

The Oil Drum: Campfire

Discussions about Energy and Our Future

A Trip to Todd's

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Below the fold is a '[Campfire](#)' submission from Todd Detzel, posting for many years on TOD as 'Todd -a Realist'. Todd has a BS in chemistry but moved into mostly process development and chemical engineering including starting-up new facilities. He was a chemical plant manager before moving to the country in 1974. Since that time he has been everything from a small-scale certified organic grower to home designer and builder. He is now retired.

Though not precisely what I had in mind for the Campfire series, Todd's story about being (reasonably) self-reliant might be a good starting point for discussions about what is/isn't possible about *individuals* becoming less dependent on fossil fuels even if society is slow to do so. From my perspective it is about wide boundary thinking, and an acceleration of timing (before retirement) of trading financial capital (and time) into real capital (in this case, equipment and human knowledge necessary for renewable procurement of basic needs). As someone who still has a foot in both the old and new paradigms, I'm not even sure *what* skills will be needed in the next generation, but declining net energy suggests more physical labor, and declining per capita wealth suggests increased focus on basic necessities. Ultimately there is a spectrum between a high-rise city dweller and Todd's story below. We can't all live the way he does, but I suspect there will be a shift in that direction in the years ahead, as more built capital created by fossil fuels is aggregated in the private sector without intent for financial profit, but reliance. How big a shift, and for how many is an open question.



A Trip to Todd's

Background

My wife and I have lived in this area since 1974 and at our current place since 1979. We've been married 48 years and chose not to have children at a time when children were an expected part of marriage. We live on 57 acres at an elevation of 3,060' in the Coast Range Mountains of northern California. Our climate is more mid-western than Californian. We usually get snowed in for a week or more every winter – often more than once – even though we are only about 20 miles inland from the Pacific Ocean.

Getting Here

Pam and Joe Jones will be visiting us today (who are a composite of many visitors including ones we've had at open house's.). Here are the directions I gave them:

You turn right off the two lane state highway as you are heading north onto a narrow dirt and gravel county road. Be prepared to stop at a wide spot if you see a pick-up truck coming down the road. A few miles up, take a turn to the left onto our private road and keep going up. It's a mile to our house and you will have climbed about 1,500 feet in elevation from the state highway by the time you get here.

About a half a mile up the road you'll see an acre pond on your left and a few hundred feet further on, a house on the right and a cabin on the left. The house is a rental of ours. The people who own the cabin come up once a month or so and are good friends. The level of the pond is really worrying because it is so extremely low for this time of year.

Todd's View of the Future

Pam: Gawd, you really are in the middle of nowhere.

Todd: *Well, from a country perspective we are in suburbia. We have friends only five miles away who have to ski or snowshoe a mile just to get to their truck a month or more during the winter.*

Joe: We want you see everything but first I'd like to know how you see the future.

Todd: *I am very negative about the future. First, there is population overshoot. Second, there is peak energy; peak resources really. Third, the financial sector and debt in general will preclude many needed actions. Fourth, the media and politicians are withholding the truth. Whether it is intentional or not doesn't matter. Only a minority of people has considered how all this might play out and the changes that are necessary. Finally, the federal government blew two chances to prove that it could respond appropriately to crises when it totally blew off Katrina (a non-pun) and approved the financial industry bailout. I believe there will be a rapid collapse, although I prefer the term "devolution" or "cascading defaults", within the next few years. Probably, in 2-5 years.*

Joe: Fast crash? Boy, are you in the minority.

Todd: *That's the way it goes. I don't live my life based upon what other people think. Further, because of a plant disaster that killed 15 men and some other incidents I personally experienced in the chemical industry, I do not take risk lightly. People who think that what is coming is a joke may starve and lose all they have. The good times are not coming back. It's going to be the permanent depression. If you don't have it right now, you probably will never have it.*

Joe: But what about mitigation? I've read about biofuels and other ideas to conserve fuel and energy.

Todd: *The mitigation ideas that people have proposed are too little, too late. All of these ideas, financial, energy, whatever, are an effort to maintain some form of business as usual when what is needed is a radical change in how people live and work and how governments govern – or not govern. And, this is not going to happen in time. It's going to be up to individuals and families, maybe neighbors, and, perhaps, communities to take action and responsibility; although I don't hold much hope for community solutions except for very small communities.*

Self-sufficiency versus Self-reliance

Joe: Well, from what I can see, it looks like you're pretty self-sufficient.

Todd: *I hate the term "self-sufficient." Damn, I sound like a grumpy old man don't I... but you know better. Anyway, it implies that I can supply all of our needs at our present standard of living. Anyone who takes the time to think about it will quickly realize that there are a number of things that we are not going to provide for ourselves. The term I prefer is "self-reliant." To me, it's like the old mountain men:*

They could do just about anything and could survive on very little but they still had to rely on the outside world for things like gunpowder, metal objects such as traps and knives and flour. But, if necessary, they could make do for extended periods and that's my goal.

My intent is to buy time by having a variety of alternatives; Plans B, C and D, if you will, with each one at a lower living standard, requiring more labor and more survival skills.

Alternative Energy

Joe: Well, on that happy note, since we're standing by a PV rack, I'd love to hear about your power systems.

Todd: *We are on the grid. In fact, we're the last people on the grid in this area. One of my concerns is that the power company will abandon this area in the future after a major storm breaks the lines because it simply won't be economical to repair them for the few customers they have in this area especially given the cost of fuel, parts and the distance the repair trucks have to travel to get here.*



Because our power has always been flaky, I installed this 3.6kW PV system and a

large battery bank in 1999. We used the California buy-down program to pay for a little bit of the system PV system. But, the cost was still close to \$30k including the batteries. The battery bank has desulfonators to extend its life. There are 32, L-16, 6 volt batteries wired for 48volts DC in four banks. We have dual Trace (now Xantrex) 5548 inverters so we can have 220volts for the well pump, stove and water heater. They each can each handle 5,000watts at 110volts or 10kwatts at 220volts. We are not grid tied since we would have to give up our time of use electric meter. To date, we've actually used 2megawatt hours.

We also have two back-up generators, an 8kW continuous output gas one and a 23kW three-phase diesel generator. If little gasoline or diesel were available, I would convert one of the generators to wood gas. I should add we'd do the same thing for at least our 4x4 pick-up.

I also used to have a 1.5kW Whisperwatt wind generator but finally sold it. It was only on a 40 foot mast and I chose the wrong location. I would have had to move it about 500 feet and gone to an 80 foot mast. The trenching alone would have been a pain since it would have crossed a number of existing underground power lines, phone lines and water lines.

Joe: Let's get down to power usage. I had assumed most people up here used propane for hot water.

Todd: *I guess it is surprising that we have a 40gallon electric hot water heater. We either use the grid or the PV system to run it. When I replaced our old water heater years ago, I debated between a propane, tankless one or to continue to use electricity. I chose juice because I can make juice but not propane.*

Joe: I'm curious, you say your PV system is 3.6kW, right? Ok, then how do you run a 40 gallon electric hot water heater which I know can draw up to 4,500watts? Doesn't it suck your batteries dry?

Todd: *Well, there's a trick. I decided to try running it while I watched the battery voltage so it didn't drop too low. I'd run back and forth from the shop where the inverters are, into the house to turn the juice off. I found that there was a rough time interval between on and off. Then I had an idea, why not just put a cycling timer on the water heater. Success! Right now it's set for 10 seconds on and 13 seconds off. The timer (Omron HC3R) sends a signal to a 220volt relay to turn the power on and off. Incidentally, we don't keep the water heater on all the time. I installed a standard duplex 220volt switch on the wall outside where the heater is and I also installed a thermometer on the outlet of the tank. When we want hot water we look at the thermometer and then turn it on if necessary. I also included a pilot light by the switch to remind us to turn it off.*

I do have a back-up water heater in storage. It's only seven gallons but that's plenty to get by with.



There is also a solar hot water system. The commercial units that are 4x8' or so would really have looked terrible sticking up so I designed my own. They are semi-concentrating. They are each 8" high by 24' long and rest directly on the roof. My two just about equal a standard panel in area. We get a 50 degree F rise in early spring and late fall which brings the temperature up to around 100-110 degrees and a 90degree rise in the summer that brings the temperature up to 140-160 degrees. This system runs off a standard timer but is also set up to use a differential temperature controller.

The differential temperature controller is really used by the heat exchanger in our wood heater. If we have a lot of fires, we often have to dump hot water. I blow down the solar collectors for the winter so they don't freeze since they don't self-drain.

Household Heating and Cooling



Pam: It seems like you have your electric power covered but what about heat? No one wants to be cold.

Todd: *Wood is our main source of heat. We have a wood heater in our living room and we use the 6 burner wood cook stove in the kitchen if we just want to take the nip off the air in the morning. But, as you'll see, we also have a standard electric range. – but, I've even cooked a turkey on the PV alone!*

I cut the wood on our property. We burn 2-3 cords of wood a year. We do use a couple of small electric resistance heaters in our home offices and one in the bedroom if it's really cold. Normally we get by with a down comforter in the bedroom.

Incidentally, we have a small wall AC unit that we run off the PV system during the day in the summer. It's 8,000BTU and does a good job. I do have to admit though that we run it on the grid a few nights during the summer when it's really, really hot.

Joe: What kinds of saws do you have to cut firewood?

Todd: *Well, on gas chainsaws I have a 32", a 24" and 2-16" ones. Then I have 2-16" and a 6" electric chainsaws that I could run off the PV system or the gas generator. And, if push comes to shove, 2-two-man 7' misery whips, a couple one-man saws and bow saws for small stuff*

And, naturally, I also have an assortment of wedges and splitting mauls but my

primary splitting tool is a 30ton hydraulic, gas-powered splitter.

Water

Joe: By the way, looking at your garden and orchard, I assume you have a well. Hell, you're on the top of a mountain in the middle of nowhere. What else would you have? How deep is it and how much does it put out?

Todd: *Actually, I know a number of people who pump water from springs far below their houses. But, we do have a well. Ours is 450 feet deep with a 2 hp submersible pump and we get about 12 gallons per minute. We can run it on the PV system to fill the pressure tank but not for irrigation where it runs continuously. It's not unusual to run it for 8-10 hours straight when I irrigate the orchard. We also have 4,700 gallons of water storage tanks; 1,000, 1,200 and 2,500 gallons. These are useful when there is a power outage since we have a 1/3hp pump that is fed from the largest storage tank and can be run on the grid, batteries or generator so we have household water. In the beginning, we hauled water in buckets if the power went out. These tanks also serve our rental and our neighbor's cabin down the hill. By the way, I still have the 12volt DC water pump we used to use with our first, little, PV system. It's a back up now.*

You know, I did a workaround on the well pump too. Ok, it can't pump continuously on the PV system but it will run through a pressure cycle if the batteries are full. What I did was to feed a solenoid via the pressure switch. The way it works is that when the pump is running, the solenoid closes an adjustable flow rate solenoid valve that leads to the storage tanks. When the pressure switch turns off the pump and the pressure tank is full, the solenoid opens the valve to the tank. By adjusting the flow rate, it allows time for the batteries to recharge and then the cycle repeats without over discharging the batteries. It isn't fast but it can fill the storage tanks. I try to never discharge the batteries more than 20% of full charge.

Incidentally, I have a back-up well pump in storage too. But, it's only 1 hp. It's virtue was that I got it really cheap.

The Garden and Orchard

Pam: Going back to the garden, can you sort of give us an overview?

Todd: *There are about 2 acres that are fenced and we use about 1½ acres. A lot of it is devoted to tree and vine crops. On tree crops, we have 4 varieties of pears, 4 varieties of plums, 2 varieties of peaches, 16 varieties of apples, 6 varieties and species of nuts and 2 varieties of persimmons. I guess there are about 50 trees in all. Then we have 6 varieties of grapes. And, finally, there are 15 varieties and species of berry and cane crops.*

On the veggie front, we have about 2,000 square feet. About half of it is wood-framed raised beds and half are terraced into the hillside. I began converting the raised beds to terra preta three years ago. Since we heat with wood, I always have small branches with which I can make charcoal. I add charcoal each year.

Although I was once a certified organic grower, I now sort of split the difference between chemical and organic practices. At 70, I'm into doing things as easily as possible and making compost isn't one of them. I use a combination of mulch growing (alfalfa hay-which I buy- and shredded paper), terra preta and fertigation (injecting soluble fertilizer into the irrigation water) using standard, soluble 20-20-20 fertilizer with trace minerals. I do add things like rock phosphate, greensand, glacial rock dust and oyster shell flour or gypsum depending upon the crop. I try to keep a 2-5 year supply of these things on hand plus things like oil and copper sprays for the orchard.

I turn the mulch under in the raised beds by hand using a long-handled spading fork in the raised beds and then I till everything in using a mini-tiller to break up the old mulch and new charcoal. I use a rear tine tiller for the terraced beds. I also use the mini-tiller as sort of a seed drill. I broadcast the seed (winter wheat or cover crop) and then run the mini-tiller over it really fast to work the seed into the soil.

As I said, I don't use cover crops on the raised beds any more because they are a pain and don't work well for me. Our soils stay too cold in spring for them to breakdown before crops are planted. However, I do use cover crops on the terraced beds because the soil isn't great and I plant crops later when the soil is warm. I used to use a mix of fava beans, hairy vetch, cowpeas and oats from Peaceful Valley Farm Supply (Groworganic.com). Unfortunately it began to cost too much; over \$2 a pound by the time it got here. I'm now using Montazuma oats that I can get cheap at our farm supply. I have about a four-year supply on hand.

But, here's a neat trick if you ever plant large quantities of legume cover crops. Wet the seed with milk in a pail or a portable cement mixer, then add the inoculant to coat the seed, dump it on a tarp, let it dry enough to be able to handle it and get it planted. This way you can be sure that every seed is coated and you don't waste an expensive product.

I'm also revisiting hydroponics. We grew organic hydroponics years ago using 5 gallon grow bags and a major overhead support system for a number of 6 foot long grow bags for strawberries suspended from the overhead. This time I'm using inverted 3 liter bottles with the bottoms cut out attached to a "T" post. I did bush beans this year as a test and will set a bunch of new ones up for strawberries this spring. The idea is to mimic a commercial unit called a HydroStacker.

I have to admit that I don't grow what I would grow if we were on a survival footing – much less on the scale necessary. A survival garden would be corn, beans, squash, potatoes, tomatoes, some quinoa and winter wheat along with greens, some peas and I might include some "edible" soybeans I grew years ago. Oil would come from sunflowers. Although I do grow some of these crops every year, I also take space for things like watermelons and cantaloupes that are fun to have. Most of the veggies are open pollinated so I can save the seed from year to year but corn would be another matter. I usually grow hybrid sweet corn because it's so much better. But, I also grow a little bit of open pollinated corn just to keep the seed viable. I have everything from field corn and popcorn to flour and meal corns. The flour corn is a pink Hopi variety and the meal corn is a blue Navajo one.

Food Preservation

Pam: I suppose you preserve a lot of the food you grow.

Todd: *For sure. And, actually, I do most of the preserving, not my wife, because she has shoulder trouble. We, I, hot water bath/steam can, pressure can, dehydrate, juice, freeze and simply store things like Hubbard squash and potatoes in a cool area. We also can or freeze some things we buy at the store. For example, we never have had good luck with broccoli and can buy it cheaper at COSTCO. So, we get a big bag, blanch it and freeze it a few times a year. A good thing to remember is that people need about one quart of fruits and one quart of vegetables a day...that's a lot of canning jars or freezer bags.*

We also buy things in bulk like wheat berries, bread and AP flour, oatmeal, popcorn, olive oil, salt and sugar. We store these in 50 gallon used olive barrels. These are great since they are food grade and have a screw-on top with a gasket so nothing gets in. We have six barrels. By the way, I always put the grains and flours in the chest freezer for a month or so to kill any Indian Meal Moth eggs.

We buy meat "in bulk" too, either from COSTCO or when a chain store has it on sale. We have an 8 cubic foot chest freezer, a 25 cubic foot upright and 7 cubic feet in our refrigerator/freezer. And, I try to keep them packed full. By the way, I vacuum pack all of the meat using a Food Saver. The meat keeps well for several years. But I also pressure can things like chicken breasts and browned ground meat.

Finally, we have a 6x10 foot pantry for canned goods. We don't eat much processed or canned food but we do need some things like molasses that I use in the bread I bake and a place to store things we've canned.

Joe: (With a wink) You putting TP into those olive barrels too?

Todd: (Laughing) *Actually, the hole is too small for the big packages I buy. The TP is in a huge, square plastic trashcan with wheels. You never know when time will be of the essence and those wheels will come in handy.*

The House

Pam: Wow, those are the highest sliding glass doors I've seen.

Todd: *Yes, you don't see many 8' high sliding glass doors in houses (the wall at that point is 12 feet high) but they fit into my design for a house that was partly solar heated and didn't impact the wisteria overhead above the patio to block the summer sun. In fact as you'll see from the front, almost half of the south wall is 8'high sliding glass doors plus another 45 square feet of windows in the kitchen. By the way, the house is 82' long and, essentially, one room deep. It has 2,200 square feet plus another 200 square feet of what looks like a porch in back but is actually a covered firewood storage area. It's sort of interesting that the garage/shop is about 1,800 square feet. My only come back for its size is that only 600 square feet has a concrete floor – much to my wife's displeasure.*

Here's the deal on the house; I've been interested in alternative energy and energy efficiency since the late 1960's. One of the things I did after leaving the chemical industry was home design and construction. Our current house is the last one I did.

Our climate precluded a fully passive heating system and an active system would have had to be huge and expensive. Instead I settled upon what we could afford which was about 30% passive heating, the rest of the heat coming from wood. Although it may not sound impressive now, the house has R-47 roof insulation, R-20 walls and an insulated slab. But, it was cutting edge twenty-seven years ago. There were lots of other energy saving things I wish I could have done but this was really a budget design. However, we did have enough money for a funky solar water heating system (coils of NSF poly-pipe laid on the roof) and the heat exchanger in the wood heater. I also put in a little PV system; all of 77 watts, a couple of truck batteries and a 500 watt modified sinewave inverter. Not bad for that long ago.

It's Not Always Wonderful in Paradise

Pam and Joe: Ok, we've seen what you're doing and have done. What does it take to duplicate what you have been doing for more than 30 years?

Todd: *I wish I could give a simple answer. But, the truth is far, far more complex. Maybe it's like people going through rehab; you have to reset your reality. Our city friends come up here and see this and the physical stuff first and say, "Oh, Wow!" What they don't see are the psychological adjustments and skill-sets that made this possible. And it's one of the reasons I don't hold out much hope for the future; many people won't be able to pull off this kind of thing even in a more developed area.*

*This isn't suburbia with large lots or even exurbia. This life of ours is really a different reality. One of the things we often hear is, "What do you do for fun?" Meaning how do we spend our leisure time. There is no leisure time. At the same time it is all leisure time because we are doing what we want to do. Does that make sense? To give you an idea of what I mean, I've been to exactly two movies in the last 30 years. I hadn't even been in a multiplex until we saw *An Inconvenient Truth*. And, we stopped getting TV years ago.*

Then there are real life threats; perhaps not every day but often enough that they live in the back of your consciousness. A number of years ago we had several mountain lions around. I used to drop my wife off at our gate a mile down our road when I went to work and she would walk back up for exercise but she eventually became uncomfortable and somewhat frightened, like someone was watching her. Not too long after this I tracked a lioness and her cubs on a lower Jeep trail, up the main road where she walked and around our house. And, I have lots and lots of rattlesnake, bear, wild pig and rabid skunk stories.

In some ways, the real killer for non-rural people who move to a rural area is the necessity, the absolute necessity, to be self-reliant. This is where relationships begin to fall apart since there is no one on whom a failure can be affixed except the person who did the work (or said they could) and there usually isn't the money to hire someone who knows how to do it. This also gets into sexism where one person or the other

feels an area should be theirs exclusively because of their gender even if they aren't good at it. Sometimes, it's a perceived inequality in the amount of work done between men and women.

Here is a quick list of the various skill-sets needed: carpentry, plumbing, electrical (AC/DC), roofing, glazing, masonry, welding, engine mechanics, timber felling, soil science, pomology/viticulture, seed saving, compost making, animal husbandry, pest and predator control, canning, freezing, dehydrating and so on. Now, no one is a journeyman in all these things but they at least have to be able to determine when they are getting in over their heads.

Then there are inconveniences such as shopping. The nearest city with a few big box stores is 60 miles one way. The closest city with a wide selection of stores is 90 miles away. Hell, our post office box is a 15 mile drive each way. Or, if you have a kid, you may spend 1-2 hours a day hauling them to and from the school bus stop and the time it takes hauling them into town for some kind of special event or practice. And, doing it in rain or snow is stressful. Plus, it isn't cheap.

There are other psychological stresses. For men, this is often the loss of their former status. No one gives a damn if you have a PhD or were once a company president. You are now just one of the good old boys in jeans and work boots and that is the standard to which you will be held. Up here, a person's actions and word is who they are.

For women, it is the loss of their social circle and trying to rebuild one in an area where there isn't much contact with other women on a social basis unless you have kids going to school or work in town.

Finally, to be comfy and to be able to do what is necessary to survive requires a very significant capital outlay for "stuff." And, I don't mean a few grand.

My experience is that most city people last five to seven years before the new wears off and they, or one of them, can't stand the hardships anymore. And, old folks get caught by the reality that the medical system they may need just isn't here.

It is a hard life but the rewards are more than worth it for those that make it.

Tell you what, let's have lunch and then go out and enjoy the views before you go home. You can see a little bit of the ocean to the west if you get tired of mountains and valleys. I can go into a lot more detail the next time you come to visit.

Pam: I'd love to spend some time looking through your books (looking at one wall of the living room as we are going outside after lunch).

Todd: That's only part of them. Both of our offices are full, too. I guess we have several thousand.

Joe: Yea, but I want to see your shop.

Todd: Next time, Joe. Next time. Plus, I never got around to some of the energy saving and prepping things we do.



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