 1048-3500

*********************CAR-RT LOT**C014
01/01/2005
PETER SCHWARTZMAN
564 E LOSEY ST
GALESBURG IL 61401-3741
S23 P5

Real Estate Sales page 18

THE ZEPHYR

50¢
www.thezephyr.com
GALESBURG, ILLINOIS

VOLUME 20, NUMBER 26 | NEW RECORD: 30 MILLION ON FOOD STAMPS | NOVEMBER 27, 2008

Energy dependance

Can we get there from here?

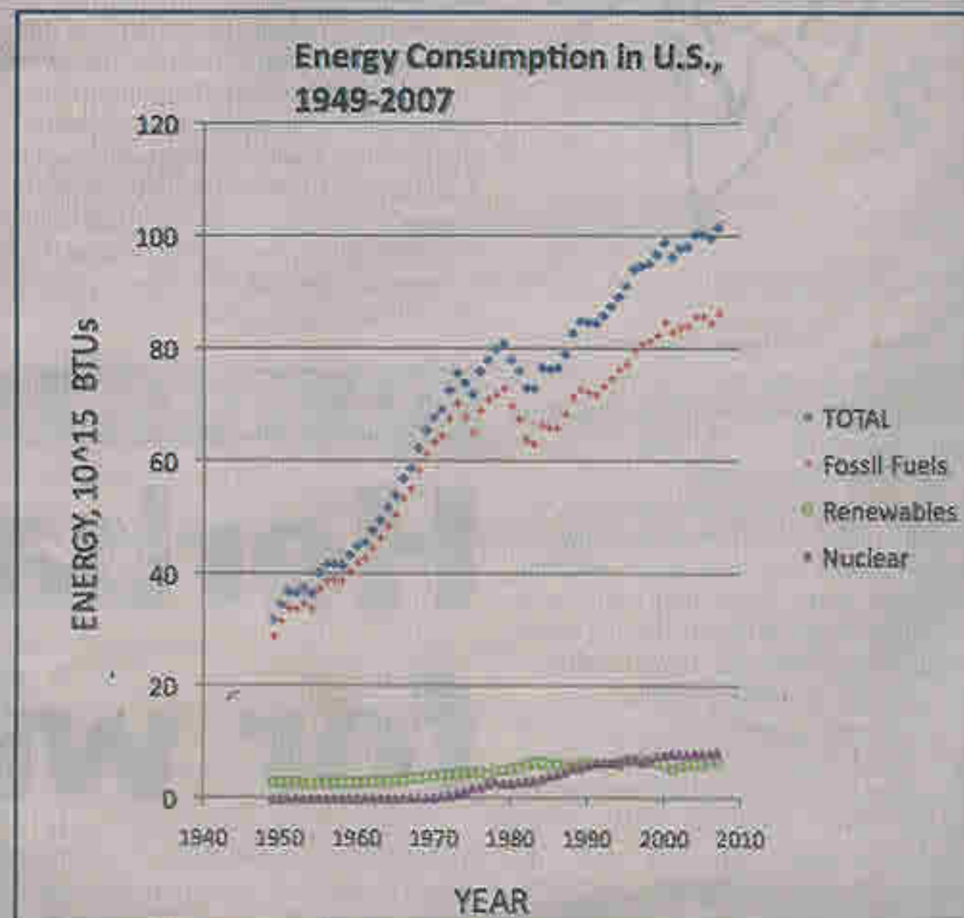
by Peter Schwartzman

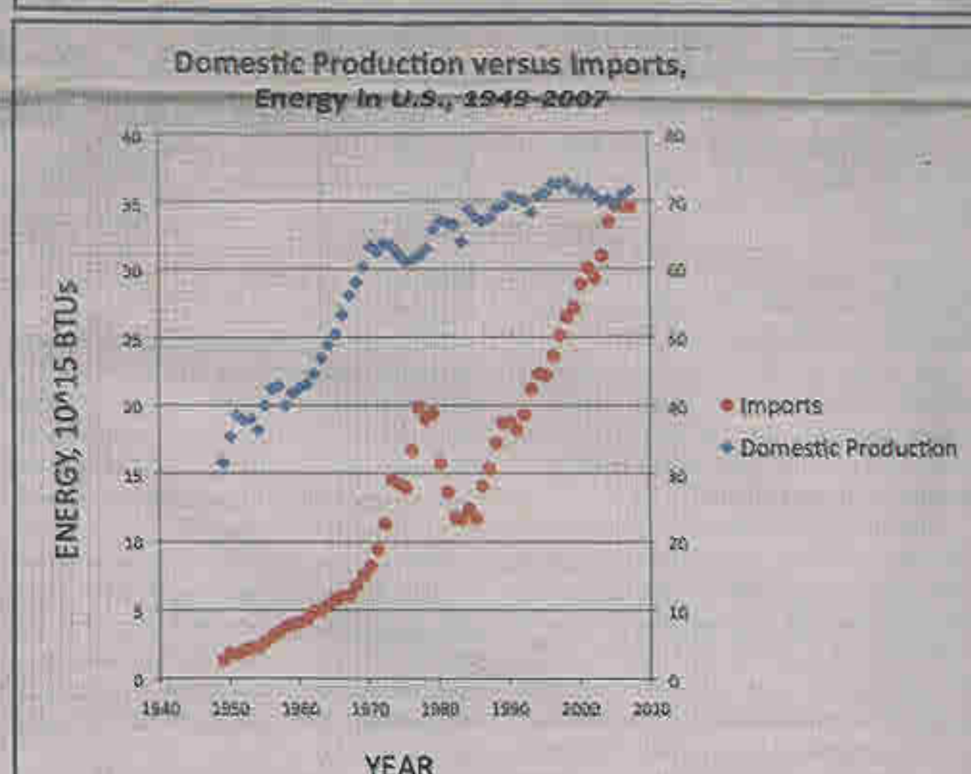
Getting enough energy to sustain us figures to be a major focus of society in the foreseeable future. As our wants continue to grow (here and abroad), we'll need greater and greater allotments of energy. However, given concerns over impending climate change and increased reliance on foreign energy sources, we need to be very cautious about the energy path we take. In this respect, the next few years are critically important because the decisions and directions we soon take will undoubtedly shape the world our children inherit. While the pace that climate change will take is uncertain, don't we need to consider if "rolling the dice" is good policy, especially when alternatives appear to exist. Also, how much longer can we rely on our military to secure sufficient quantities of foreign oil and natural gas? How will we begin moving towards climate stabilization and energy independence?

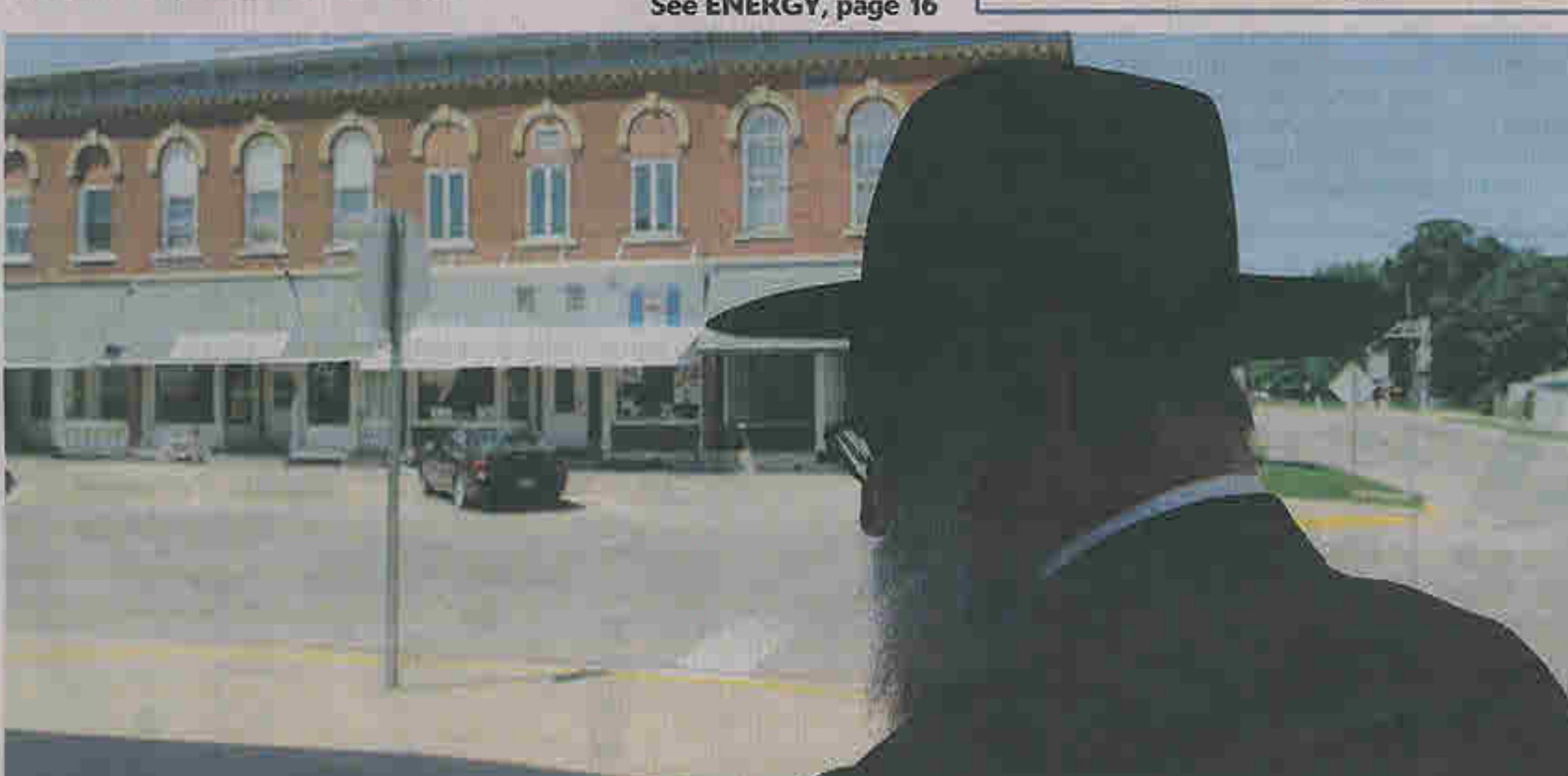
These questions require our attention now. It is important that all of us grapple with them, and not let a few deep-pocketed politicians decide without our counsel. However, in order to do so, we need to understand some basic concepts about energy. Surprisingly, our educational system generally gives us very little to work with when it comes to understanding the ever important energy system. And, unfortunately, the press doesn't give folks sufficient background either, perhaps because the writers themselves have little preparation. In light of this, let's cover some of the basics, clarifying a few things that have perplexed me and sharing a few implications following from these basic revelations.

One of the more mystifying aspects of understanding energy is making sense of all the terms that are used to represent it. Consider that BTUs (British thermal units), Joules, kWh (kilowatt hours), calories, therms, quads, foot-pounds, and ergs are all different measurements for energy. All of these units have their adherents/users but it is imperative that we are conversant with them and understand how to convert from one to the next without great difficulty. For an example that illustrates this, consider: If someone has 14 100-watt (W) light bulbs in their house and they use them approximately half of the time, how much energy will this require (and how much will this cost) for an entire year? First, we have to understand what we mean by a 100W light bulb. It **doesn't** have anything to do with how much light (measured in lumens) is released and everything to do with how much energy (here in the form of electricity) it takes to light it up. (This is why an efficient fluorescent bulb can emit the same amount of light as a standard

See ENERGY, page 16







Postville and Monmouth

The recent INS raids that have shut down the largest Kosher meatpacking plant in the country have devastated Postville, Iowa. Richard Crockett looks at possible local implications in his article on page 15.

Rabbi Shalom Gurkov walks on Main St. in Postville, Iowa. The Rabbi vigorously disputes the accusations of crimes.
Photo: Richard Sennott/ Minneapolis Star Tribune/MCT

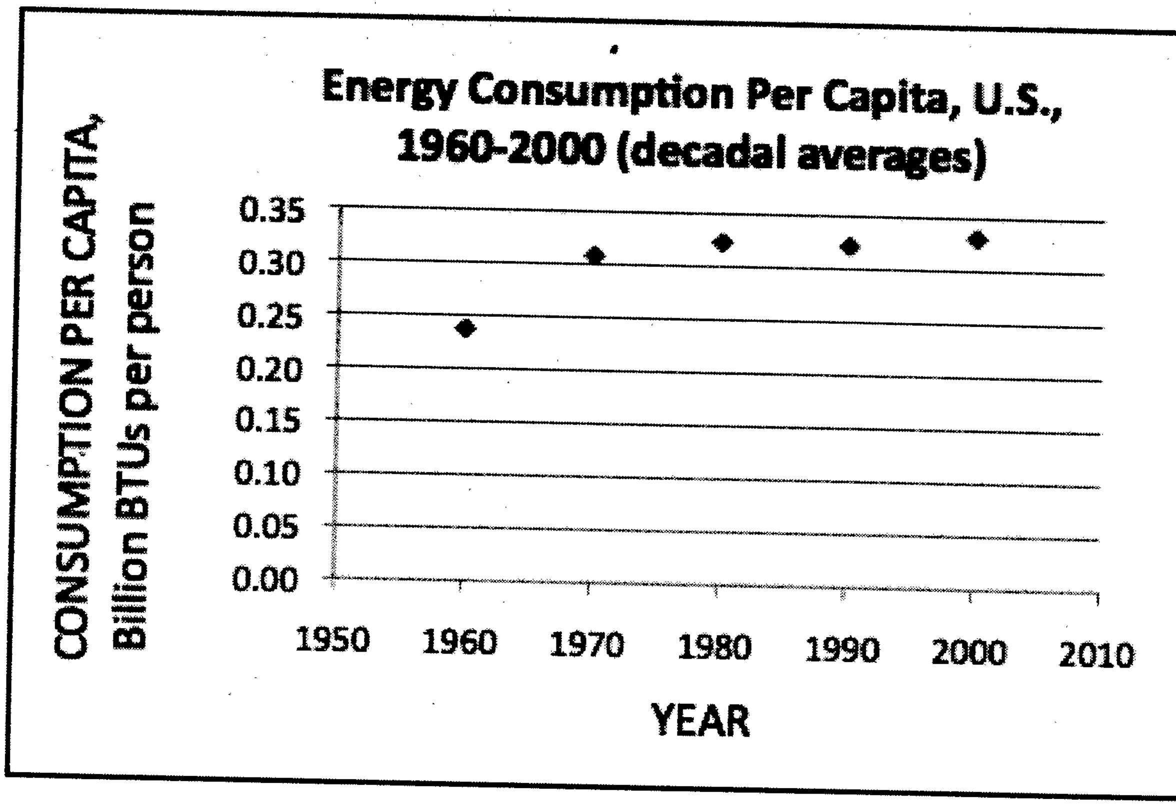
ENERGY, from page 1

incandescent one while being of a much lower wattage). But the unit of watt/watts is actually a power measurement, i.e., an energy intensity or energy per time; it takes roughly a watt of power to pick up an orange from the ground and put it on a kitchen table if one takes but a second to perform the task; the same task drawn out over a longer time period requires the same energy, but less power. So in twelve hours of use, a 100W light bulb requires 1,200 W-hours, or 1.2 kWh, as you will see it listed on your electricity bill. Fourteen such bulbs, over an entire year, will use 6132 kWh. And since the going rate for residential electricity in the state is ~$0.11 per kilowatt-hour (interestingly, the industrial rate is over 30 percent less in Illinois), running these bulbs each day, for twelve hours will cost $675 annually (EIA). No wonder it pays to turn the lights off.

Yet when we start to account for our collective energy usage, we often use other units. Currently, annual per capita energy usage in the U.S. is about 340 GJ (billion joules) or ~97,000 kWh. Extrapolating this to all 300+ million people in the United States, it is determined that we, collectively, consume 102 EJ (exajoules, exa- is used for 10^18). Typically this is written in terms of BTUs (as shown in the figures) or quads. Since one quad is equal to 1.055 EJ, we consume about 97 quads of energy each year, which is an amazing number when one considers that the world's other 200+ nations combined only consume ~353 quads. So, here in the U.S., we consume ~22 percent of all the energy, though we make up less than 5 percent of the world's population.

Once one gets familiar with the units, the next insight comes by way of differentiating between energy forms. We either get our energy from fossil fuels, radioactive materials, the Earth's core, or the Sun. While the Sun's energy, as direct light as well as in some of its secondary forms—wind, waves, and currents, is by far the biggest supplier of energy on the planet, we humans rely heavily on the much less abundant form—fossil fuels. Currently, about 80 percent of our consumption of energy comes from petroleum, coal, and natural gas (40 percent, 23 percent, and 23 percent of the total, respectively; nuclear power only provides 8 percent of all the energy used nationally (and 6 percent globally). We use fossil fuels to drive our vehicles, transport ourselves via other modes, heat our homes, power our machines, and fertilize and chemically-treat our fields. We use electricity, on the other hand, to power many household appliances and some industrial machinery. Nationally, though, the consumption of electricity accounts for only ~12 percent of all the energy that we directly consume. (It actually requires ~38 percent of all our consumed energy to produce this 12 percent, which leaves 62 percent left for non-electric purposes. This is due to major inefficiencies that result from converting raw materials—such as coal—into electricity.) Most of our electricity comes from burning coal (52 percent), with the rest derived from natural gas and nuclear power, each to the tune of between 15 to 21 percent. This leaves only about 11 percent coming from the renewable sources such as hydroelectric (~7 percent) and biomass, geothermal, solar and wind (combining for ~4 percent).

It isn't just that we are using finite resources to fuel our society and economy, we've been on a path of increased energy consumption for quite some time. For instance, energy use in the United States has nearly tripled (up 194 percent) since 1950. Most of this stems from the growth in population, but some is due to increases in per capita energy consumption which is up 39 percent (from 1960 to 2000) (see figures). Thus despite using increasingly efficient technology in many areas, our greater demand for goods has more than offset the advances in efficiencies. Globally, things are moving even at a greater pace. Developing countries in particular are seeing their energy consumption rise much more quickly. While the "developed" countries have actually seen per capita energy consumption level off in the past 15 years, "developing" countries have seen it grow 42 percent. Over the same period, China has seen its per capita energy use go up a whopping 73 percent, a staggering figure given its population is over 1.3 billion now (more than four times as large as ours) (WRI).



And all these energy forms aren't created equal however. Not only do they have the potential to produce different amounts of energy, they are distributed very differently about the planet. In the former case, a pound of gasoline contains about 27 percent more energy than an equivalent weight of natural gas, about 1.5-2.8 times more energy than coal, and yet less than half the energy contained in hydrogen (Smil). This is among the reasons why it makes the most sense to use gasoline in our cars (at least as compared to other fossil fuels). Though hydrogen is very energy-laden, it is gaseous at room temperature and pressure as well as very, very explosive. In the latter case, our lack of oil in this country and abundance in places like Iraq, Iran, Nigeria, and Venezuela, make for interesting (and often humanly devastating) foreign policy decisions.

These energy forms all also come with different externalities, i.e., the additional costs/damage bore by society and the environment in the extraction, processing, distribution and use of a particular energy form. By burning coal, we put mercury into the environment. Some of this we ingest when we eat tuna or swordfish (well, almost any fish, actually). This can do irreversible harm to our bodies, neurologically and immunologically. On the other hand, solar panels typically require the use of heavy metals (such as, tellurium and selenium) that also can do damage to life if ingested in high quantities; selenium is actually consider a trace nutrient that appears to benefit humans who consume it in their diet. So there is no completely "clean" energy source and one must actually do the full cost analysis (which we don't do) to find out which is preferred. The true cost of these energies must include these externalities. In fact, the first thing we need to do is reassess our values and our priorities. If we did, I don't think we would be talking about "clean" coal and nuclear power as part of a healthy and secure energy future.

We've been on a path of increased energy for quite some time. For instance, energy use in the United States has nearly tripled (up 194 percent) since 1950. Most of this stems from the growth in population, but some is due to increases in per capita energy consumption which is up 39 percent (from 1960 to 2000) (see figures). Thus despite using increasingly efficient technology in many areas, our greater demand for goods has more than offset the advances in efficiencies. Globally, things are moving even at a greater pace. Developing countries in particular are seeing their energy consumption rise much more quickly. While the "developed" countries have actually seen per capita energy consumption level off in the past 15 years, "developing" countries have seen it grow 42 percent. Over the same period, China has seen its per capita energy use go up a whopping 73 percent, a staggering figure given its population is over 1.3 billion now (more than four times as large as ours) (WRI).

What does one make of all these numbers? Well, we are still dominated by fossil fuels both for our electricity as well as energy in general. Their use results in carbon dioxide emissions that are pushing the climate system to unknown tipping points (i.e., a point where irreversible change will occur, such as the melting of an ice sheet or a shutting down of the deep water circulation in the ocean). Additionally, burning these fuels also produces carbon monoxide, a poisonous gas, as well as other gasses and particulates that are dangerous to our lungs and other life forms. A shift to renewables (as many have recommended) will greatly reduce these atmospheric inputs but it will require a major change from things as we now have them. Wind turbines are going up all around us and this trend is expected to continue. If we can begin to manufacture turbines in this country on a large scale, this won't only make wind energy a great environmental choice but will produce tons of good paying jobs as well. A report just released by the Center for American Progress, points out how a "$100 billion down payment on a better energy future" will pay huge dividends for workers in the U.S. (Pollin *et al.*). With a serious commitment to renewable energies in the U.S., we should be able to produce 45 quads of energy (or 46 percent of our current usage) by midcentury (Pimentel *et al.*). Much of the remaining energy needs can be obtained in the form of future energy savings (conservation, i.e., using less and adopting more efficient ways of doing things). These savings can come in by way of better insulated homes, more car pooling, higher fuel efficiency standards, improved public transportation routes, enhanced local food consumption, installation of fluorescent or LED lighting, and the purchase of energy efficient appliances.

These conservation efforts get at the core of one of our most serious issues we have to deal with in the U.S.—our gluttonous energy usage. Not only do we use huge amounts of it (in per capita terms, we use 91 percent more energy than the Japanese, 88 percent more than the Germans, 6 times more than the mainland Chinese, and 16 times more than people in India or Kenya (WRI)), we now also import nearly half of the energy we use (see figure). Notice how quickly we have increased the amount of imported energy, three-fold in just twenty years. Clearly, this trend can't continue. Domestically, we have very little oil left, so it seems we are going to have to change our ways, rather abruptly in fact. Walking the climate change tight rope also doesn't seem wise. It is time to change. So, be prepared to change. Welcome it. Cleaner air and fewer wars over oil will be just two of the many positive benefits of such changes.

One gadget that might inspire you and others to be more conscientious about household energy use is called a Kill-A-Watt; it can be purchased for $20-$25 online. It allows you to see how much energy a given appliance is using (very simply to, just by plugging it into the device and then into the wall). This information can provide the visible feedback we need to make more responsible and cost-effective decisions. Hopefully, this device will make its way into some stockings this year.

Schwartzman's other *Zephyr* articles on Energy (all available online): "The sun: an answer to many of our problems." 1/10/08. with Tim Montague. "Continued Energy Woes or a Secure Energy Future?" 8/31/06. "Is nuclear the answer?" 5/26/05. "Where has all the oil gone? Short term chaos. When will we ever learn?" 1/30/03.19, 2001.

Works Cited:

EIA. Energy Information Administration. (electricity rates) www.eia.doe.gov/cneaf/electricity/epm/table5_6_a.html (annual reviews) www.eia.doe.gov/emeu/aer/overview.html

Pimental et al. (2002) "Renewable Energy: Current and Potential Issues." *Bioscience*.

Pollin et al. (2008). "Green recovery: A Program to Create Good Jobs and Start Building a Low-Carbon Economy." Center for American Progress.

Smil, Vaclav. (2006) *Energy*. Oneworld Publications, 181 pp.

WRI. World Resources Institute. earthtrends.wri.org

Peter Schwartzman (email: wordnerdauthor@gmail.com) is associate professor and chair of the Department of Environmental Studies at Knox College. Father to two amazing girls, Peter hopes that their lives will be lived on a less-toxic, more just, more loving planet. A nationally-ranked Scrabble® junkie, he is also the founder and maintainer of websites dedicated to peace and environmental well-being (www.onehuman.org & www.blackthornhill.org) as well as cofounder of The Center (thecenteringalesburg.org).