

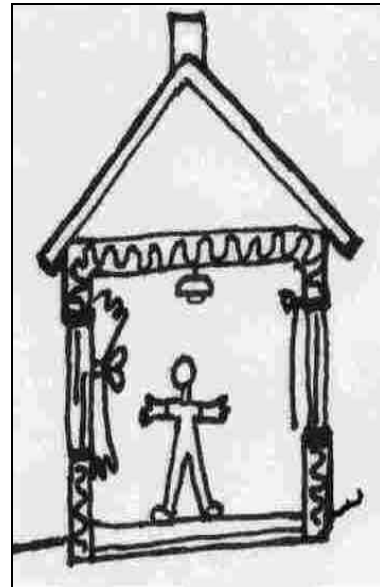
# The Fuel Saver's Guide

subtitle: Beating the System. 11th edition, 2011

An Ebook for the new millenium

Updated  
To 12/10

Published and distributed electronically and put into the public domain  
as an answer to the energy woes of today and of the future



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## *foreword*

Almost nobody reads forewords. However, let's do one anyway and take a look at why you downloaded or otherwise received this huge file, and what to expect from it.

- \* Frustration caused by rising/oscillating home, industrial, and transportation fuel prices. This guide is designed to help you control fuel costing as an individual or family. If you are a business whether large or small, it will, when applicable simple suggestions given here are implemented, add handsomely to your bottom line.
- \* Frustration caused by the arguments over 'greenhouse gas generation' aka CO2 or global warming gases. Whether scientists agree with each other or disagree over the cause of global warming is not the issue. The issue is that excessive use of carbon bearing oxidizing fuels by an expanding population is poisoning the atmosphere of the only planet that we have. Agreement of opinion of any of the world's scientists as to the cause of global warming is not necessary for an individual to cut his/her contribution to the atmosphere of greenhouse, acid rain, and lung concern gases and other, such as particulate pollutants, thereby saving wasted fuel dollars that could be better used for other purposes or banked for future use.
- \* Frustration regarding the long lead times that both government and industry require to implement promised programs and hardware to reduce fuel consumption, therefore fuel costing. There is no valid reason why a family or business can't start on their own fuel saving program now, today. You will be way ahead of government and industry timetables, independent of them. Yes, as time goes on, more 'ammunition' will come along from various sources to help your fuel conservation program. But now, starting with the Fuel Saver's Guide, you don't have to wait for it.

And finally,

- \* Frustration caused by the simple fact that almost everything you have heard of previously to reduce your own fuel expenses costs big money to implement. This guide is heavy on 'free' or 'minimum cost' methods to achieve close to minimum fuel use in your – and everybody's - situation. This guide is not 'adware' or 'futuretech'. Futuretech is a cop out. Every fuel saving suggestion given here can be done now and every piece of hardware needed to implement it, if any, is available now.

You may be surprised by the free distribution of this guide. Maybe looking for a 'catch' to it such as requesting contributions etc. There are none. The participants in the ad hoc workgroup who produced this document have their fuel based frustrations too, and have found ways out of them. This free sharing of the distilled knowledge of many individuals is the cure for us, a reaction against the tyranny and influence of the fossil fuel industries into every part of our daily lives. We can't boycott them. However, we can use less of their products, none wherever applicable, and reduce their *influence*.

*We urge the readers of this guide to get on this program. Use less fuel, and share this guide and all other fuel saving info with others. Your planet (and your bank account) will thank you*

As with all ECFSC participants, anon

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## Gas saving tips

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*It's smart to be energy smart*

- Be aware that your driving habits and style influences your gasoline bill.
  - Concatenate short trips. Do them all together, a planned route.
  - Do as little idling as possible. According to a Canadian govt study it is better for your engine to warm it up by driving easily than by Idling it. Remote starters promote long idling, fuel waste.
  - Use the A/C less, only when you really need it. It costs fuel to run.
  - Don't just complain about owning a gas hog, get rid of it.
  - Keep your tires at 35 lbs or highest mfg's rec. – check pressure monthly.
  - Buy only from the gas stations that are the cheapest. Use the lowest priced no lead grade if 'premium' not needed. NEVER make a trip just to buy gas.
  - NEVER use plastic to buy gas, as with minimum payment you add finance and possibly service charge to it's price even if it's paid up monthly.
  - Car pool for commuting, shopping, children's activities etc.
  - Commute in the family vehicle that uses the least gas.
  - Get a bike, electric bike or adult scooter for the short 'one person' trips.
  - Never let your teenager borrow your car until he/she is educated as to *economical driving practices*. It is up to *US* to teach *THEM*.
  - Think before you drive – is this trip necessary today? Again, concatenate.
  - Plan ahead to avoid stop and go or heavy traffic.
  - Drive slower, drive steadier. Fuel mileage is best at or below 62 mph.
  - Anticipate traffic lights and stops. Coast earlier. Accelerate slowly.
  - Use public transportation whenever possible.
  - Buy your next vehicle with fuel economy foremost in mind.
  - Consider alternative fuel systems – electricity, biodiesel, hybrid.
  - Consider not owning a car, but renting one when you need one. All other transportation public, or on a bike, electrified bike, or adult scooter.
  - Consider moving closer to where you work, or finding employment closer to home. Shop closer to home. Consider family entertainment that does not involve driving, or involves minimum driving.
- While you're at it, consider energy saving improvements to your home. Heating fuel is going up too. Why waste it? Only buy 'energy star' rated appliances. Use compact fluorescent light bulbs. Use a fan or natural circulation instead of A/C most of the time. Cook more with your microwave. Improve insulation. Stop drafts. Use a 7 day programmable thermostat. Keep winter temp at or below 68.

**Saving fuel helps to preserve depleting natural resources  
And ramps down global warming – acid rain particulates / gases.**

**Don't accept those 'mucho dinero' fuel bills. Use your head to save money  
and to beat the system that made them happen.**

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## FUEL COST PER MILE

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**Miles per gallon** | **Fuel price** | **Per Mile** | **Per 100 miles** |  
 (Short trips are at ½ 'city' mpg except for hybrids scoots and plug in electrics)

10 (Hummer, SUV)	\$2.00	20c	\$20.00
20	2.00	10c	10.00
30	2.00	7.5c	7.50
40	2.00	5c	5.00
50 (Prius, hybrids)	2.00	4c	4.00
10 (Hummer, SUV)	\$3.00	30c	\$30.00
20	3.00	15c	15.00
30	3.00	10c	10.00
40	3.00	7.5c	7.50
50 (Prius, hybrids)	3.00	5c	6.00
10 (Hummer, SUV)	\$4.00	40c	\$40.00
20	4.00	20c	20.00
30	4.00	13.3c	13.30
40	4.00	10c	10.00
50 (Prius, hybrids)	4.00	8c	8.00
full size electric veh @3m/kwh	@ .15/kwh	5c	5.00
100+ mpg (gas motorscooter)	@ \$3.00/g	3c	3.00
low speed Evehicle 25mph max	@ .15/kwh	1c	1.00
electric bike or motorscooter	@ .15/kwh	<1/2c	<.50

Example: interpolating the chart, your vehicle gets 25 'highway' miles/gallon at \$3.00/gallon. Your cost per mile and per 100 mile figure would come out to halfway between the 20 and 30. Figures. Average the 'per mile' to get cost. (ave 15, 10 = 25/2 = 12.5c / mile and x100 would be 12.50/100 miles). **Short 'cold chassis' trips are ½ your 'city' MPG figure.** So using the example above, cost would be **more than double per mile** (about 27c) **for the first 5 miles of each trip.** Note that prolonged idling does not completely warm up engine/chassis/tires (see gas saving tips). Note that most all 'scooter', bike, or 'electric bike' or electric vehicle miles replace 'cold engine' gas vehicle miles (short 'small grocery' trips etc) although this chart doesn't show it. Note: Gas price column should be interpolated also for an exact figure, dollars and cents.

The fuel mileage of your vehicle and the way that you drive that vehicle have much more to do with the cost of your trip than the price of gas.

**DON'T BLAME THE PRICE OF GAS,  
 BLAME YOUR OWN CHOICE OF VEHICLE AND YOUR DRIVING STYLE**

*It is smart to be energy smart*

## Miscellaneous items / alternatives regarding fuel and fuel saving

Everyone you know should read this Ebook. Even those who do not have the net or email (print it out). Most of the information in here will never get into the media. It upsets too many commercial appletarts. It also upsets advertisers and people who sell gas hogs or fuel. AND... much of it can be a shock to many readers. First, transportation issues.

### *Figuring your own vehicle's miles per gallon accurately*

When you stop at the gas station, fill her up. When the automatic nozzle stops, start it again 3 times (it will click itself off, do 3 clicks). Or if possible, fill to the top of the filler tube. Record your odometer mileage including tenths. If you have a trip indicator, set it to zero. DO NOT, this first time, record the number of gallons you bought (this common mistake throws off a lot of calculations. Best to pump it yourself gas station attendants like to stop on even numbers so they won't have to make small change. .

Drive until you have used most of the gas, below ¼ full. Stop, if possible at the same gas station and fill again the same way same grade of fuel. Record the number of gallons read on the gas pump including decimal figures. Record your mileage or record your trip indicator, subtract odometer readings to get the difference, ie, the number of miles you drove. Do the entire procedure twice in a row, once is not enough for best accuracy. With a pair of 'fill and records', you will see a difference – so average them to get an overall average figure. However, a single fill will be good enough for a 'starting figure'

With a calculator, divide the fuel 'gallons' figure into the miles. Record the answer to 2 decimal places. This is your own vehicle (and driver's) miles per gallon. A starting point. Don't do this testing right after a tune up. Some cars require about 100 miles after tune up before their engine's computer finds and sets the optimum points for all engine parameters. And - as on pg 4, expect lower mpg if you have mainly done short trips.

REMEMBER that the 'rated' fuel mileage given when you bought the car (city/country) was for a brand new vehicle likely done under ideal conditions on level ground with an expert test driver. OR; it could have been done on a test bed or even as an engineering calculation without driving. Your figure may be worse than published. If it's not satisfactory, either it needs a tune up, or the tire pressures are low, or the person driving it needs to follow several of the driving specific 'gas saving tips' in the pg 3 document gas saving tips'. Possibly all 3 of these reasons. If you don't know the published figures, that's OK, do a baseline test (shown below). Even if it's better than published, you will still save money using many of the hints in this document and in 'gas saving tips', as you will also be burning less gas by driving less miles and driving differently. Adopting other tips and examples, - one instance being concatenation, another, averaging as explained later - you will burn MUCH less fuel.

There are exceptions. Mileage varies between summer/winter (better in summer) Sometimes the gas station itself gets filled by a different supplier and the gas is different. This will make a mile or so per gallon difference usually. Some states use a higher percentage of ethanol in the gas, which lowers fuel mileage. Anyone else driving that car will use it differently (jack rabbit starts, gas pedal 'pumping' while driving, tailgating and quick stops at traffic lights, or driving over 55 will lower it, over 62 lowers it even more. Those people going over the 65 mph speed limit are really paying the fuel companies through the nose! Even hybrids don't get max economy in the fast lane. Air resistance is

not a linear function, streamlining not perfect, and vehicle designed maximum efficiency point has been passed, is on downcurve for all vehicles regardless of mfg or type.

Incidentally, when you see someone on the throughway doing 60 or so in the center or right lane, chances are that person knows the 'tricks' of getting better gas mileage and is implementing one of them. The entire process has a name, is called 'hypermileing'.

### ***Gasoline/diesel fuel savings issues***

There is very little difference in brand or grade of gas as to power, mileage obtained etc. What you are really doing is choosing the price you want to pay for it. If you have chosen to buy a vehicle that requires higher octane premium gas, that's tough, but you must (unfortunately) pay for that choice until you trade for one that doesn't. **Do not justify your choice of a new vehicle** for reasons of so called 'image', so called 'safety features' (most are mandated to be the same) or fancy geegaws on the dash that take your attention away from driving. Look at the economical to drive vehicles first, make your choice among those types (and that includes hybrids, the new era top imaged luxury vehicles).

This writer has been using pretty much exclusively 'cheap brand cheapest price gas' for over 40 years and has never had a gasoline-caused problem. Nor has heard of anyone else having one except for muddy water in the gas from poorly designed low lying gas stations after real big rainstorms. And that can happen at expensive brand stations too.

Only real difference – you must pay cash for lower priced offbrand gas. Here you can save too, getting cash from your bank's 'no charge' debit machine - or even as you pay for your groceries with debit card as a 'cash checkout' from the supermarket. You will not have to pay service charge or interest on the gas station's card or additional 'loan' interest on your own revolving charge card if you get your cash from a debit card.

Note that some gas stations charge more per gallon if fuel is paid for by card. Paying with cash saves you this charge as well as the card's own 'interest rate'.

Commuters, sit and do some 'Jr Hi School' math with a calculator on your charge card statement and see how much interest you pay on anywhere around \$100-500 worth of gas a month. Even if the gas portion is paid off **monthly** you lose money, as interest on most cards is figured **daily** on the unpaid balance until you pay it. And that's every month. You lose always, the more you charge on those cards no matter how fast you pay them off. All charge cards are merry-go-rounds designed to make money for the stockholders of the corporations that own that particular 'brand' of card. The only way to get off the merry go round is to stop using the cards and pay them off as fast as you can. The convenience of a credit card when buying gas? Hello?

Incidentally; most who really know their money math do not even own charge cards. They use a debit card which is just like writing a check unless you use a machine that is not allied with your own bank and charges a fee. This writer has only had one 'debit card service charge' since getting the card a few years back and that was unavoidable. I did not raise my money to **give** it as interest to a bank. I raised it to **put into** a bank so **they would give me interest** This is the underlying principle. (Even the checking account in this family bears interest. Shop the banks look for the best deal). Do that, your money itself becomes more efficient. It's just like getting a decent raise in pay, but this kind of raise is almost tax free, FICA free. And you don't have to work to get it. Just think before you choose a bank, and think before you buy.

Incidentally, nix 'overdraft protection' on your debit card. Many banks add a hefty fee for overdrafts when they get protected. Most of them, the overdraft gets paid by Visa

etc and then you pay big interest plus bank charges. If your debit card gets lost or stolen and used before you can cancel it, theft would be limited to your balance then the card would run dry. With overdraft protection, theft would continue. Your security is much better without it.

If you set up your household financial affairs to maintain a bank balance large enough for any expected household purchases (example, one of those \$3,000 TV sets), you would then be your own banker and not pay interest. Instead, you would earn a bit less interest on the decreased balance of that account if it is interest bearing. Which would be in the 'peanuts' category compared to a card or other type finance charge.

The only purchases that you should need to set up monthly time payments on would be a house mortgage and a new or pretty new used car. Both of these bigtime 'charge accounts' are unavoidable.

However, if a person can reject the image advertising of a new vehicle and set their mind to driving a used 'cash car' and knows how to pick em, scratch the car payment, and the expensive comprehensive insurance needed to satisfy the requirements of the finance company, and the car loan and insurance finance charge and save bigtime on depreciation of the vehicle too. It is a lovely feeling to own and drive a real decent fuel efficient car that someone else has paid most of the depreciation on. This writer (along with most auto mechanics, used car salespeople and a lot of bankers) has been doing that for *many* years.

Business, corporations, even government must use a card for record keeping purposes. Unfortunate, but good records are a vital part of being a successful business. To those people; examine your use of a card to see if a minor change of accounting/payment practices (such as payment in full each month or before interest starts) could save you yearly dollars here.

You will find that it really pays – with the average person 20 to 30% and with some, like the fast lane road rage type up to 50% of their gas dollars - to follow the pertinent 'driving specific' tips in the gas saving tips document on page 3. Any driver can do more than 50% by also following the 'non driving specific' tips, such as miles per gallon averaging. One example given further on using 'averaging' reached over 90%. Averaging will be explained later with real life examples under it's own heading in this document. You save by (1) vehicle efficiency (2) driver efficiency (3) driving less. Doing all 3 simultaneously is the program here. They all work together. Two out of three isn't good enough. *All are possible for every driver on the road!*

Averaging is the logical extension of the above program, and the program must be in use before averaging maxes it out. All gas/diesel saving must begin with page 3.

It is obvious from studying this document, the mileage chart, and 'gas saving tips' that every individual driver is responsible for the fuel 'miles per gallon figure' he or she gets. Styles of driving vary. Types of trips vary. Instance; Do not blame the person who does a lot of short trip cold miles driving (like bringing children to school and sports events etc) for being a wasteful driver. It is the nature of the trips (short trips with the whole vehicle drivetrain, not only the engine, not yet at optimum temperature for fuel economy) causing poor mileage (even those, minimum idling and economical driving habits will improve).

And - - don't pat yourself on the back for good mileage unless your *only* measure is what you yourself used to get in the same vehicle before changing your habits. And if you do want to document your improvement, do it on at least 2 full tanks of gas doing the

same 'oldstyle' type of driving without changing. To make a baseline for comparison, don't change a thing for the first couple of recorded and calculated full tanks. (Which unfortunately would be a waste of fuel dollars compared to not making a baseline). Optionally, you could use your mfg's EPA mileage ratings (average them) for your baseline. But your vehicle must be in perfect tune with tire pressure to spec to do that.

Implementing the tips given here you will be able to get *better than EPA rating*. Not only 'better than EPA,' but your total automotive fuel cost will go down considerably. The average driver now gets worse than EPA rating. Some get much worse.

Now here's the bad news. If you are driving a vehicle such as the much maligned SUV, inherently bad on gas due to weight size and especially, excessive unnecessary power, you will gain little with the 'driving specific' gas saving tips. Reason, cold hard unchangeable mathematics. If 10mpg is what you're getting due to vehicle design, improving it 20% only gets you 2 mpg more, total 12. If the vehicle design has better economy and is getting 25mpg, 20% of that is 5 mpg, total 30. Over twice what you will save using the same methods on a 10 mpg gas guzzler. And - as you see by the 'mpg' chart - mpg translates directly into dollars. AND – this type fuel economy, as all others given here, adds up to serious money yearly.

Let's reiterate; *Think yearly*. All 'rich' people do. AND use the methods on the guzzler anyway, try not to drive it a lot, trade it. That is, if any dealer in his right mind will take it.

How would you like to get 20% (a minimum figure, most get a good bit more), one dollar out of every five of every dollar you spend on gasoline (and other fuels as well) as non-taxable tax clear cash in your fist all at once 12 months after starting this (or any) fuel saving program? And at the end of every 12 month period thereafter compared with now. Put your imagination to work and dwell on it. This is the bottom line of what will, in fact must happen when you follow the free advice given in this guide already and in the following pages, especially the home energy and financial issues near the end of Section one. This is not just a promise, it is a tax exempt raise in pay as well as being mathematical certainty. And Free! The choice to get this extra cash or not is yours. All it takes is a change in vehicle use, coupled with a change in driving style and habit.

If driving the guzzler is unavoidable, such as a work truck, use the methods anyway at least it's something, and endeavor not to drive it unless you are actually working with it, laying the fuel cost off on a paying job. Don't justify and say 'the customers pay for it anyway and it's a tax deduction'. This is fallacy. As any real sharp accountant could tell you. It's your money. Don't give it away to the oil barons. They are rich enough.

If you are driving a guzzler for such reasons as 'personal image', remember that the image of these vehicles has changed, the owners of fuel hogs are thought of these days as being 'not too bright' instead of 'too rich to care about fuel mileage' and are not envied. Trade it for something 'smart'. Like a nice 30+ mpg sports car. An *economical* 7 passenger minivan or crossover (newspeak for station wagon) Perhaps a hybrid. Then use the fuel saving info to do better on that ! It's the 'new green image', and it's smart.

Note that engines over 3.0 liters are never particularly good on fuel (excessive unnecessary power.) As a general rule, the higher the engine displacement, the lower the fuel mileage. Exception here – the person with a smaller engine who 'pushes it' to more than design average speed/load gets lower fuel mileage for the 'pushed' trips. Turbochargers likewise guzzle fuel. Fast vehicles are thirsty vehicles and besides that,

using that unnecessary power and ability may get you an expensive speeding ticket.

A yearly listing of different makes/models fuel consumption comes from the EPA / EERE. See website listing in section III. This listing covers older vehicles too, not just new ones.

***A quick fuel saving tune up for most everyone for about \$10.00*** (for most people)

If you have fuel injection (most vehicles today do). Fuel comes from the injector nozzles like out of a good quality spray paint can. A little bit of gum inside one cylinder's nozzle will make the spray pattern desired by the mfg off center, or a stream, or otherwise defective. Sometimes this roughens the idle just a little, not real noticeable. But it plays hob with fuel mileage as if one cylinder is not burning it's gas as designed to, you then have 5 ½ instead of 6 cylinders. Half a cylinder gone. And that requires more gas pedal (injector pulse width) for the same road speed. Therefore, less gas mileage.

**Step 1.** There are injector cleaner liquids on the market in auto stores. Buy a mid priced brand. Follow directions. Some people report a boost in fuel mileage as much as 5 mpg more just for cleaning the injectors with a nominal 20 mpg average vehicle that is presently getting less. However, most everyone gets closer to 2 mpg gain – which should bring you back to the EPA rating. (Other improvements given in these pages will help mpg more than that but you must start off with clean injectors.) You will not need to do injectors again for perhaps 20,000 miles. For air cleaner interval below, see your manual.

**Step 2.** Fill all tires to 35 lbs (or more if specified in your manual, such as for trucks) The high limit of their range. It is important to keep your tire pressure up and equal, check them at least monthly, and always before long trips. NEVER carry low pressures to soften your ride. This costs you dollars in gas and quickly wears the tires. Sometimes it is recommended to go lower on the fronts to minimize aquaplaning at high speeds. But you will not be going at high speeds any more. Just average or below speed limit speeds.

**Step 3.** Replace the engine's air cleaner filter (or clean it if you know how). You are done. Now, after a couple of weeks to work the stuff through the fuel system and get rid of the gum, check your mileage (same driver, same route) again. Smile. If your idle still isn't silky smooth, remove one spark plug, Look at it. If it looks good, not eroded, use the cleaner again. If not, change 'em all. Incidentally, have found no difference using those 'super premium priced multi electrode or special designed plugs. (Remember, with new plugs your engine's computer will take a few days to reset itself the results of fuel consumption calculations might not be accurate immediately)

***If, by this minor 'home 'tuneup', you can gain just 2 miles a gallon, with an overall average 20 mpg vehicle that is a 10% mileage gain. Ergo, when you go 1000 miles in that vehicle you get 100 of those miles free compared to now. At the present price of about \$2.75 a gallon (10/09 East Coast) that is \$12.52 that stays in your pocket for every thousand miles you drive. At 50,000 miles per year that's \$626.00 per year. How many miles do you drive a year? Grab a calculator and your service records or MV inspection reports and figure this out. We are not talking peanuts here but big bucks tax free income that cost you next to nothing to receive. If you also implement other fuel saving principles on page three, you can, in addition, save much more than this in any vehicle you drive, not just the one you tuned up as they concern vehicle use, are not efficiency improvements to a single vehicle. Put a big WOW after that ! But start with the above 'mini tuneup'. If your injectors are crippled by gunk or your air supply***

*is choked by dirt, you are throwing away this non taxable free money through your tailpipe. Saved gas will (much) more than pay for it. And..... keep on paying you.*

*In addition, Just a single point from pg 3 (low tire inflation) can take as much as 10% away from your present or improved MPG figure and COST you the same \$626 /50k miles. Every pound low = app 2% less mileage. Habitual fast lane speeding will do that too at a higher % rate. Doing a lot of short range cold chassis trips has a much worse fuel mileage loss percentage figure than this. You get 50% of your 'city' mileage figure for short cold chassis trips. Most people who do this simple 3 step home tuneup above report getting 'better than EPA' listed mileage. AND the other items add to this.*

**All the little losses of vehicle/driver/trip inefficiency add up to a much bigger loss.**

***Our purpose is to help you get a gain of vehicle / driver / trip efficiency.***

***Now you can likely see why the subtitle of the Fuel Savers Guide is 'beating the system'.***

***With this one tip, most beat it for up to 10% of the fuel cost for every trip taken. And there are more tips!***

Dwell on what you just read on pgs 9-10. The most important place to begin if your vehicle is not brand new or 'regularly dealer maintained'. Your vehicle must be running at peak efficiency for other automotive tips to work at peak efficiency.

AND – you must be able to 'think yearly' to appreciate it.

You people who know how to use a calculator properly with your yearly mileage records. Whip the thing out and do the math. Figure every car in the family. And don't fall out of your chair when you see the results! With a three car family the fuel savings given so far could be, on the average yearly, equal to the cost of a round trip to Hawaii.

### ***Cars that start hard or don't start at all in the rain***

YAH – everyone thinks of the plug wires and distributor cap and rotor. So some carry wire drying sprays or even start em by drying the wires and cap with a hair dryer.

Look to the spark plugs themselves. Even some mechanics say they never wear out in the newer cars. Wrong. The gaps erode wider and it takes more voltage to make a hot spark at over the designed width. The wire dry or hair dryer work to start the engine because it eliminates the moisture-caused electrical leakage which lowers available spark voltage to jump that big worn gap. A diagnostic computer readout does not report any error code for this trouble, even a tough dyno test says everything's OK.

This is why good mechanics R and R the job (ripout and replace) wires, cap, rotor and plugs together for wet starting problems. If you have this problem, take out one plug and look at it. If it's gap is eroded replace all of them. This quite often solves your wet start problem without wires cap and rotor. It will also boost your miles per gallon by a mile or two when your computer resets. Plugs should be replaced every 50,000 in newer cars, but in non electronic ignition vehicles (older) gapped at 15,000 replaced at 30 to keep up fuel mileage. A widened gap is retarded spark timing to the older non-electronic ignition vehicles. Retarded spark eats gas. (Too far advanced makes fuel 'ping' and is damaging.)

If you just bought a used car, especially 'private party' it pays to visually check at least two plugs. You don't know what sort of plugs the previous owner had in there, perhaps cheap ones which erode quickly. If they look bad, reiterating here; change em all. AND... super high priced plugs are no bargain as they won't help your mileage.

### ***Cars that don't start at all***

Remember that a fuel injected engine requires no 'pumping of the gas pedal' to start it. Don't touch the pedal until she is running. If you 'pump' you will flood the engine and then will have 2 problems instead of one. Diesels will flood too. Encountered one dead Diesel (Mercedes) in a parking lot where fuel was actually dripping from the tailpipe from 'pedal pumping' trying to start.

Some cars – especially Diesel - seem to require ether based 'starter fluid' especially in cold climates to start. Instead of that, spray in WD40. It's easier on the engine.

If she turns over real slow or only clicks, look to the battery first, get a jump from someone or better yet, buy one of those 'emergency car starters' which is essentially an extra jumper battery to carry with you. Jumping can start a flooded car if you don't touch the gas pedal. When jumping one car with another the 'donor' car's engine should be running, and leave the cables connected for about a minute before you try to start. **Be extra careful of battery polarity (positive to positive).** If you make a mistake here, you could blow out your alternator – or even more.

Most 'parking lot', even home driveway 'deadsters' are caused by leaving the lights on which kills the battery - especially on rainy days. Always check the lights when parking. Quite a few are caused by leaving a door open or listening to the radio while parked.

Another type of 'no start' especially on winter mornings. Battery good she turns over fast but won't start. YAH many people carry starting fluids. But forget the important part of using them. Normally with a fuel injected vehicle you don't touch the gas pedal when starting. However, this deadster is no longer a 'normal' vehicle. When using a starting fluid you have to open the throttle (floor the gas pedal) (hold it down, don't pump it) to give the engine enough air to be mixed with that fluid. This is quite often the reason why the mechanic you call can start the car using a spray can starting fluid but you can't. He will work the throttle – hold it open - from under the hood instead of with the gas pedal.

There is nothing the average owner of a vehicle less than 10 yrs old can do to repair it under the hood except to add fluids, change filters and clean and tighten the battery cables and terminals. It is well worth it to join a 'motoring plan' that pays for towing if it is less than \$75 yearly and you don't already have a dealers plan that does that. For seniors, the AARP plan is satisfactory, hassle-free.

### ***A fuel tip for those looking for a van pickup or other 'work truck'***

Especially used trucks. In the old days we rated these as either 'plumber's trucks' or 'highway trucks'. The difference has to do with fuel mileage as well as rated load. 'Plumbers trucks' need to always carry heavy tools and heavy buckets of pipe fittings. Therefore they need to have big engines heavy duty suspension and have a high rear axle gear ratio.

'Highway trucks' are used for lighter loads and long distance travel therefore have a lower rear axle ratio. Also, quite often, smaller more economical engines.

Translated into fuel mileage; if you use the wrong truck for your purpose it will burn a lot of gas. In the 'plumber's' type, the rear axle ratio being higher to carry a heavy load, the engine makes more turns at the same road speed, regardless of engine size. That means that moving with fast traffic or on the throughway, the engine is running too fast for good fuel economy. Also, these higher weight capacity trucks are apt to have a more powerful engine in them, which of course takes more fuel. They are gas hogs simply

because to do the job they are designed for, they have to be. Whether loaded or not.

Highway trucks are lighter duty, meant for lighter loads therefore can have axle ratios closer to the ideal for standard cars. Likely also have 'car type' engines. If heavily loaded they bog down a bit therefore fuel mileage suffers. But isn't it better than driving a fuel hog that always get bad mileage than to have one that does that only with a 'much higher than average' load?

Trucks built to plow snow in winter never get good fuel mileage. Engine power and axle ratios are both at fault, factory chosen for best performance when pushing snow. Don't commute in one. Daily commute in this type will burn a lot of gas.

With a used truck; A quick clue to what type it is; Look at the rear springs. If you see an extra leaf it's a heavy duty – if you see a heavy duty trailer hitch it's a heavy duty. Cars and trucks also have a plate on the driver's side door that tells you weight carrying capacity. Typical mileage for a fullsize 'heavy duty' may be 10-12mpg , highway type same mfg /model 18-22. Dual rear wheels also lower fuel mileage.

Think about what you will be carrying in the truck. Economical minivans (or crossovers, newspeak for station wagons) with fold down seats or with rear seats laid down or removed with a loose plywood floor laid in carry a lot and get decent fuel mileage. A lot of fleets are using them now instead of van trucks. And electricians, HVAC people. Even plumbers! If you choose one, get the side and rear windows 'dark tinted'. Why tell people what you are carrying?

Always consider your purpose, load, and major expected route (City or hwy) when you buy a pickup or van type truck. Let the dealers salesman know your type of use.

### ***Miles per gallon averaging***

Simply stated, this is, in a family with more than one vehicle, using the vehicle that costs the least to run to do most of the driving, commuting included if possible. Averaging the MPG/miles driven of 2 different vehicles, you get a higher total average MPG. Often, much higher.

*Example 1)* Both people work days. One vehicle gets 30mpg the other gets 20. The person with the longest commute, ie the most miles should use the 30 mpg one. Even if it's a beater, not chic looking etc. A look at the chart (pg 4, fuel cost per mile) will tell you why. In this instance, at \$3.00 a gallon, every 100 miles you are throwing away \$5.00 if you use the higher fuel consumption vehicle.

The example above, local to here: A fellow commutes from Boston's South Shore to Cape Cod about 150 miles a day for 5 days, 750 miles a week. At the present price of gas (Summer '08) near \$4.00) he was throwing away \$50.00 a week on excessive fuel expense before he switched from his 20 mpg car to his wife's 30 mpg car. Of course, the actual cash saving has to take into account how much her fuel bill went up. In this case not much she has an 'in town' job about a 5 mile round trip commute, only 25 miles a week. They made the switch and are happy as the proverbial clams.

This is also a good example of 'thinking yearly' rather than just weekly or monthly. How much non-taxable yearly income did this couple earn due to the switch? Grab a calculator and figure it yourself. ☺ (Wow!)

(Note that new thought. Saved fuel of any type is actually a non-taxable tax clear income)

This also shows the importance in 2 car families of buying vehicles that both parties are comfortable operating, and if one is some sort of a 'sports or snowplow truck',

driving it as little as possible. Better still, trading it for a real economical vehicle, perhaps a hybrid. Incidentally, here in the Boston area it is getting hard to get a decent trade on an SUV. You see some pretty new looking ones in people's yards with for sale signs on them.

(note 09. Many decent looking SUV's were crushed during 'cash for clunkers'.)

*Example 2)* Car pooling. That's averaging. It doesn't require math but if you got 4 people in the pool and each one drives a week, that is 3 weeks out of 4 that you don't drive. Or pay. The savings are fantastic. The longer the commute the more you save. AND; if it's to a T parking garage or commercial parking lot you save even more, 3 weeks out of 4 you don't pay to park. AND if there are tolls to pay, that's 3 out of 4 you don't pay. AND if every driver in the pool understands and practices the other fuel saving tips you all save even more. AND if more people car pooled there would be less traffic on the road, less delay. AND you could use the HOV (high occupancy vehicle) lane so you would spend less time on the road, spend more time at home.

Everyone who carpools wins big. Only people who lose? Big fat oil industry cats mainly in CA and TX and overseas people, mainly those who wear bathrobes in public.

There are usually 'car pool people hookup' orgs in or near every major city. Some are volunteer (no fees), some are commercial (private buses or paid references to other people wishing to carpool or already pooling with a spare seat). See website listing for one example of this. Some newspapers have a 'rider wanted' section. Or they could be in 'misc'. A 'carpool or rider wanted' notice on the supermarket bulletin board – yours or someone else's - could get you into this.

Another type of car pooling; Informal, single vehicle, between friends. Essentially, a private 'bus' for a specific purpose, if one of them has such as a 6 or 7 passenger van, minivan, or station wagon big enough. Everybody else kicks in a couple of bucks for gas. You all go to the mall, or to church, or to wherever together. Nice and simple. But don't get trapped into driving one person to a place for 2 bucks unless you want to go there yourself.

If it's a longer ride, figure the gas using the chart and go for the nearest higher dollar total, but 2 bucks a ride is still minimum. Remember, there's oil and wear and tear and insurance too. And the more weight you have in the vehicle the less mileage it gets. These days (mid 08) with \$4.00 gas, three might be a better figure. Don't charge excessively, that's an unlicensed livery. Liveries need a special permit, perhaps a special drivers license too.

You have to get together and set this up yourself. Maybe a weekly grocery trip. Explain it to the group so they won't think you are a cheapskate. Everyone saves gas money this way and whoever drives does too because he/she gets paid for their gas. This is done a lot in small towns where major shopping gets done in a mall or the city. Sometimes it's a nice relaxing lunch date with friends along with the shopping too. Stuff like this happens in Mayberry USA – and an awful lot in VT NH and ME.

*Example 3)* This writer owns a 20 MPG avg Ford Windstar. Also, an adult size 750 watt Chinese electric 'commuter motorscooter', 48 V battery operated. Any trip within the 20 mile round trip range (between battery charges) of the scooter is done on it. This type has enough locked compartment space to carry a full gallon of milk plus other 'emergency shopping' items. Of course she is not driven in bad weather or in winter, but

does a lot of miles on those 'one person little trips' always necessary such as small shopping, to post office, library, town hall, visiting, club meetings etc.

Note again the figures above. 20 mpg for gas, 20 mile range of scoot. At the gas prices of today (6/08, almost \$4.00), every 20 'scooting' miles within it's range this writer saves \$3.94 (minus about 17c – Boston area – for electricity). Saving money is equal to getting paid that money with no tax on it, so it's like getting paid for doing the trip.

Think that's good? Here's the biggie; Well over half of those scoot trips are short, in the 'cold chassis category. Ergo, the calculation figures at a gas saving of half the 'city' mileage of the gas vehicle. Which is, figuring half  $17\text{mpg}/2=8.5\text{mpg}$  rather than the average figure of 20. Makes a 'wow' out of the whole thing. Grab a calculator and figure it yourself! (11/10 update, gas is rising again, up to \$2.80 locally).

To charge the scoot for 20 miles takes about 17c worth of electricity. Scoot does not depreciate much, was inexpensive not requiring financing (a cash buy) nor does it need expensive maintenance, or compulsory or any other kind of insurance to register it. AND the registry fee is cheap. Think about it.

Scooter is new this (05) late Spring and so far (Nov '05) she has a bit over 600 miles on her. 600 miles (using the chart at \$3.00/ gal) works out to (as all of the short trip driving would be cold miles at  $\frac{1}{2}$  the mileage (also 'cold when coming back from an extended visit or other short trip )  $\$90. \times 2 = \$180.00$  (at \$3.00 a gallon) worth of gas I didn't have to buy, not mentioning less wear and tear on the Ford. And the driving is more fun. Many more miles will be logged next year, and in the future. (Update '08. There were! Scoot has more than paid for herself and has had no maint except lubricating the front wheel bearing – an easy 'home mechanic' job (same job as with a bicycle) which was in the manual that came with her for 1000 mile maintenance).

Seeing as these same type scooters (or electric bicycles) are available at anywhere between \$300 and \$1000 and don't eat much, they will pay for themselves in short order. Gas scooters of the same type get 90-100 miles per gallon, pay for themselves too but it takes longer and there's a bit more maintenance to do.

*Remember your purpose, these scooters and moped types are, among other duties, used for small grocery shopping and must be able to carry a small grocery load, preferably under cover in compartments, haversacks etc.*

A totally different kind of 'averaging' is done using only one vehicle, It could even be the one you are driving now. The principle here is simple, logical, and already mentioned in the page 3 'fuel saving tips' poster. But not as averaging.

This is simply the concept of knowing that short 'cold chassis miles' trips are costing you more for fuel than 'warmed up engine' miles – and as a result, lowering the number of trips that you make especially focusing on the 'cold' ones. This is called 'concatenation', a mathematical term meaning 'combining similar items to simplify' Seeing that miles are mathematical quantities, the term fits well. One thing not mentioned on page three is that using concatenation for short trips, the vehicle's engine and drivetrain only has to warm up on the first of those combined trips – so you are getting 'city', not 'half of city' miles per gallon for the rest of the combined route.

Favor alternatives to do some of those short 'always necessary' trips. A fellow local to this writer for instance, drives to the gym  $\frac{1}{2}$  a mile from his house. Why not walk? Why not jog? Why not bike? All are healthier. And that's what the gym is for. He would be

averaging' total miles down by replacing (cold) driving miles with 'human power' miles, which cost nothing at all. And ask any doctor, walking helps to maintain health,

Another: Buying ahead on those non-perishable items you are always running out of and have to drive to get. and 'stocking ahead' food items that commonly make short trips necessary. Buy two not one of the most common 'run out' items you have, and when the second one is opened, put it on the shopping list. Ergo, less 'emergency' food etc trips.

Cutting down the total (especially 'cold engine') miles that you drive puts money not in your fuel tank but keeps it in your bank account. Perhaps an ivory tower professor of mathematics from Cal Tech would argue with this statement, but averaging a single short trip with not having to make it at all cuts the cost of making that trip to half, then almost zero if you do it while doing another in the same direction. That's what you do repeatedly when you concatenate a bunch of short trips. At any rate, you save bigtime with concatenation regardless of specific instance whether you agree with the above statement or not.

One last comment regarding averaging. Buying a new fuel efficient vehicle to replace a fuel hog in your family will certainly average your family's automotive fuel costs down. But it isn't enough. The driver of that new vehicle, to gain maximum benefit from the new fuel efficient vehicle, must become a *fuel efficient driver*. A new vehicle DOES NOT render the 'driver specific' tips given on page 3 obsolete. The new vehicle is only half the answer. The driver is the other half. Looking at the same thing a little different way; Half of your total 'best fuel miles' package costs you money (buying a fuel efficient car). The other half is absolutely free (changing your driving style and habits).

Let's reiterate. Page 3 is the key here. That's why it's up front and that's why it's a poster. AND why part of pgs 8 and 9 are amplified by example in boldface type. Following those simple suggestions on page 3 puts a lot of money yearly into your pocket. If you like that, put a lot more in there by implementing, not just reading the 'home, lifestyle etc' suggestions given in the rest of this guide.

The following section gives an overview of other alternatives that are especially effective to cut down, average down those fuel - wasting short trips.

### **Simple Alternative Transportation; Alternative Vehicles**

The most successful – not up and coming but here now – alternative fuelled vehicles are the mini (low speed) and fullsize plug in electrics. There is a lot of (generally media sourced) misinformation out there about them. More common though are the hybrids, which have proven themselves reliable and efficient and have revolutionized internal combustion vehicle powertrain efficiency. Think of hybrids as 'half electrics' for now.

The information regarding plug in electrics in *these* pages is accurate. Reason; All of this information about plug-in electric vehicles on the following pages has been contributed to the Fuel Saver's guide by people who are party to first hand 'horses mouth' info as these people are now driving full size plug in electrics and have been driving them regularly, many of them for years.

Some are degree engineers, mechanical or electric or non-degree technicians in the same fields. Some are 'car' or 'electric/electronic' hobbyists. Some are educators with the necessary talents. Some are what you might call, for want of a better name, 'fuel save nerds' who have chosen electric as the best way to do it. Some are 'enviro proactives'.

There are many different reasons and combinations of reasons why plug-in electrics large or small are a viable ‘today’ choice of powered transportation.

Of course plug-ins are not a choice for everyone, as most full size EV/s out there now have been converted to electric by their owners. Mechanical/electrical skills are necessary. Another example would be those apartment dwellers who have no place to plug them in.

: There are people in the world who either would not or could not open the hood of a car. Their talents and interests lie in other directions. Fine people all. For those people, the closest vehicles to them are the hybrids, partially electric, well proven now to be fuel efficient, clean burning, and reliable. The pioneers in the plug-in field have all been ‘techie’- mech/electric technician types.

You will see a lot about electrics of different types in the following pages. Reason being that nobody has written a lot about them before, and a lot needs to be written. There is much information that needs to be brought out to the public that is *not* tainted with commercialism or even present day fuel and auto industry brainwash to maintain a status quo atmosphere regarding personal choice of transportation types. Billions of dollars have been spent by automotive/fuel interests to maintain this status quo position.

The truth of the matter is that a lot of power, a lot of speed and a lot of fuel consumption or the ‘high class’ images promoted by both domestic and imported auto manufacturers are not the slightest bit necessity for personal transportation.

Alternatives save fuel. Of special interest are the plug-in electrics. Plus point, they cost much less to run and maintain, and are much easier on our atmosphere, emitting no carbon bearing gases or other pollutants, as other powered vehicles must.

As to the minus side; Most plug-in electrics have a relatively short range. This is easily overcome by using the electric only on the short trips. The average family spends over half of their ‘non-vacation’ driving time doing short cold engine fuel-wasting trips such as intown or small item grocery etc shopping, picking up mail, going to intown meetings or events, bringing children to school or school sports events etc. Even more than that if there is a ‘fairly short’ work commute involved. These and more similar trips are all opportunities to save a good dollar on fuel and en passant, contribute less carbon bearing and other pollutants to the atmosphere by owning and driving a plug-in electric fuelled vehicle.

The technology of plug-in electrics is mature. Full size vehicles such as the 5 passenger Ebox (see website listing – and contrary to media blather it *is* a production vehicle!) and the Tesla (a performance electric that will beat *anything* in a street drag) are out there as well as numerous smaller personal vehicles as described above in example (3) above and in the following pages.

Presently, commercial plug- ins, except for ‘minis’ and conversions of gas powered vehicles are out of price range for the average person. But that doesn’t mean that the average person can’t have an electric.

Of course there are the microminis, most of them LSV’s (low speed vehicles) as described further on for the states that allow their use ( FL GA MA ME and NV allow them among others). A plug-in vehicle of one of the types shown in the following pages of this guide can be a smart choice for individuals – or even families where a full size gas vehicle as a second car would not be an option. Example, the electric bicycles below can be an option of powered transportation for those over 16 without drivers licenses, as

most states do not recognize bikes, even powered ones, as needing license or registration. And a bonus. The present gas commuter who has a commute within range will find any sort of electric a fun commute rather than the present harassment. Suggestion to the reader; Examine your own use of a gas powered vehicle to see if there is a place for this clean and relatively inexpensive form of alternative as a 'second' vehicle in your life.

#### **A) Mopeds and scooters (2 wheeled vehicles)**

There is very little info out there regarding this alternative. We will expand it here. **Mopeds** are actually low powered strongly built motorbikes, a step below light motorcycles, about halfway between bicycles and motorcycles. All have pedals. The gas burning type are limited to 50 cc's piston displacement by law and 30 mph in most states and new laws have been made that new ones imported to the US must have clean burning 4 cycle engines.(The older ones had noisy smoky 2 cycle engines).

Some of these are plug-in electric, battery operated. The electric scooter mentioned above (in example 3 pg 13) is DOT approved and classed as a moped in most states, quality is sufficient for anyone familiar with Vespa scooters or motorcycles to approve.

To class as a moped in MA and most states, top speed the vehicle is capable of doing on the flat can be no more than 30 mph and in MA at over 25 mph they are 'speeding.'. Compulsory insurance is not required, nor a motorcycle license in any state. Registration fees are cheap ( 2 yr RMV sticker, \$40 in MA). Check your own state MV laws before considering one.

All 2 or 3 wheelers in the moped (30 mph) class must be DOT approved, 'adult size'. Anything that's not DOT approved is not legal on the roads anywhere, an example being the 'road rocket' type mini motorcycles – which are 'offroad only', or light foldup scooters. Note that HP vehicles do not fall into this 'DOT approved' class, they are presently unclassified by MV bureaus, mainly ride on sidewalks.

The differences between road-legal mopeds and road –legal scooters are mainly in the frames. Mopeds have pedals. Scooters do not. Mopeds have large bicycle size (20-24") wheels. Scooters have smaller wheels, on the order of 12 -16". Both use 'step thru' frames but scooters have floorboards, where mopeds have the bike type pedals as footrests. However, most state motor vehicle registries class them both as 'mopeds'.

Mopeds and scooters are available with either gas or electric power. The gasoline versions get between 90 and 110 MPG and the adult 2 wheel electrics are figured at a 'miles per gallon equivalent ' (MPGE) of a bit over 300. (variable as to gasoline price)

**WARNING:** Smaller wheeled scooters than mentioned are mainly foldups, not DOT approved and unsuitable (or in most states, illegal) for commutes. The most reliable of this 'tiny' type at present appears to be the sit down foldups as sold by Izip and under 3 main brands, Izip, Schwinn, and Currie, which is the mfg source for all similar. None of them are registerable although they have been on the roads. Note that this same company (among several others) also markets DOT approved scooters and Electric bikes. If you are interested in any of these type vehicles, google the subject, you will find many dealers. Most small wheeled powered vehicles are only toys. However, many of the larger vehicles in this class are viable for 'close commutes' if legal for the road.

Most states and municipalities have banned the non-DOT scoots from the public roads due to unprincipled use by teenage hot rodders. However they are great for large campgrounds, to carry in motorhomes and on cruising yachts. Advice for these: The seats

of fold-ups are uncomfortable on all tried out here (many). Best to find a good seat from a junked moped (not a bike, tried one) and use it. Never consider a stand up scooter, they are fatiguing to ride and carry no groceries. Most stand-ups have very poor brakes.

Segway is a different breed. A fun ride but slow with very short range and no space for groceries. Too much complex electronics. Heavy to put in a car. Some malls are banning them. Decent DOT approved commuter type scooters come at much less than 1/4 their price. Segway has it's place such as within plant or campus grounds for mail delivery, management, supervisory duties or light maintenance. Also these will be used more within planned communities as they are being built. But never on a public road, as they will never win the DOT acceptance necessary to do that.

*As to commuting with an electric bike (ebike), moped, or scooter.* Most 'T' station lots and parking garages near Boston have free 120Vac electric charging facilities, many other suburbs of other major cities have a similar arrangement (although you must pay to park in some of them). Some scooter commuters charge at work. (Extends range for the trip home). In other words, you can live 15 miles from the T station and charge there for the other 15 home making effective round trip range 40, not 20 as specified by most fullsize electric scooters. This also works visiting friends charge there. Always bring a short (10-12 ft) extension cord and multi outlet adapter if you do this. These don't draw a lot of power, up to 5 scooters can charge from one standard outlet. From 'near empty', charge time for most brands/types is about 4 hrs, at which point the charger goes to trickle (maintain) or shuts itself off. Most owners just plug them in when getting home and forget them til the next use. If interested in this option, check your own 'T' station for available outlets if you will use electric, also try out a 'secondary road' route to go there as scoots bikes etc cannot travel on limited access throughways.

A nice thought; If you could do half your commutes with a scoot, you would pay only half your present gasoline bill, half your 'T' parking fee, and put less miles on your car.

A word about range. Gas mopeds usually go 100 miles before they require refueling. Most adult electrics have a round trip range of 20 miles before needing a charge. This puts people off, especially with the electrics. Reason; They don't 'think out of the box' and are thinking in automobile terms of an 'all purpose vehicle'.

Scooters/mopeds are 'special purpose vehicles' and that purpose is to have fun while saving gasoline and wear and tear on the car. Or as an 'ultra economical second car' for short trips. Same as a bicycle would do but longer, faster, effortless. Short trips are all that will ever need to be done on a moped or scooter and as mentioned on the 'mpg chart, short trips in a 4 wheel gas vehicle are expensive in fuel. For the 'scooter' example given on pg 13, the longest trip ever taken for these shopping etc trips during her recorded 1000 miles (not documenting any more, just happily riding her) was 16 miles round trip, mostly 'cold engine' miles if by car both ways.

If there are multiple trips, you plug her in between trips to refresh the battery so a person can actually do these short trips all day, well over the published or calculated 'range' figure. This is true of *all* plug-in electric vehicles big or small. It is called 'opportunity' charging. ALL EV drivers known to this writer of any sort of Evehicle do it. . Another perk - these park closer to the door at work, shopping, anywhere including the T garages and parking lots. Charging outlets are all inside the T parking garage here, near the bike racks, out of the rain and nearest to the train. You do less walking, can always

find a 'close' parking space anywhere with any sort of bike or scooter.

Cost of operation here in MA; 2 yrs moped registration; \$40, motorcycle license not required, just regular license. Insurance not required. A DOT approved helmet required \$30-\$50. A good cable lock \$15.00. Electricity to charge equivalent to 300+ miles per gallon and it doesn't show up on the electric bill (maybe a buck a month). Gas version of the same brand and type scooter is about 100 mpg, range is 100 miles before refuelling and they have pretty quiet 4 cycle engines, not screaming popping 2 cycle types.

Scooters/mopeds require almost no maintenance, basically the same type maintenance as bicycles. (Do a fairly slow break-in when new, check oil level regularly (if gas fuelled), keep the tires at specified pressure, lube brake cables, tighten anything loose, not much else except front wheel bearing lube every 1000 miles) Incidentally, Low tire pressure shows up dramatically as decreased range and hill climbing power on any type scooter, cycle or moped. Reiterating the instruction books that come with all, 'check tire pressures frequently'

As to MPG averaging an electric scooter (Escooter) with a car. In the pg 13 example the math isn't even worth doing. This is November '05. This writer, a scooter owner, has not bought gasoline since June, tank in the Ford van is still 1/4 full! (missed the whole 'Katrina' price spike) This is the example spoken of earlier. Averaging gas cost down close to 100% for each of those months in between.

(update 07) Same story. Gas vehicle used so little that auto insurance company gave a 'low yearly mileage' discount for 06 insurance coverage, rebate for 05. 07 will have one too, and 08. These rebates helped to more than pay back the scooter's purchase price quickly.

Note that now (10/07), motor fuel is a bit lower but on the rise again. The higher it goes, the more money that is saved by the alternative fuelled vehicle owner.

When choosing an *electric* moped or scooter, remember that the more power the motor has, the less range the scooter will have. The one in this example has a 450 watt motor. Enough power to negotiate the steep hills here with a 210 lb driver and full load of groceries. More power only shortens range, will climb steeper hills but top legal speed is still 25 MPH (in MA). Less power would be OK in flat country (250 watt recommended minimum) and would have more range, given the same battery type and weight. As to gas mopeds, all have 49cc engines, therefore have pretty much the same power and range.

*Update 9/08.* Locally (Boston area, to the South, Rockland) a large 'small engine ATV and lawncare equipment' shop just took on a new 'unfamiliar brand name' Chinese-built adult size Vespa-like gas scooter. This has an electric starter, all the bells and whistles expected of a deluxe model and plenty of covered storage space. Under seat space will fit a Gallon of milk plus more. Design is modern (streamlined with fairings) and comes in 2 types and several colors. A test ride on one proved it comfortable to ride and quiet, with plenty of power for the hills compared with most other brands. Workmanship appears excellent. Four cycle 90cc, needs no oil mixed with the gas. The price? An amazing \$800. Best of all, this dealer, already being in the 'small engine' business, could service it on the premises if necessary (very seldom, there is little to go wrong) both in and out of warranty.

This writer would have bought one then and there if there wasn't already a pretty new and decent scooter in the family. It is a policy of ECFSC not to 'do commercials' or have commercial innuendoes so won't give the brand name. However, if you see a real slick

looking Chinese 49cc gas scooter at this price with electric start and a kick starter also, that has twin (streamlined and integrated into the design) mirrors, a locking rear carrier, big underseat storage with lock, and a locking gas tank cap at or near this price, it's likely the same one.

As to riding these; You would think that the low 25-30 mph speed of mopeds and scooters would turn you off as being a crawl. Not always the case. In the typical ride here, a suburb of Boston, traffic on the commuter's town roads is heavy with many traffic lights. Mopeds or scooters always beat cars through these multiple traffic lights as they mainly ride on the right, in the 'plow lane' where bicycles do. Cars doing stop and go never build up much speed. There is a mile section here where this writer on a scooter beats the cars by a full five minutes at traffic peak time. Bicycles come in second. On another main road in town, close to 10 minutes, both outgoing and incoming. These machines allow driving at the congested times on roads where you wouldn't think of even trying to use the car unless you absolutely had to. The city of Boston with its congestion sometimes appears full of them mainly used by college students and commuters. Think 'real fast bicycle that doesn't need pedaling' when you see any type of powered scooter.

## **B) Human Power**

*Never put down the lowly bicycle.* With dual 'pannier type' carriers astride the rear fender a bike will carry groceries, school paraphernalia, or much sports equipment. So what if some teenagers don't think they are cool. They are! That's one of the many reasons they are used so much by college students (even professors!)

A fellow here in Cohasset MA got his picture in the paper during the height of the '05 gas 'prisis' as he has a pickup truck and a bicycle. He logs 4,000 miles a year on the bike and less than 4,000 on the truck. Now that's real averaging ! He has more than doubled his personal fuel mileage, cut his yearly gasoline bill by well over half (as most bike trips are 'cold engine' gas vehicle trips). And . . . it's good exercise, ask any doctor.

The trick of riding a bike (or scooter/moped/Ebike) comfortably is to make sure it fits you comfortably. Adjust it for yourself. Then start those muscles that don't get used much otherwise off slowly, and gradually increase your distance of travel. Don't start right off on long rides, build up to them. For our purposes it is not necessary to have a hi tech expensive bike (which are stolen quite often) but a mass market special with good carriers added to it or even a good used one from a bike shop or yard sale. Get one with fenders in case you get caught in the rain. Only bike racers, bike tourists, and athletes have a reason to have expensive bikes. AND – remember your purpose. A bike is useless to you unless it can carry groceries. Get those big rear carriers, or a bike trailer also if you foresee carrying big loads.

Some bikes have 'automatic shifters'. Don't get an early one. They are fussy and need adjustment often, won't shift out of 'low' until you are pedaling like mad. They drop the chain a lot. The newer 'electronic' automatic shifters haven't been out long enough to make a report on, but hopefully have solved these problems.

Some bikes are 'low riders' called 'recumbents'. Pedals in front, you lay back into a chairlike seat to pedal them. Many are built in home shops the special parts needed are available. These are for serious cyclists only, and expensive, and can be a disadvantage in traffic as are not as visible as conventional bikes. Some of them are trikes. Upside,

they are especially good for bike tourists. Note that most all of them carry bike flags and nite blinkers for visibility. Google the subject to find out more about these.

*Bicycles can be easily electrified* by replacing the front wheel with a motorwheel, most of which come from China as kits. Early ones were unreliable junk. The newer motorwheel kits have been much improved, reports on them are excellent..

The older motorwheels added pedaling effort to the bikes when not activated, the newer ones seem to have overcome this problem. A tip is don't go for speed, go for a max of 15 MPH under power alone, otherwise they will bog down on even mild hills and won't carry heavy loads of groceries. Uphill you have to help the motor by pedaling, or on big hills you must walk it up but what the hey, it's a bike isn't it? But relax and enjoy the rest of the ride as you beat the system real cheaply.

NEVER consider a friction drive (puck drive) bike motor whether gas or electric. These don't like rain, the drive slips – and wears down the powered tire fast, you will need a new tire every year. Some of these friction drive bikes or conversion kits are built thoughtlessly so that the pucks themselves wear out as well as the tire. Pucks made from grindstone don't wear out, it's the motor bearings on those that wear out (from sand getting in) plus the yearly tire. Sand doesn't get into motorwheels (motor within the wheel) and tires wear very little, like other bike tires.

Recently (10/06) a nice looking 750 watt motorwheel electrification kit was seen including batteries for \$399. On the net on a scooter site can't remember which. 750 is a lot for a bike this should have no need of pedaling on all but the big hills. But with that amount of draw, range under power alone will be relatively short (bikes can't carry a lot of battery weight). There are also (09) chain (not puck) drive 49cc gasoline powered conversion kits, both 2 and 4 cycle. Look good, and not expensive. Google the subject.

People who have these conversions (or factory electrified bikes) tend to use the motors almost fulltime without much pedaling. Effectively, these conversions have become motorbikes that need no registration or drivers license. Because they are still bikes.

There is a couple in Hull MA that have for their **only** transportation 2 *factory built electric bicycles*. Both have bike trailers, used when necessary. When they need a car, perhaps once a month, they rent one for the day. Makes sense, as everything they both normally need including work commute is right in the same town. They even go camping with these, and have blow up kayaks that fit in the trailers for a run around the estuary and a little fishing. Range is about 20 miles under power in flat country, less in hilly country. Speed of electric or electrified bikes is about 15 mph some go up to 20 on the flat. Recently, these owners bought spare battery packs to take with them in the trailers, now are able to go longer distances without charging or go camping where there is no electricity to charge.

Electric bikes, like scooters, use so little electric power to charge them that it doesn't affect the electric bill, so fuel is effectively free. And needless to say, same as the electric scooters, these are ecologically sane, making no emissions or CO2. Theirs are 'Think' brand from Sweden – but were mfg'd in China. The company is out of business now (09) but most parts are 'generic'. They have had them for about 7 yrs without any problems. However, these were initially expensive, with trailer about \$2000 each. Nowadays, you can get a decent basic adult electric bike made in China for less than \$1,000. Izip is a brand to investigate. There are others. Check your local bike shop.

Electric assisted bicycles in MA require no license or registration but you must wear a helmet. Which is prudent on any bike. Check your own state laws regarding electrified bicycles. BTW; Think of electric assisted bikes as 'human power/electric hybrids'.

Motorcycle shops can handle repairs on any Electrified bike, or any moped or scooter, and most problems on an electric bike or scooter are the bike part itself, not the electric part, items such as worn tires or brake shoes, brake cable adjustments etc. Bike shops can work on them, or any owner who is familiar with bike repairs and has the simple tools to do it. Most maint is on the 'bike' part (tires, brake pads etc) not the powerplant.

There is a new type bicycle rarely seen in the US but fairly common in the low countries of Europe. This is called the 'long John'. Envision a standard bike, heavily built, with a long low platform between the rider and the front wheel. These are 'cargo carriers' – the space on the platform could easily hold a weeks groceries for a big family. These require the 'athletic type' to ride them, they, being heavier, are not easy to pedal except on level ground. Presently, there are no reports of powered versions, but this may be forthcoming. Or a motorwheel kit could be added by the owner.

There are also *adult tricycles*. Fullsize bikes built as trikes. These are mainly in flat country such as FL and AZ, also used within retirement communities, large campgrounds etc. These have a large carrier between the rear wheels, excellent cargo carriers. Like bikes they can be motorwheel converted to electric power. However, go for a slower top speed than 15 mph. These are not hot rods but workhorses you will find them fun to ride. Also, trikes with this high a center of gravity must be slowed way down on curves and to almost nothing to turn right angle corners as they don't lean like bikes, will trip and tip instead and will unseat you as well as damage themselves.

Some trikes are the 'pedal powered taxis' you see in the big cities and at tourist resorts. They are well built and safe. But they are heavy, requiring an athletic type to pedal them.

There is one company (Ebike) that made a different design trike, which was available only as an electric. As the 2 rear wheels were small and fairly close together, they would lean, therefore no 'corner' concerns. These were a fun ride too and hauled a load - but they were pricey, well over \$1,000. Ebike is no longer in business at this writing. Why? They came out too far ahead of their time with a product line much too expensive in comparison with other brands of electric or other options.

One smart company (Italian mfg) has come out with a trike (gas powered moped type) that has tilting wheels. No 'corner' concerns. However, it is expensive. There is another in the final stages of design in New England. Some 'low rider' recumbent pedal trikes have this feature.

Advantage of these types; no kickstand necessary, low center of gravity meaning no corner concerns and will carry a heavier load than a 2 wheeler which is great for 'short delivery' vehicles such as 'in plant' or college campus. In years past we had 'sidecars' for both scooters and motorcycles for local delivery service, these latest are modern engineered versions whether pedaled or powered.

### **Other Alternative Vehicles**

Motorcycles are a giant step beyond scooters and are good commuting vehicles. However, the greatest majority of these are heavy powerful vehicles only getting 35 to 60 MPG. The light ones (250cc or so) do much better on fuel and most light ones can keep up with fast highway and right lane throughway traffic. ('10) One rider recently spoken to

rode his hi tech design 250cc sports bike 1000 miles from Midwest to Boston. And back.

All motorcycles need special registration, compulsory insurance in states that have it, and a motorcycle license. So with these added expenses, are not dirt cheap to ride as the moped/scooter types have proven themselves to be. There are electric versions available including trikes completely enclosed, see these on the internet

*Handicap trikes* are not just for the handicapped. Used HP trikes can be found cheap, going rate around here seems to be about \$300. They are quite well built and reliable, most of the older ones will run on 2 12 volt garden tractor batteries.

Some have 4 wheels, most have 3. They will go 2 miles, some of them more, at 5 -7 mph, or up to 5 miles using expensive HP vehicle batteries. The newer ones often do better than this, and there are relatively expensive ones – even 2 person types - with bicycle size wheels that are excellent as to range as they carry big batteries and can be converted to carry bigger heavier batteries. If your grocery run is a mile or two roundtrip, and you install a big carrier basket, you are in, even with smaller older ones.

Have seen these haul trailers and even a couple with sunshade umbrellas. They mainly ride on sidewalks, always stay far to the right otherwise. FL West Coast is full of them. This, as a second vehicle is smarter than using a big vehicle to do a little trip. And fun. *There are a lot of 'little electrics'* of all types in foreign countries and in the US, especially in FL and AZ, GA and a couple others around the retirement communities.

Some of those are home made by retired mechanics, machinists, engineers, etc. Why electric? Distances are short, hi speeds unnecessary for these experienced and wise people. You don't need 200 horsepower to go a mile or two for a jug of milk or to play bingo and these people know it. Electrics of any type are simple, quiet, emissions and vibration-free. And they cost next to nothing to run and maintain.

*ATV'S* are used mainly in remote areas as small commuter/shopping vehicles. However, being built for 'deep woods' use the tires brakes and suspensions are not suitable or even quite unsafe for paved roads. And most are noisy.

The future may bring us ATV types which are more suitable to be used on public highways. Best advice – don't wait for them. If they are 'better' for paved roads, expect them to be 'worse' in the woods. Some things do not compromise well.

*Golf carts* are good large plant maint vehicles, some are used as LSV's (below) but are set up for roads, not golf courses. Most are 36 or 48 volt electric and will do 25-30 on the road, need a charge at 30 miles or so on road surfaces, less miles on rough ground. Some are gasoline but require more maint than electric, do 50 or so miles a gallon on the road.

Golf carts are banned from public roads in most states. However, GA allows them in many places and the area around Peachtree City is full of them. There is another community (Kissimmee FL) where you often see more of these (and NEV's, see below) parked at the market than you see cars.

*Neighborhood electric vehicles* called NEVs are also called LSVs (low speed vehicles). The most common are the 'bubble cars' you see meter maids drive, or are used in large gated communities, resorts, or college campuses by maint and security people. In MA, mainly municipalities and campus type schools use them, and recently (Fall 09) a law has been passed in MA to allow their use by regular citizens on public roads having speed

limits of 30mph or less. They are electronically governed for a maximum of 25 mph. So far (3/10) there are 8 registered in the state as individually owned commuter vehicles due to this new law. There is now a dealer on Cape Cod, where these would be quite useful taking the back roads to beat stop and go tourist traffic.

Only some states have laws allowing citizen owned NEV'S on the public roads. Hopefully all states will come out with uniform NEV/LSV laws for private ownership and public road useage as many of these are like miniature cars with windshield wipers, even heaters, and make ideal emissions-free and super cheap to fuel commuter vehicles, 100+ mpg equivalent, up to 275mpge (see website listing). At this MPGE, presently (10/10) they cost a penny a mile to drive.

Most LSVs so far have been electric. In most states allowing private ownership and use of NEV's on the roads, speed is limited to 30 MPH and they cannot use 'expressways'. 35 mph limit would be a better legislated maximum speed for these, as the newer ones are capable of a bit more than that and they would match existing traffic patterns better. Most foreign countries seem to be full of LSV's. In the USA, some golf carts classify as NEV/LSV (identical, but different terminology) where that type is road legal. All they need is DOT approved lights etc and road rather than turf tires.

*Fullsize plug-in battery electric vehicles* are no longer made in huge quantities in the US since GM ceased production, then crushed their sporty plug-in EV1's. However, fullsize plug-in electrics are being produced in moderate quantities by two different US companies. The specifications and driving ranges of both are amazing due to advanced design and especially due to the new generation li-ion batteries used by both. See these on the internet (the Tesla 2 seat sports car, also the Ebox 5 passenger).

There are also plenty of full size plug-in battery EV's (PEV's) out there both in the US and in other countries, especially in Sweden, the UK, and in developing nations. Most of them will go 60 miles on a charge and can do over 100 a day if charged twice a day, and can do 65 on turnpikes. Gasoline mileage equivalent, figure these at 80 mpge (miles per gallon equivalent) regardless of the price of gas. Some do better. In the USA these are mainly conversions of standard vehicles from their former state, gasoline powered, to plug-in electric power.

*Conversion of a vehicle from gas power to electric* is not rocket science. Neither is it terribly expensive, especially as a 'do it yourself' project. The 70's energy crunch developed plug-in electric conversions to be much more than just an 'automotive hobbyist' thing, with new electric/electronic modules and hardware coming on the market designed for this use. Most of these earlier vehicles – especially the most popular (a packaged VW beetle conversion) are still on the road (electrics are reliable). And the parts needed to convert are now 'state of the art' improved using today's technological advance and with over 30 years of recent USA on-the-road experience behind them.

The most complex part of the conversion process is mechanical, not electrical – such as welding up the battery racks and setting up proper weight distribution for the particular vehicle being converted. The greatest number of these use readily available and relatively inexpensive golf cart/towmotor type lead acid batteries. Also the greatest number use dual purpose or separate 'onboard' chargers which will charge on any household outlet, or will operate on a 220V electric stove or dryer outlet as 'quick

chargers'. All quick chargers will fill up a fully depleted lead/acid battery pack overnight.

Special chargers for the new Li-Ion battery packs take a lot less time to do a complete charge. However, those batteries are horrendously expensive, most use flooded lead acid (golf cart type) batteries. When the price of Li-Ion comes down, every vehicle ever converted can switch to this new more efficient much longer range lighter weight type.

Many conversions are 'home'(read that as backyard built) projects.. Some are trade school or tech university 'class projects'. Also, specialty shops do custom conversions for those who want a 'turnkey' product, just figure out what you want, order it, wait a bit, and bring her home. Example, one electric vehicle specialist in NH has electrified over a dozen Chevrolet S10 type pickups. However, the greatest majority on the road today have been home converted by those who either have the trade skills and the tools or want to acquire the skills through building a project. These people have, en passant, the pride of using their skills and knowledge to build a fuel saving asset to the environment which in the long run will pay itself off. Two books are available on how to do it, both available from the Electric Automobile Association website (see listing, EAA national).

Many examples of this type vehicle can be seen by visiting a monthly club meeting of a local chapter of the Electric Automobile Association. As with any club meeting, good weather brings more members out. One recent New England chapter meeting had 11 full size plug-in electrics present plus one being converted on the premises (plus several hybrids) and New England is not a big chapter. Location/Date/time info regarding meetings is on each chapter's website. Hint; get there early, Bring a camera.

One 'factory' conversion of note is a 'production' car built to order for the customer, the Ebox. This is a topnotch conversion of a brand new 5 passenger Scion XB which will do 85 MPH and go 140-180 miles on a charge. Zero to 60 `time is 7 seconds, she is quick. This vehicle does not use lead acid batteries, instead using advanced li-ion types, and uses a revolutionary 'packaged' AC drive system rather than a DC 'modified forklift truck type' motor. Full charge with her 220VAC fast charger can be done in 2 hours, or normal rate 5 hours. She can also charge from any home 120V outlet. There is practically no owner maintenance needed beyond keeping the tires at pressure and washing the windows. Google it. For the packaged AC drive system, see website listing.

Likewise, there is the Tesla for the 'sporty' crowd. A two seater plug-in appearing at even the second glance to be an immaculately designed and detailed recent gas powered sportscar of standard European breed (a Lotus body) but able to do a 0 to 60 of 3 ½ seconds on blacktop pavement with standard 'road' tires without spinning the tires. This writer was a passenger in one during a 'cone race' at Hagerstown MD this year (09) where the beginning straightaway was of a length to do this 3 ½ second noiseless takeoff.. Perfect control and a beautiful U turn to get into the cones without any undue noise or wheel skip during the whole thing. That blast of acceleration at the start was unique even to one used to fast cars, like turning on the afterburners of a jet plane while wearing earplugs (she is quiet!) An unforgettable ride (we did 2 runs, the owner was only racing against himself and two other Teslas as nothing else on this track could touch them). Presently (11/10) there are over 1400 of these on the road! If 'fast car' thrills are for you, and are willing to pay for it, this is the vehicle to investigate first. Gas sports cars are tricky, and require much expensive maintenance. This one isn't and doesn't.

An internet search will find you other custom conversions of sports cars, kit cars, and even conventional production cars. A plug-in production car of note is the Nissan 'Leaf' which is a new design not a conversion, uses maintenance-free Li-ion batteries like the

others mentioned above and will do 100 miles on a charge.

There is a lot of tech university interest in electric vehicles as design exercises. Northeast Sustainable Energy sponsors the 'Tour de Sol', a car show and enduro with engineering trials for them, whether solar powered or not. Teams come from all over the country and Canada to compete and exhibit. This is presently based in New Jersey.

NEDRA (the national electric vehicle drag racing group) has several racing classes for electrics, they drag race mainly at Hagerstown MD, and at Woodburn OR, Las Vegas, FL, CO, and at the Bonneville (UT) Salt Flats. Most of these racers are conversions of existing gas chassis, street class dragsters that are used for commuting and shopping. For those interested in drag times, the current NEDRA champ for the quarter mile is Dennis Berube at 8.801 seconds, 137.65mph. For motorcycles, Killacycle did 7.864 at 169mph. Electrics can be quick if they are built to be quick. (10) There is a new electric drag racing group on the East Coast (ECEDRA) see the website listing for race dates.

In the Jan 05 issue of Car and Driver magazine is an electric rail type dragster that is charged only by both wind and solar power (and wins!). She is a converted 'junior' class dragster chassis. This same racer, maxing out in its class on an 1/8 mile track (and setting a time which may never be exceeded in that class) has since (07) been converted to a salt flats racer and is active on the salt, looking for electric competition forthcoming.

Racing is the way that gas vehicles have traditionally been developed and proved out and through it, become more efficient and reliable in the past. It is the same for plug in electrics and their components. The batteries in the new hybrids have been developed and improved greatly over the past few years through the tortures of the racetrack along with other type batteries. So have the electronic controllers and motors for the electric vehicle conversions, and the smaller motors in the NEV's. If you want to view these trials, the EAA website or local chapters available from it – and NEDRA have the dates.

Winter vacation in FL? Check out the 'Battery Beach Burnout' for both the electric drag racing and an EV motorcross (timed cone setup) as well as a general EV show on the same weekend. Verify the date and location on the web on the FLEAA and NEDRA sites. See website listing in section III. The Washington DC chapter of the EAA has one yearly at the Hagerstown MD dragstrip and a 'cone race' the day before at a local mall. There are a *lot* of regular plug-in commuter vehicles, mainly conversions (some of them 'street' class dragsters) attending and on display at any of the electric racing events.

*Upsides and downsides of plug-in electric conversion:* The greatest 'up' for the majority of owners is that the owner becomes totally independent in regards to transportation fuel. Price and availability are no longer a concern, commute will not be affected by the volatility of the politics or practices (or prices) of the international fuel cartels.

Fuel pricing is a good part of that. The average owner spends about \$15/month for electric fuel and uses a lot less gasoline for the second car (gas) in the family as all short high fuel consumption trips are done in the electric. And work commute if possible.

Approximately \$15 a month more on the electric bill vs \$30-50 a week for gasoline makes sense for this writer, a non-commuting converted electric owner. One who commutes will do proportionately better.

Gas-specific maintenance is no longer a concern. No more surprises from the muffler shop or 'bad news, trade her's from the repair department. 90% of the items that would

need regular maintenance and lubrication or are subject to breakdown are gone.

At inspection time, no expensive disappointments due to a failed emissions test. Inherently, there are no, and never will be any emissions at all, including greenhouse gases'. Nothing comes out as you drive. And ... a good percentage of the electric grid is also emissions – free (hydro, geo, solar, wind) the rest of it 'greening up' as time passes.

Another; the decreased wear and tear as well as fuel expense of the second (gas of course) vehicle in the family due to increased use of the electric. – which means that the gas vehicle can usually be kept much longer before needing service or trading in. A converted electric never needs to be traded. That is, unless the owner wants a different type electric vehicle, in which case the present electric is normally passed along at an electric car club meeting or sometimes, by a non-club member, gets sold on the net.

Owner specific maint, which even a gas car needs, is limited to checking tire pressures and checking/filling battery water when needed. Battery terminals should be inspected, tightened if necessary. Occasionally, the battery voltage should be tested and any low ones found should be charged individually. This is called 'equalization' and is done on submarines, lift trucks, and other vehicles using batteries in series. Exceptions here, the Ebox, Tesla, And Volt. All use battery packs not needing either dealer or owner maintenance. The 'minis' (LSV's) are also in this category. No battery maintenance as most use sealed industrial type batteries. Also, scoots and Ebikes use sealed batteries

Of course the converted vehicle is still, even with the new powerplant, what she was born to be so that a dealer or independent mechanic can still get parts and work on the rest of it such as brakes and shocks. New electrical parts added are all standardized, easily available and the 3 electronic modules added to make the conversion are, in addition, rebuildable. (a charger, a controller, and a DC/DC converter)

As to downsides; Largest downside is that lead/acid batteries age. As this happens, performance stays about the same but range goes down. The wise owner puts away a portion of his saved gas/maint money each month into a 'battery amortization' category so when this finally happens buying a new battery pack will not hurt.

The owner of a home conversion will need to know what the batteries require as to obtaining maximum lifespan and how to measure them and water them.

Again, the exception of Ebox Tesla and Volt (and likely any other commercially built plug-in fullsize electric using a LI-ion or other advanced batt pack in the future). Nobody knows for sure what the lifespan of these newly developed battery packs will be. Some say they will last as long as – or even longer than the vehicle. The figure of 346,000+ trouble-free miles has already been proven for the different type of hi tech batteries in the Prius. Much longer than those of present day home converted electrics.

Some of the 'naysayers' have called 'short range' of plug-in electrics a downside. It is not. These vehicles are purpose-built to do all the short range fuel wasting trips, and as a 'buffer' against the possibility of gasoline prices again going skyhigh, or extreme case of gas becoming rationed or even unavailable. All longer trips are done in the family's conventional gas vehicle. So far, all plug-in electrics known to this writer are 'second' vehicles in the family, or even third. But they are 'first' vehicles during commutes, shopping, or any other trips within their driving range.

All other downsides have to do with the owner having to make minor adjustments his lifestyle to allow for maximum use of this economical vehicle, and learning to drive it

for maximum efficiency, just like any new vehicle. When the owner has this learning curve 'taped', all downs relevant to learning go away.

*Regarding the driving of these full size home/school shop etc converted vehicles.* They are a bit heavier than stock gasoline so power brakes are recommended. An electric vacuum pump is added to replace manifold vacuum to run the power brake booster.

All electrics are ghostly silent, especially noticeable upon acceleration. Conversions will keep up with any commuter traffic and if throughway driving is a part of it, 60 mph is not a problem for a full size vehicle. Vehicles can be designed maximized for performance, in many cases outperforming their gas equivalents but most are set up as commuters, maximizing their range between charges. As with gas vehicles you can't have both with a converted vehicle (You can with such as the Ebox, Tesla, Volt, and Leaf)

The feel of the average Evehicle is like any 'stock' stick shift gas commuter with a basic small 4 cylinder engine in it, with a couple of passengers aboard. All 'commuter vehicles' even gas powered ones are mild mannered, electrics are no exception. The average type of vehicle mentioned in this section thrives on a 25 mile or less each way commute. Double that if she can be charged at both ends of the commute.

Some 'city' or 'T' parking spots have 120V charging outlets. At the Boston red line (Southernmost terminal, Braintree) for instance, there are 5 120VAC charging spots and the electricity is at no cost beyond parking fee. Some EV drivers charge at work. Charging may not be necessary but many do it anyway if opportunity and permission are there. It doesn't cost much for electricity, typically about half a buck a day. Many employers say 'yes'. And, of course, the self-employed most always charge at work.

All owners of conversions also have a gasoline car for the long trips so the relatively short range between charges (50 – 60 miles for a typical commuter type conversion, many get more) is not a problem. Range is only a problem in the minds of the 'knockers' of electric, the untutored. These vehicles are purpose built as a 'second car' or even a 'third' to do all of the short fuel- wasting trips (see pages 3 and 4 of this guide) – and the everyday commute if it is within range - and the knockers don't know that. Knockers don't know much. (Neither do parrots)

As to the fuelling of these vehicles; Seeing as that the battery chargers have automatic shutdown when the battery is full, the vehicle, when parked at home, is most always plugged in. Just like a cordless electric razor is. It is almost unheard of that an electric vehicle owner runs the battery down to dead. There is a voltmeter to monitor state of charge. If disregarded, the vehicle 'yellows out' just as a flashlight does, the driver feels her getting 'lazy', stops at any gas station to charge for an hour or two for a couple bucks and is more careful to plan his driving next time. Simple. Proportionately, an awful lot more gas vehicle drivers suddenly and mysteriously run out of gas. No warning? There's a gas gauge in every gas vehicle but it somehow gets disregarded.

Most converted EV owners have 'fast chargers' at home which operate from 220V electric stove or dryer type outlets. These allow a full charge in about 1/3 the time of a regular charge, giving more miles possible per week than can be calculated by normal methods. The 'knockers' or even degree electrical engineers do not know this as they won't investigate, won't think 'out of the box' but continue to knock, parroting out of date adverse media comments.

Mainly, the media favors a 'status quo' position regarding EV's. Electric vehicle people do not spend advertising money in mainstream media. Gas vehicle manufacturers

and fuel producers do. The media is responsible to their advertisers, a fair, honest and logical position for them. As for the knockers, parroting that is a comfortable thing for them to do which takes no brainpower at all.

(edit note) Never argue with a person who condemns before he/she investigates. Just give him the website you downloaded this guide from, or a CD or thumb copy of this guide. This writer drives a PEV (a converted GMC pickup, 20 golf cart 6 volt batteries in her) converted at about 87,000 miles, now has over 40,000 electric miles on her and has had her to many 'cruise nights' where antique/custom/hotrod types congregate weekly giving free shows to the public. There, some people will knock electrics. Even when they see one with a happy owner. The concept of a separate 'commuting and short trip' vehicle to save an amazing portion of gasoline money and to help clean the air is foreign to them. Well, the concept of putting gas money and gas vehicle maintenance money in my own pocket instead of somebody else's is not foreign to me, or to any other EV driver. Two vehicles are necessary in this family, one of them is *much* less costly to run, has no time payments, and needs almost no maintenance. End of comment)

*There are other gas powered vehicles besides transportation types that have been successfully electrified.* Lawn care is one area of interest, and for many years, lawns have not necessarily been mowed by noisy smelly trouble-prone gas engines.

There are plug in electric and cordless battery operated mowers out there in the marketplace. Neutron is one cordless available today and there have been others in the past of the same type. Your own mower will need expensive repair or replacement as all gas powered mowers do. Investigate electricity when you are looking for a new mower.

One factory design of note, a brand new product of the 70's, not a conversion, is the electric lawn and garden tractor designed by GE and sold by GE, New Idea, and Wheelhorse during the 70's -early 80's energy crunch. These were 'estate size' use 6 golf cart batteries and sport a 42" 3 blade front mower deck, a 40" snow blade, even a 42" snowblower with it's own electric motor. Rear accessories were also offered including a driveway/lawn vac, and several other tilling and lawncare accessories. Lift for accessories both front and optional rear is an electric winch. Plug-in 36 volt DC electric hedge shears and grass trimmers were also there for the little jobs.

Smaller versions were sold by GE and Wheelhorse in this period, Sears even had one of their own design all using 2 blade belly decks. These were a bit more expensive than equivalent gas 'riders' but needed almost no maintenance beyond sharpening.

Electric tractors were built sturdy, estimate well over a third of those built are still in use today. Their gas operated cousins of the period have long since burned or rotted out.

There are several owners of these tractors in New England - more in different parts of the country - that charge purely by solar power. An article on how to do this was in the Jan-Feb '04 issue of 'Current EVents', the quarterly publication of the Electric Automobile Association. It was the lead article - began with photo on the front cover. These tractors, by replacing gasoline fuel by solar electricity, pay back the cost of the panels quickly especially in situations where they are in use 12 months of the year. Quoting the article, their fuel is 'pennies from Heaven'. A bonus, they are quiet.

Electric lawn tractors went out of production in the mid 80's, a failure of marketing rather than the products themselves. However, There is a company in Canada presently

building the same type lawn tractor with multiple accessories using the latest technologies, it is called the 'Electric OX'. This plug-in battery operated tractor has the power to throw snow across the street, an EAA member close by this writer has one.

Most of the 70's 'fuel crunch' factory, backyard, and commercially built full size auto and pickup truck conversions are still with us. Full size Evehicles are mainly in CA, although there is a scattering of them in every state of the union.

The major public concern regarding electric vehicles seems to be the amount of lead in the batteries. Not a problem at all as 97% of all discarded lead acid batteries today wind up at highly regulated battery recycling plants. The other 3% are the ones that are not disposed of properly by uncaring individuals. Today's figures may be better due to higher scrap yard prices for lead. There will be no additional lead or any other chemical element added to groundwater or atmosphere by electric vehicles due to this government mandated and regulated battery recycling procedure. Other types of batteries as they are developed will fall under this mandate as well.

As to another common concern; stack emissions from power plants to make additional power for these. Download the Chip Gribben report available from the EAA website listed here. Add to it that not all electricity is produced by burning fuels. While there, download the one about EV myths. Also, EV history.

Lately (08) there has been much media talk and speculation regarding large numbers of fullsize PEV's being added to the present load on the electric grid, thus overloading it. This is pure hogwash likely generated by 'big oil' lobbying of the media. They do not take into account the much less electricity that would be used to process and pump gasoline, or used in the pretty much constant repair of gas vehicles, unneeded by electrics. Neither do they recognize the fact that most everyone who has so far used an electric vehicle since EV history began before 1900. (Electrics were the first vehicles that could be called 'automobiles' even before steamers were built) has charged at night when the grid is lightly loaded (malls, offices, businesses, factories etc closed at night)

These media commentators need a wake up call. As a final comment here, these self proclaimed experts do not take into consideration the increasing use of widely distributed fuelless windpower or photovoltaics to generate electricity for the grid. Nor do they recognize the many homes that are presently producing their own solar electricity, or the ones that will be built in the future. There are also 'solar homes', widely distributed throughout the country, that do not draw power from the grid, but supply power to it. Seemingly, most media commentators and a lot of the 'experts' they call up don't recognize the positive impact of fuelless wind or solar produced electricity either.

The newest full size pure electrics are a giant step into the future, as for the first time in history they do not use lead acid batteries. They use hi tech, light (and quite expensive) Li-ion (same as most laptop computers) or other advanced types and are much more efficient overall, with much greater speed and greatly increased range between charges. Battery lifespan at present is unknown but will be much greater than laptop batteries as the automotive versions are not 'miniaturized', but built full size and ruggedly to withstand high mechanical and electrical stress. At present super pricey, with increased production prices will go down. Many people in the auto industry look forward to such vehicles as the futuristic and sporty Tesla, or the revolutionary 5 passenger Ebox, a much less expensive Evehicle, getting down to or even below the price range of midrange

SUV's within 10 years. Presently, the Ebox goes for a bit less than an Escalade, and is now priced less than it's 'Wiki' listing. The Nissan Leaf plug-in will be 'popularly priced' within the range of most 'second car' buyers. This is proof that even though GM 'killed the electric car' and through that, attempted to kill the genre, the only one they killed was their own EV1. They could not stop progress.

(6/08) GM is now announcing a different type of EV - the Volt - hyped in one report as a 'revolutionary design hybrid - in the design and pre-production stages. However, the credibility that GM lost over their EV1 (plug in) debacle in their highest 'target' marketing area could come back to haunt them marketwise.

(4/09) Perhaps if GM did not 'kill' their own electric cars, instead producing them in quantity and marketing them, they would not have suffered the financial crisis of today.

(9/10) Yes. They plan to market a 'range extended plug-in' (the Volt) not lease. After 40 plug-in electric miles the gas engine takes over. Google this! An exciting concept giving us the best of both worlds in a single vehicle. A plug-in Hybrid!

(10/10) Starting to see kits to convert present hybrids to plug-in hybrids. For more information on conversions, check out the EAA website. Ogle the pix and follow all the links. Some of these links are suppliers of conversion parts. Suggest also attending a local chapter meeting (dates/places/directions/times are on the local chapter links) where there will certainly be EV conversions to view and perhaps test ride. These people saved money and had fun by driving converted plug-in electric cars and trucks even back when gas was cheap!

*Tip regarding all alternative plug in small electric or electrified vehicles:* Unsatisfactory reports on these are always due to people using them who do not understand the instruction manuals or operating parameters thoroughly. Examples; by inattention to instructions, discharging the battery of a scooter or converted bike without immediate recharging, causing it to sulfate – especially over the winter. Or treating the vehicles roughly expecting them to be toys or hot rods rather than workhorses, commuters, and fun vehicles. Or not doing prescribed maintenance such as lubrication points and tire pressure. Even a bicycle would not satisfy this type person when mistreated this way.

Also, electrics of any type, even fullsize conversions are habit forming. You will find that you would *rather* go out on the electric doing the short trips and small shopping than in the gas car. Electrics are attention-getting, you will often find people admiring it and questioning you about it so be prepared to answer questions.

One last comment regarding pure plug-in electric vehicles; the higher gasoline prices rise, the more an electric vehicle owner saves in comparison to gas. Our electric rate depends only in part upon the price of fossil fuels, it will not rise as much.

While on the subject of environmentally clean electric transportation, check out environmentally clean sustainable electric power. Crank 'windfarm' into your browser. For an operating municipal wind turbine, crank in Hull MA, the town website or Hullwind.com. There definitely are alternatives to burning expensive fossil fuels in powerplants.

The Australian outback has run mainly on wind generated electricity since the WWI era. On the farm and in many homes in the USA in the 20's - 40's period before the REA,

most electricity came from windpower. Look this up in old (1920-40) Sears and Roebuck catalogs, many different small wind plants were offered besides their own.

There's a lot of wind energy being used in Europe and Australia. The USA is just starting to get into it again, grudgingly, as the oil coal and natural gas lobbyists who influence the federal govt don't like it one bit. However, it makes sense and can happen if people are for it and local governments, not being heavily lobbied, responds to the people's needs (not the fuel producer's needs!).

As you will see on the Hull MA website, this has happened. Hull has smart forward-looking people in their town govt and municipal power organization. One member of the municipal power organization in particular, who did the research and became a one man lobby to the rest of the board. Also, to those few people, both elected/appointed and regular townspeople at the time who would listen and see the many advantages of town government owned windpower to a community.

Hull also has smart forward looking regular citizens who conceived the area's first independent 'green' organization and promoted windpower to the rest of the people, fought those who opposed it through the local media and won the battle. This started as a tiny organization that held the first 'Earth Day' show since the 80's (Sustainable Living Festival) in Eastern Massachusetts, thus winning over both the rest of the town government and a good portion of the general public to the cause of green squeaky clean fuelless power.

This organization has prospered, and fostered 'sustainable living' groups in other towns in the 'South of Boston' area. From a first free to the public 'Earth Day' show attendance of 300 adults, this same free show run by the same people this year (09) had an adult attendance of near 3,000. Hats off from the ECFSC participants who produced this Fuel Saver's guide to the town of Hull's municipal government, and to the people, both active and retired, in their power board. Also, especially, to the unflagging dedication of the leadership and rank and file members of the Hull-based organization now known as Sustainable South Shore.

(update '08) Since Hull has shown the way windpower-wise, Hull's town government has had a lot of official visitors from the governments of other municipalities, seeking to learn how they can do the same thing, set up their own municipal wind turbines. There are proposals pending, computer studies of aerology data being done in many places due to these visits. People in town government are beginning to learn that a wind turbine, at it's bottom line only has two outputs. Cleaner air for the planet and money for the municipality, industry, corporation, or even private individual who owns it.

Wind turbines (and photovoltaic arrays) become income for a municipality the moment they start to produce. An income that does not depend on taxation, has no emissions or other detrimental effects, and needs no 'staff' or other expenses. They can be put most anywhere including on town owned or even 'unbuildable' land. And the biggie is that this new income helps hold down the tax rate of the people of that municipality in these days of increasing municipal fuel (and all other) expenses.

There is opposition to wind power. Lobbying for this comes from 'guess who' – the industries who would be negatively affected by it, meaning the fossil fuel industries.

As to public opposition; this is mainly from those who are afraid that they might not like the view. This is commonly known as NIMBY (Not In My Backyard) opposition.

Many ‘pseudo enviro’ issues – those disproved by experience in other areas and countries are repeatedly brought up to hobble the municipal leadership who would otherwise embrace windpower. These opponents even believe and promote to the citizens that a huge tower in the area would lower property desirability, therefore saleability. Hogwash, as in Hull MA, all property values within the sight of either of the wind turbine towers have increased since the towers were put up. This same thing, increase of saleability, has happened in all known other communities that have put up wind turbines. It shows a forward thinking municipal government, a good place to live.

A question to those windpower opponents; Seeing as that our expanding population must have new sources of electric power in the proposed area of the new wind machines, would you rather see dirty smokestacks in their place? The fuel producers would.

Back to the main subject at hand. Transportation.

***Forget hydrogen powered vehicles.*** The combination of a fuel cell stack and high pressure or chemical absorption tanks are only a complicated and extremely expensive substitute for a battery in a conventional plug-in all electric chassis. Essentially, a longer range lighter battery. And we already have that. (check out Tesla, Ebox sites).

This is pie in the sky stuff for rich companies to buy and to make others rich and the average person could never afford one. Even if we could, most commercial hydrogen is refined from natural gas and then we would be back in the clutches of the fossil fuel barons. Until there is no more fuel left to refine. Likewise, the much heralded 'at home' hydrogen source extracts hydrogen slowly from natural gas, a depleting non-sustainable natural resource. The supply side of Hydrogen is not sustainable unless electrolysis or membrane separation is used to make it from water using sustainable electricity such as wind or hydropower. These separation processes are inefficient whatever their power source may be, therefore costly. A huge capital expense will be required to produce store transport and distribute the hydrogen needed for even a miniscule (<1%) amount of the transportation we have today – and even more in the future. This expense can be seen already in CA – the ‘hydrogen highway’, a small part of it being in existence as in CA, hydrogen from the producers is already flowing to food processors and the chemical industry, and has been for many years. However, the rest of the distribution will have to be built. Being capitalized at today’s high interest rates, this fuel will not be cheap.

The media, apparently being lobbied by natural gas interests, appears to be convinced that hydrogen is a brave new way to run a car so it gets a lot of media play. Some industries are making bigtime govt subsidy money messing with it. It may pay to use it as urban public transportation fuel. But it is not, and never will be for us, the little people, at a reasonably affordable price. No. Nyet. Non.

(‘10) There has recently been discovered a new use of hydrogen for automotive transportation. Not as a primary source, but as a ‘fuel additive’ which increases the MPG of the vehicle. This is being done by ‘gearhead techie types’ in different ways, breaking up water (H<sub>2</sub>O) into a gaseous mixture (HHO) by electrolysis and inhaling it by manifold vacuum into the engine. The engine’s operating parameters must be changed to use it efficiently. When done properly the result is less emissions than stock plus 10-20% gain in fuel mileage. It is not for everyone and will likely never be seen as an OEM or aftermarket add-on due to the technical skills needed to operate it efficiently and safely. Google HHO to see this process.

*Other types of 'new tech' automobiles* are out there. Giving one, compressed air power.

High pressure tanks and hi pressure mini turbines will certainly run a vehicle. BUT . not economically. The supply side, IE the compression process is quite wasteful of energy. The higher the pressure, the lower the efficiency of this supply side. And it takes an awful lot of pressure and pressure tank space to get even a light vehicle an appreciable distance before refuelling. And... refuelling takes time, as refilling divers tanks does.

As with hydrogen distribution, there is presently no infrastructure (compressed air stations) and these, being capitalized under today's high interest rates will make the fuel expensive.

Another issue: Air pollution caused by lubricating oil in the exhaust. Anyone who has ever run an air turbine powered hand tool could tell you about this.

Most of this 'brand new development ' type stuff is 'futuretech', a cop out. In order to be viable today, a new transportation development has to be available today, debugged by long experience today, mass produceable today, and the most important part, affordable to the masses today. Countless thousands of people are out there now saving money and lowering their CO2 footprints by using presently available alternative vehicles. Don't let a dream of 'futuretech' put off your own plans to make a change that can be done now.

*Hybrid cars;* In every hybrid by any mfg, an electric motor/generator and a gas engine work together to give you 'better than excellent' fuel economy in a full size 4 or 5, even 7 passenger vehicle without compromising performance. This is the best possible 'full size' vehicle solution for the most people at present and likely in the near future to ramp down a family's (as well as the world's) need for automotive fuel. The Toyota Prius is the best known, and has been on the market long enough to prove it's reliability, and the validity and reliability of the genre. There is one Prius in Hingham MA with over 346,000 miles on her (late 07) having had no drivetrain repairs and still using the original battery pack. Performance is 'like new'. This Prius holds the unofficial 'record' for most miles driven by a hybrid vehicle in North America and likely, in the world. (Jan 08 – unfortunately, a real dumb 'right of way' head-on by a new teenage driver at an intersection ended the life of this record breaker at close to 350,000 miles. The owner, fortunately unhurt, now drives a Gen II Prius and has just under 200,000 as of late 09) Several others near that 346K mileage are reputed to exist in Japan where they were first introduced.

Fuel mileage of the gen 1 (original) Prius varies between 60 (in normally wasteful short trip and stop and go driving) and 45-55 on the turnpike. In other words, these hybrids get better 'city' mileage than 'country', the reverse of 'gas only' cars. At high throughway speeds in the passing lane (perhaps doing 85) they get about 40. The MPG variance depends mainly on terrain, winter/summer, and individual driver habits as other vehicles do. The Gen II (2006-9 model) does a good bit better on gas and has other improvements as well. Instance – the rear seat now fold flat all the way back, the shift lever is easier to handle. Visibility is better. Security is better, with 'no key' startup.

There are very few hybrids of any type available in the 'used car' market. You almost never see the Prius advertised. There is no need for dealers to advertise this model. They are so much in demand they sell 'sight unseen', often with a waiting list. (07, producing more, no waiting now). (08, same story. Few trade-ins, people keep these hybrids.) (09 Ditto) (10) Advertising now, as more production lines have switched to building hybrids.

A fine solution for a gas hog owner to eliminate present 'gas price' woes and prepare

for a future with even higher (\$4.00 – \$4.50 7/08 in most of New England presently) gas prices is to trade in the guzzler for a hybrid. (9/08, \$3.70 and falling but it'll be back up there soon.) (2/09 below two bucks but how long can that last? Gone up 15c in the past 2 weeks) (10/09 up again). (11/09,12/09 up again What could we expect anyway?)

The Prius, by the way, is a great 'long thruway trip' car, comfortable and effortless to drive, great visibility and response. This writer has driven thousands of miles in two different Priii (the plural) both Gen I and II and although not an owner, when 'new car' time comes around, will definitely buy one.

Toyota now makes a 4WD hybrid SUV (Highlander) able to tow 2500 lbs, so those who want SUV features can now have a hybrid that is rated at, depending on terrain and load between 30 and 40+ MPG. Which is outstanding, unique for a big 7 seater 4WD vehicle with 268 hp total that will do 0-60 in 7.3 seconds. One local owner reports almost 50 highway mpg, better than it's EPA rating. Fantastic for a full featured SUV. He must be pretty good at economical style driving. Imagine ! An SUV that's *not* a gas hog!

Honda stopped producing the Insight, which is a 70 hwy 60 city mpg hybrid vehicle. It's a light 2 seater with a sports car look. There are very few around as used vehicles. People who have them keep them. Honda now has a Civic hybrid. Ford also has one (the Escape SUV type) You will be seeing more hybrids by various manufacturers as time goes on now that they have been proven and have caught on with the public.

Hybrids are relatively expensive now, trendy and likely the most fuel efficient fossil fuel burning full size vehicles that will come to the public in the present generation. Hybrid drivers are looked upon as wise people, in tune with the times, and the Earth and her needs. Gone are the days when even an expensive gas guzzler driver is looked up to. 'Not too smart' is the general attitude towards the fuel wasting vehicle driver at present and will continue to be as fuel prices go up and down – and up – and up.

Being developed with a few on the road now are 'plug-in hybrids'. These give a range of about 30 miles on electric alone and are charged by plugging them in. Pure plug-in electric for the short trips, hybrid for the long ones. An aftermarket conversion kit is available for the Toyota Prius to add this plug-in capability. Envision the question "Which fuel am I going to drive with today?" The conversion is pricey now but as production gets into full swing it should come down a good bit. The future should bring us a OEM versions of this type vehicle. However, it would be a good bit more expensive for this type of 'dual fuel' model. (10) GM now has one, the 'Volt'.

An internet search will reveal other 'hybrid type' conversions available for some present cars but here the warning. Much of this is futuretech. What isn't may have an unrealistic payback period. Do what your heart and pocketbook agree upon but don't wait for it. The 'Now' solutions have all shown practicality and reliability. Investigate, choose, and end your concerns over a future where fossil fuels could never get cheap. There are websites now that can help the hybrid driver gain even better than the 'more than excellent' EPA fuel economy ratings through technical knowledge of how these vehicles work, and driving specific methods. Two are listed in the 'web address' section at the end of this document. Of course, all of the driving specific tips given in the

'fuel save' section here will work with the hybrids. Just owning a hybrid will not give you the maximum fuel save it (or any vehicle) is capable of. On these sites you will also find other site listings and links that will help you in your program of 'hypermiling'. Much of the info there applies to regular gas/diesel vehicles too.

For those who think the hybrid is a new concept. Yes it is, for automobiles. However, the railroads have been successfully (and cheaply compared to other fuel systems) using hybrids (diesel electric locomotives) for over 75 years. Pure electric loco and 'streetcar/subway' transport has been in use in the US for well over 100 years. More than 50% of all mainline railroad trackage in the world has been electrified, uses pure electric locomotion. Almost all urban mass transport in the world is pure electric. Both the 'Chunnel' and the bullet type high speed trains are electric.

### ***Vehicles other than the above categories***

*Boats; Recreational boating;* Choose sail rather than power. Fuel at marinas etc is much higher priced than shoreside. It only takes an economical 6 hp outboard to bring a 24 foot 5 sleeper sailing sloop home or out to where the fish bite when there's no wind.

As to powerboats; plug-in electric sport fishing and cabin cruisers in the same size range have been built or converted in FL among other places. They charge from dockside power and can be hybridized easily using a contractors 220V generator. On electric they are almost as quiet as sail. These are custom, mainly by hobbyists and are not production craft. Halsey Herreshoff, a U.S. yacht designer/builder of international repute, came out in 06 with a hybrid day cruiser. This too can charge at dockside.

Lake Winne in NH has many wood powered steam launches (picture 'African Queen' types.) Most are restored antiques. Some are newly built reproductions. A person needs special skills to run these, most owners are live steam antiques hobbyists or engineering people. These too are quiet and cheap to run. Every year there is a week long regatta for these on the lake's North end. Many are kept at the lake all year, some come trailered in to participate.

*Camping vehicles;* This writer, in the late 70's, toured extensively coast to coast in a pickup camper, the truck was a 350 Chev Silverado. This was mainly 'right lane' thruway driving and fuel mileage averaged 15mpg for the whole trip, twice what a towed trailer or motorhome of any sort available then was getting even in 'best case'. Inside the camper were 2 Puch two cycle gas mopeds (100mpg, 49cc, 25mph) with folding rear baskets which did all the little trips in the areas of interest. A 2x6 stowaway ramp allowed easy loading/unloading. The camper part was chosen for interior space to store these and the ability for 2 to sleep and cook (on rainy days or during short overnites) with them aboard.

Perks; Mopeds were treated as bicycles at places like Disney and Magic Mountain, parked for 50c or free and right at the main entrance. Campground was 5 miles away from Disney FL, for instance, much less expensive than closer campgrounds. During extended stays it was not necessary for the lady to store all the cooking stuff and myself to unplug/ store the cords, water hose etc when leaving the camp for shopping exploring, points of interest etc, then repark, relevel, and reconnect after the trip. The mopeds saved this extra work. Less work on vacation = more time to play. Many stops were state parks and they are fantastic! All campgrounds we stayed at had showers, most also had swimming facilities, convenience stores etc. Never leave on a trip like this without 2 different current 'camper's' map books to cross-check facilities, and a general, but open

to change route plan.

Total cost of 6 weeks of this was much less than the cost of a week cruise to the islands, or 'fly and rent a car' for a week to most anywhere. And we traveled at our own pace, no harassing schedules, delays, lost baggage issues or jet lags. And we saw more.

*Other;* Note that the 'big 3' automakers in the US are having financial trouble. If they built the economical automobiles that people want and need instead of concentrating on heavy 'image' marketing of overpowered hi priced gas hogs they wouldn't be. US Mfgs build excellent vehicles but are behind the times, not in step with demand. We need 'peoples cars' not overpowered fantasy imaged gas hogs.

Somehow, Detroit has been blind to the success of foreign manufacturers who have given us 'people's cars'. And has forgotten the lesson of the 70's which made these smaller lighter more economical vehicles (and their manufacturers) popular.

***In general, automobile manufacturers (and buyers) need to restructure their thinking as to the 'image' of inefficient gas guzzling vehicles. These vehicles are neither good for the atmosphere, nor good for the planet's limited petroleum reserves. It is a selfish uneducated image. Is that the image a person would want?***

### ***Fuel pricing***

Petroleum derived fuel prices, especially gasoline, diesel, and heating oil have been doing jumping jacks for many years, mainly since the late 60's. Up, down a bit, up, down. But mainly up. Research this yourself on the net. There are 'fuel price watch' sites listed here. (11/08 – gasoline is a bit below \$2.00/gal now in the Boston area. Figure out for yourself why it has gone down.

(Hint; the US auto industry needs a bailout and the dealers are clogged with both new and trade-in high fuel consumption vehicles that are not selling. Joe and Jane Sixpack and their clones may think 'The gas emergency is over. Now I can buy that nice looking 12mpg SUV cheaper.) (10\09 – the cash for clunkers program took in and crushed quite a few of these and other types of gas guzzlers. Joe and Jane etc. likely bought the rest.)

'Down' at present regarding oil by the barrel - the main reasoning by petroleum resellers to 'adjust' consumer price - can quite easily go 'up' again.

Another; Fuel prices were manipulated downwards to slow down and finally end public interest and participation in fuel economy measures during the last part of the 70's energy crunch. Government subsidies on such as solar installations ran out their time periods and were not renewed. The auto industry again started to promote power and performance rather than fuel economy.

Is this present (late 08 – early 09) downturn in fuel prices part of a similar manipulation of both government and public by the fuel industries? A repeat of the historical planned petering out of the 70's crunch? Media reports here of speculated causes cannot be relied upon.

Regardless of the cause – you who read these pages will, by implementing changes in the amount of fuel you burn and keeping to the principles shown in this guide will still save you a peck of money while simultaneously, by lowering your fuel usage therefore your carbon footprint, help to clean the atmosphere.

When crude oil derived transportation fuel and home heating fuel get to unprecedented prices and gasoline got to a higher price per gallon than milk as happened in Fall 05 (and is headed there again now in late 07) (and has again surpassed it in '08, 09, and 10) something is basically wrong with the system that provides them.

The reason for the Fall 05 rise given by both government and media was that hurricane Katrina knocked out a good part of production, refining, and distribution capacity. Hello ? Anyone who checks the date that Katrina hit against the curve of rising prices of fuel will find that fuel rose to an unprecedented high well before Katrina. But who checks? The public has been programmed to accept, not question media reports.

Secondly; There were other refineries not affected, which could continue to provide 'pre Katrina' prices to their customers but didn't. To many, it is obvious that the extra jump in price was the entire system of distribution taking advantage of the public to pay for and 'average out' post Katrina recovery costs of the lost facility. Same thing has happened again 9/08. Big rise everywhere allegedly due to hurricane damage to oil facilities in and around Galveston. And today, with the CA offshore oil disaster.

Third; a vital support system is that is so fragile that every fuel user in the entire country was (and is today) affected by damage to a relatively minor part of it is *obsolete*, especially in these days of worldwide terrorism. The answer, of course, is a more widely distributed less complex production and distribution system.

The electric grid is a good example of this, as it is together, yet independent. The loss of one plant or even multiple plants simultaneously will not affect price, production or distribution of the entire system. And the biggie; It has happened before, the great Northeast blackout was an instance. The price was not and could not be affected. And power was back in the entire outage area in a few days. Recently (12/08) a huge ice storm without precedent knocked out a large number of Western MA power transmission lines. Crews have been working to restore power 24/7 and now, 2 weeks later the job isn't finished yet, several small communities still do not have power. (All restored several days later) Have any electric bills been affected? Of course not. And they won't be.

You will find more information regarding fuel pricing farther on, and on the net. It's going nowhere but up. The price is one of the three basic reasons why we look for alternatives. The one that hurts us today.

The other two hurt our children, grandchildren and great grandchildren yet unborn.

- Will there be underground fuel for them when they need to use it?
- Will airborne pollutions and global warming put an end to life as we know it?

Burn less fuel. Future generations are helped by your actions now.

### ***Alternative fuels***

Crude oil is the source for many products and processes besides just transportation and heat. We must have alternatives as our normal fuels. Among the reasons; when this crude oil gets burned up, we will also lose the industrial products derived from it.

Most plastics are crude oil derivatives. There is hardly a branch of the chemical industry that doesn't use some part of each barrel of crude by breaking up crude petroleum's long chain molecules into 'tailor made different molecules' in it's output. Even medicines including many of the new 'wonder drugs' could not be made without crude oil. Look this up in an encyclopedia, you will find a list longer than we would want to print here of products and processes that would be forever gone if the

chemical basis of them, oil with one list, coal with another, natural gas with still another were gone.

The worst thing that we can do with this crude oil (and the other long chain molecule fossil fuels) which now appear to be in plentiful supply but will in the relatively near future decline to a trickle is to burn them or any part of them. It makes no sense at all to recklessly squander these endangered natural resources. They are the heritage of our grandchildren and their grandchildren. Therefore, the need for alternative fuels.

Here we will deal with those alternative fuels suitable for use as transportation fuel, especially conventional cars and trucks. *Alternatives reduce our dependence on domestic and imported oil but still, no matter how clean they burn emissionswise, they still oxidize carbon and put out CO<sub>2</sub>, the primary global warming gas. There is only one 100% exception to this general statement on this list.*

*Biodiesel* is a partial exception to the CO<sub>2</sub> problem. When corn, soybeans etc are grown, photosynthesis takes place and the plants absorb CO<sub>2</sub> and put out oxygen. Therefore the supply side puts out only the CO<sub>2</sub> needed to process the oil bearing part into vegetable oil, which is much much less than the CO<sub>2</sub> output needed to refine crude oil into motor fuel. This veggie oil can be burned pure and new, or it can be first used for food prep purposes and when worn out for that purpose, recycled into motor fuel. Afterwards, a lot less energy than initially (mainly chemical energy) to process 'recycled from food prep' veggie oil into diesel fuel.

Another advantage; Vegetable oil is easily biodegradable and inherently clean burning, unlike crude oil (mineral oil) derivatives such as gasoline or Diesel fuel.

And the big advantage; it can be 100% USA supplied (mainly corn or soy) doesn't need expensive dangerous fuel wasting 'supertanker' transportation to get it here, or can get involved in a 'Torry Canyon' type oil spill. It won't show up some day on the world's beaches due to tanker spills or as in '10, undersea oil well leaks.

The downside; That is, if it all gets grown and processed here. Presently, it is not.

However, there is another type of biodiesel that is. Biofuel is refined here in MA using second hand friolator oil that won't cook good any more. We call vehicles that use the stuff 'greaseburners' and the fuel itself is called 'grease' (as opposed to new pure biodiesel.) A diesel must be converted to burn 100% 'recycled bio', the conversion kit is (07) about \$1500 including a heated fuel system for those well known New England winters. (09.price has gone down a bit check the web on this) (and of course, the 'do it yourself' home auto mechanic could do it himself at much less cost..

The used 'fry oil' must be chemically reprocessed, as filtering alone leaves in chemical and particulate impurities that cause short engine life. There are 2 companies in Boston that do this commercially. There will be more, as the equipment to do it is relatively inexpensive, a person can set up a miniature processing plant in his garage. Several Boston area people, individuals, who have converted their own diesel vehicles are already making their own motor fuel. Several of them sell and install conversion kits to fit most any diesel. Hang 'greengreasemonkey' into your browser to view this option. There are others, see website listing also google the subject.

At present, (07) the cost of recycled biofuel from a commercial producer is about the same as diesel fuel, around \$2.90, but is quite a bit less, about half that, for homemade fuel. However, the cost will remain at today's level regardless of what happens in the oil

industry. (08-Wow did it happen !!) If you bring in your own used vegetable oil to one of these reprocessors, you get a discount on the fuel, which is great for those who own restaurants. (08) A few restaurants, mainly chains, are not giving away used fry oil but selling it to commercial reprocessors now. However, there will always be oil for the small home processors from the smaller places. The exhaust of reprocessed is quite clean, smells like french fries. (10/09) The best 'raw secondhand friolator oil for the individual processor to use can be obtained from Chinese restaurants, as they change their oil more often than most restaurants to keep their delicate tastes consistent.

Biodiesel, as 'brand new' vegetable oil has a problem. Land being used to grow fuel cannot be used to grow food. There is only so much arable land in the world suitable for farming and our growing population will need more of it for food as time goes on. Great areas of virgin land, especially in enviro sensitive areas such as the Amazon rain forest areas, are being and have been cleared to produce soy, cane, beets or other biofuel (ethanol or veggie oil) feedstocks. A good reason why the prospect of using recycled fry oil is so exciting. (Rain forest land absorbs and converts much much more CO2 to oxygen than cropland of any sort. Get rain forest info from National Geographic)

Some stations especially on turnpikes are starting to sell 'blended Diesel fuel' sometimes called 'clean burn Diesel. This is usually 5-10% bio that burns cleaner than straight diesel, giving the engine less carbon-caused problema.

Home made biodiesel (aka 'grease') on the other hand, is mainly recycled waste vegetable oil that would normally go in the garbage and has already been used for food prep purposes. Motor fuel is it's recycled state. Now (07) we are getting more 'new' veggie oil as blending stock and more 100% biodiesel.

*Corn squeezins* Basically this is not a real clean burning fuel. Ethyl alcohol (ethanol) same as 100 proof rotgut moonshine but denatured so it can't be imbibed. In former days this was mainly used as shellac thinner. Some people have experimented with burning it 100% with various converted vehicles in the farm belt but have had poor results. Also, it is an additive (vicinity of 2 – 10%) to gasoline. It lowers emissions but unfortunately, as it burns poorly and picks up water, also lowers power and miles per gallon. The supply side of ethanol puts out a 'garbagey' smell (as it is a ferment/distill process) and it takes a lot of hydrocarbon sourced energy to process it.

This is not a 'world solution' as arable land must be used to grow the raw material corn sugar beets etc. Land that is taken over to grow fuel cannot be used to grow food, same problem as with new vegetable oil. With ethanol produced in the USA, the spent corn mash is used as pig fodder, which helps the supply side. Methanol, AKA 'wood alcohol' is too dirty a burn to use for motor fuel. Also, this reuse of spent mash can not happen.

Experiments are taking place now (06) to use vegetable husks to produce this fuel rather than using the edible part of the plant. In FL, waste from the orange juice processors recycles into ethanol, but being seasonal, this will never be a big industry. As with biodiesel, there is much virgin land loss, sensitive forests burned especially in the Amazon rain forest area to farm sugar bearing ethanol feedstocks such as corn and cane.

***The addition of ethanol to automobile fuel lowers some types of emissions. However, it also lowers miles per gallon. The more gallons used to do the same miles increases those same type emissions and adds more of other types, also increase greenhouse gas output when looked at as an overview, including miles driven, of the entire transportation cycle. Another reason why alternatives to the present oxidizing fuel systems must be put into practice worldwide.***

*LNG (Liquified Natural Gas) or CNG (Compressed Natural Gas)* This is used mainly for mass transportation in cities as it is clean burning, much less polluting to city air. It is not available everywhere. Some buses are now LNG or CNG. And Boston smells better, especially in and near the T bus terminals, because of it. Many smaller vehicles are presently running on CNG. This fuel is an oxidizing fuel as well, having all 'oxidizing fuel' properties and dangers to the future of the planet. See above.

*Propane.* This too is a clean burning transportation fuel mainly used in forklift trucks. Most any car or truck that uses a carburetor and not fuel injection can be easily converted to use this fuel, but it derates the horsepower about 20%. Propane burners do not dirty their oil, engine and exhaust components seem to last forever. Many propane delivery trucks burn it. At present it has a lower price than gasoline but being a depleting hydrocarbon fuel, this price advantage should not last long. Propane burning or carrying vehicles are not allowed in most tunnels and many states require a special road tax to be paid on it as well. Propane is not yet available coast to coast without getting off the turnpikes. And of course, there is as much CO<sub>2</sub> and other greenhouse gases produced by propane as any of the other oxidizing fuels mentioned.

*Electricity.* A different category transportation fuel than all of the above as it is not only clean but sustainable. Gives off no CO<sub>2</sub> global warming, 'lung concern' or acid rain chemicals or emissions when used, the cleanest (as well as cheapest) fuel that there is.

The supply side can be clean and sustainable (hydroelectric, windpower, geothermal, photovoltaic, or surprisingly, nuclear). However, it can also be quite dirty (coal) and use depleting non-renewable fossil fuels (coal, oil, natural gas, propane) to generate it.

All handicap individual personal transportation has always been electric, and the history of highly successful electric automobiles and trucks goes back to before their steam or gasoline equivalents came on the scene. In the early days of the automobile, electrics were valued by individuals as they needed no steam engineer, chauffeur, hand cranking to start, warm up or special knowledge to drive. They were clean with no odor, especially liked by the ladies. They were quiet, didn't frighten the horses. The only reasons they got out of favor was the invention of the electric starter for gas cars, also the extreme low cost of the crank started Model T Ford priced electrics (and many, many gas and steam car brands) out of the automotive/truck market.

Electricity is *the* major transportation fuel today in the world's railroads and urban light rail (subways, streetcars) and is beginning to pick up popularity again in great numbers with the hybrids. (Electric cars with an integrated onboard gasoline run generator is the easiest way to think of them). Plug in battery operated commuter scooters are fast gaining popularity (especially in China, India and Pakistan and the US West Coast).

There are many electric LSV (30 or so mph) delivery and commuter vehicles mainly in Scandinavia, Europe, China, Japan, and the UK. Some US states allow these smaller lighter and economical vehicles to the general public, not just to municipalities. (We need this type of MV legislation in ALL of our states. Until we have that, the US will be far behind the rest of the world in clean fuel efficient personal transportation) (10) MA has been recently added to the list of personal LSV allowable states. Thank you, State Senator Bob Hedlund, Chairman of the State Senate's transportation committee.

In addition to being a clean motor fuel, electricity is and always will be cheaper than

any other motor fuel, given vehicles that have been designed to use it. Railroads are fast becoming all electric all over the world mainly for this reason. Over 50% of the world's mainline trackage including the hi speed 'Chunnel' and bullet train runs are electrified.

A look at the 'MPG chart' on pg 4 will show the price difference. And that's not a 'projected theoretical' difference, it is what's happening now, with present day technology, in countless families all over the world. Check out the EAA website and when you do, consider that not all EV users are association members. Mainly, members are the individuals who have converted their own vehicles or drive vehicles converted by other individuals and have an interest in the technical issues of their electrics. Hybrid people are there too if they have an interest in the technical aspects of hybrids. The New England chapter presently has close to 30% hybrid members. Several members have both a hybrid *and* a plug-in electric.

Electricity was the first automotive and truck motor fuel of the past, it is presently the fuel of choice for forward thinkers, and mainly due to the declining amounts of pumpable fuel left underground, **must become** the motor fuel of the future.

### ***Non-transportation fuels***

There are some fuels that are intentionally not mentioned above as they are not in big supply or not particularly suited to being 'transportation' fuels.

As for these 'non-transportation' alternative fuels; many are listed below. All but the last four mentioned in the list below put out lung concern particulates plus global warming and acid rain products. These therefore can not be a world solution to our need for fuel.

As for these last four? Non-polluting. Clean and green. But at present mainly limited by the politics, practices, and lobbying of the present fossil fuel supply industries. These last four, listed under their separate heading (non-polluting) have no ownership or limitations, and are clean green fuels available free for the taking.

*Biomass* . This is the category of many different fuels that have a biological origin but are not fossil fuels. Ethanol and Biodiesel for instance, are sourced by biomass. Such fuels as 'trash to energy' and wood come under the heading. Biomass converts to energy through oxidation (burning), therefore puts out CO<sub>2</sub> and other undesirables. The main reason for the use of biomass fuels is as an alternative to expensive fossil fuels. Below, the (#) symbol will identify other biomass fuels.

*Biogas* # This comes as a by-product of sewage treatment and has been used for many years in many city systems to run sewage pumps. The town of Braintree MA has capped their old landfill to provide biogas to generate electricity. Quincy, a bordering city, has just started producing biogas (mainly methane) in their own capped landfill which has also become a golf course. Unfortunately, landfill taps deplete like regular gas wells, time of useful production depends on their size. Small landfills do not make a profit. A new thought in the same category is to use municipal garbage in plants designed to harvest the biogas from it, the spent residue becoming fertilizer.

*Wood # and coal* were used in gasoline-starved WWII Germany England France and Spain as transportation fuels by onboard 'airless' 'coking' of coal and wood, the burning of resulting carbon monoxide/methane/hydrogen rich gas in modified gasoline engines at much lower power outputs. Most were trucks and buses. Smokey and inefficient, these

vehicles were called 'gasogens'. Check this out (WWII history/civilian effects)

During the same period, Germany (mainly) made 'synthetic oil' from coal. This was a dirty process but who thought of that in those days with the Allies closing in? The process has been cleaned up (somewhat) and is being used to provide small quantities of motor fuel today. Another fuel type of chemical origin, pure hydrogen peroxide, was used in the last few submarines WWII Germany built. These were called 'Walter boats'.

Wood# and coal have been used for transportation by the railroads in steam locomotives since 1804 and are still being used today mainly in 'tourist railroads'. Wood and coal fuelled steam operated farm tractors were in use long before the gasoline engine or automobile were developed, and are still being run at 'thresherman's reunions' in the USA, mainly in the midwest and still farming in the OH and PA Amish areas. In the plains states, hay# was burned by these tractors in a special firebox.

Today, wood chips or pellets# are burned in quantity to make steam for electricity generation. This allows use of wood unsuitable for any other purpose (such as stumpwood, bark, tree trimmings etc) to be burned uniformly and predictably. Pellet stoves are quite popular for heating farm outbuildings. In the same category are the stoves that burn dried corn kernels#, mainly corn growers use these.

In the late 1860's and up to about 1950, street gas for lights and cooking was made by injecting live steam into burning coal, giving a gas rich in hydrogen methane and carbon monoxide. There were several companies that made general purpose stationary engines and water pumps that used this gas. The entire cycle was inefficient and dirty but coal in those days was plentiful and cheap. Calcium carbide, an electric furnace product, made acetylene gas, same story, but acetylene was used mainly for welding metals and for lighting. Acetylene is still used today in quantity, mainly for welding and cutting iron and steel but it too expensive and dangerous to use for transportation or home heating.

*Peat* (which is 'young coal' needing only burial by natural disaster and only a few million years of land upheaval, compression and aging to become coal) has been used for heat in Scandinavia and the UK for centuries. It is nearly gone in the UK now, burned mainly to give an authentic atmosphere to tourist pubs and inns.

*Bagasse#* is dried sugar cane after the sugar has been extracted. It is used as the fuel of choice to make process steam for sugar extraction and to run steam locomotives for plantation railroads in many sugar exporting countries. A nice closed cycle.

Municipal trash# is an up and coming source of steam for electric generation. Southeastern MA has a fine hi tech plant called 'Massburn' that sorts the trash to remove recyclables and hazardous chemical items before burning it.

### **Non- polluting sustainable sources of energy**

*Tidal power* has been used in the past for small mills and saltworks on the US East Coast in the late 1600 to early 1900's period. Presently, large scale uses of this power are being investigated. Any large scale use of tidal power will require huge expense. The power itself is free, but the methods of collecting of it, at present, are not cost effective when compared to other sources of sustainable energy (windpower) in the same areas.

*Geothermal* is a great source of power. Iceland practically runs on it. However it is not a transportation fuel, mainly for heating systems and not available everywhere in the world. Wherever it is, even in small quantities, we should be using it. (Active volcanoes are the ultimate geo, tapped wastefully by natural forces rather than by the hands of man) Where there is a lot of it, as in Iceland and at Mauna Loa Hawaii, geo is used to make

electricity, which then can be a transportation fuel .

Small geothermal aided home heating/cooling systems are available in the USA, working on a new principle, therefore not needing hot springs or magma sources near them. They are heat pumps, saving Summer heat from indoors, storing it underground rather than discarding it as air conditioners do. In the heating season this stored heat is used to supplement the 'heat' end, making it more efficient. Energy to run this cycle, of course, is electric as with all heat pumps but you get much more 'bang for your buck' from this system than other heating systems available. And . . . electricity to run this type geo aided system can be sustainable if your utility provides it.

*Hydroelectric power* is in use all over the globe and has been for years. It is inexhaustible, and works any place that has falling water or a lake that is replenishable. Most hydroelectric systems have required huge expense over many years to set up (think Hoover dam). However, there is a category of mid size and even small (one farm) hydro producers in most mountainous areas. Where there is hydropower available in any quantity, even that which is available only part of the year, we should be using it. Small hydro has an advantage. The systems, once installed, require no engineering skills.

*Solar power* can be used by anyone, from big industry to the small homeowner, even backpack camper. It is easy to collect in many different ways. When collected it can come through it's collecting and storage arrangement as either heat or as electricity (photovoltaic, PV for short) depending on the collecting hardware used. Many contractors in the US and Canada and all over the world install this hardware, or it can be bought and installed, some of it even manufactured by the average homeowner who is skilled in the use of tools. Solar power installations pay their way, as they replace conventional 'bought' power and have long life and require little or no maintenance. The most efficient solar power for the homeowner with the fastest payback is domestic hot water heating. And - contrary to popular belief - solar power collectors need not be installed on a roof. Many are ground-mounted.

*Windpower* is a sustainable land based or transportation fuel older then the pyramids, at its peak in the era of tall ships. Land based windpower has been with us for well over a thousand years mainly for pumping water and grinding grain, and through the generation of electricity, well may become the transportation fuel of choice of the future.

### ***Fuel saving gadgets for automobiles***

Years ago this writer tried flash (superheated) steam injection along with a few other items such as rejetting the carb and dash controlled timing Yes – these gave a mileage boost. On a nice simple 1939 Oldsmobile flathead 6. However, there is serious doubt that similar measures would do anything to today's much more sophisticated engine designs. A local experimenter messed with it a good bit on a computerized fuel injected vehicle a couple yrs back. Results were inconclusive. We suspect that because the older cars allowed manual timing advance (which was mainly the reason for the fuel savings, long trip dash controlled manual timing advance without preignition) and the newer ones timing is done by the onboard computer, he could not gain that timing advantage.

Tried also one of those 'super spark' things on the ignition coil of a Dodge 318. No mileage or power difference at all. It just made engine static on the radio.

Today there is a magnet that goes on the fuel line and is said to 'polarize' the gasoline molecules. Hasn't done a thing for anyone I know, and this writer knows an awful lot of automotive diddlers (gearheads) both full time professional and backyard mechanics.

There are 'miracle liquid' gasoline additives in small expensive bottles that are hyped to get you more miles per gallon. Yes, these work but are mainly fuel injector cleaners with a different hi tech sounding hype. They work because they clean your injectors.

Acetone, an enamel solvent, works as an additive to increase miles per gallon, even after the injectors have been cleaned, giving an additional increase. As in the instructions for these miracle liquids, add 2 oz of acetone to 10 gallons of gasoline. Acetone must be pure, as with one or two brands of fingernail polish remover. (example; Sally's Beauty Supply, a franchise found most anywhere in the USA - get the clear kind without coloring). The commercial 'automotive enamel solvent' types do not work well, as they may contain a trace of benzene which negates the effect.

This writer is presently using a mixture, 10 gallons gas, 2 oz acetone and an ounce of Marvel mystery oil. Many people including this writer get an extra mile or two a gallon by doing this. It's an auto mechanics secret, not for everybody as these solvents are volatile and dangerous for the layman to handle, can even hurt your car's finish.

Note: More is not better, it's worse. The effect has a critical curve. Don't overdose.

Note: Drive economically, as with page 3 so you won't blow away this extra saving)

Note: An oldie but still goodie. A little (2 oz) Marvel Mystery Oil in the crankcase and very little (1 oz per 10 gallons) in the fuel tank. Keeps everything cleaner and extra lube.

Note: Diesels are helped by this too. Even better for them, there are commercial additives for diesel, the best known is 'Power Service' which among other things prevents run-on.

Note: Cars designed for Europe's standard fuel, 94 octane, must use premium gas because the USA's standard is 87. DO NOT run regular gas (87 octane) in these vehicles. To do so will likely cause damage to the engine. Some additive info says that they will allow 87 to be used, but this writer presently would play it safe, bite the bullet and pay more for premium rather than take chances with a \$25,000+ vehicle. Best bet; don't ever buy a vehicle that requires premium. (And never think that premium (or expensive) gas will make your car that does not require it run better). This writer *always* buys the cheapest gas available in any area, even from 'unbranded' stations. And has never had a gasoline-caused problem in over 50 years of driving.

To this writer, many of these 'miracle fuel saving gizmos' are just another variant proving PT Barnum's famous quote 'there's a fool born every minute'. As well as the anonymous addition to that, 'and two to take him.'

Suspecting that if some accessory did come out that worked to significantly improve mileage; it would not be marketed in the sensational mail order fashion that it is (*Amazing mileage booster* or whatever) but would go through legitimate parts stores and chains such as Advance, Pep Boys, Auto Zone, Sears, Western Auto etc stores that deal with a lot of walk-in trade and lots of auto mechanics.

Small companies without facilities to produce large quantities of product would likely market through the internet. Some of these may be viable due to the better understanding of combustion in these hi tech times. If legitimate, working as advertised and patented, the rights would be grabbed up by a major auto manufacturer or oil company and it would disappear forever. That's what happened to the Fish and Covey vapor/catalyst so called 100mpg carbs and several more like em. You can get a copy of the patents of these things but they won't work with today's formulations of gasoline. They did work

back then. That's why the gas formulations were changed years ago. To make all catalytic/vapor systems inoperable.

(12/09) a couple of the 'MPG device' (fuel expanders, which **do** work) websites have disappeared. Why? Nobody seems to know.

There are exceptions. One showing promise is called a 'Fog Warmer' otherwise known as a fogger, fuel heater, or fuel expander. This gives a solid mileage increase on diesel and Japanese fuel injected gas vehicles. These are a bit expensive and are best installed by automotive technicians familiar with loop charged fuel injection. If installed in 'Detroit' gas vehicles, their computer systems may, given a short time, react to the change by lengthening the injector pulse width or making other adjustments to bring the engine parameters back to "factory specified normal"; thereby canceling a good part of the gas mileage increase. Non-USA built cars do not react like this.

A search on the web may get you info on expanders but these must, at present ('10), be built by the car owner and that means safely built. Best not to mess with them. You can get the same plus even more gain by changing your driving habits and vehicle use as already mentioned here on page 3. Any gadget so far built or even forthcoming and successful will not help a wasteful driver.

There is a good amount of experimentation going on (08) among a new breed of automotive mechtch /gearhead for want of a better name call these people 'fuel save nerds'. In the past these people experimented with stock engines and made them more powerful for racing and communally gave us the 'hotrods' and a whole industry devoted to them. Now many of these same type people experiment to give us fuel economy. Some are even experimenting with hybrids. They have had some relatively minor advances and may, in time, come up with a significant advance or advances in present day automobile fuel economy. However, today's vehicles are built so as not to be 'diddled with' and certainly not to have their computers and systems modified for economy, while at the same time lowering emissions even further than stock.

Wish these people the best but better still, think before you buy your next vehicle. Think fuel economy rather than power or that elusive and fickle 'prestige'. Favor the mfgs that give us fuel economy rather than brand recognition, powerfully imaged TV commercials or unnecessary power and weight. Big tanks are not safer. Top heavy or tall vehicles roll over. It's your driving skills and attention to the road and other traffic that make a vehicle safe, not the vehicle itself. Think about it.

Union people note; Here we are NOT condemning American-built vehicles. (This writer owns two, both US (union) built. One is a stock Ford Windstar and gets used very little, only on long trips, the other is a GMC pickup that has been converted to plug-in electric, a daily driver. Both are excellent, highly regarded here. We are only advising people to think 'fuel economy' in their choice of vehicle type.

The best fuel saver is not a gadget. It is a person. And that person is you. A change in driving habits, perhaps coupled with a minor lifestyle change using an alternative mode of transportation to replace some regular vehicle driving. Trading for a vehicle much more economical on fuel. Improving home heat, water heating, and electric fuel economy as shown further on. All will do more to downsize your total fuel bill than anything else you could ever do without spending a huge amount of money for it.

### ***People and planet***

Each of us living souls represents a fraction of 1/7 billionth (.000,000,001 or 1 to the 9<sup>th</sup>) of the world's population. And the world's population is steadily increasing.

However, not all people use the same amount of fuel. There are many people in this world, who for all intents and purposes, use none. There are also starting to be many more families that produce their own sustainable energy (windpower, solar electricity and heat) rather than consuming non-sustainable energy (fossil fuels, anything that burns (oxidizes) carbon to produce energy).

To overbalance this, most of us use a great deal more energy than necessary. With an increasing world population, the energy needs of the planet must increase.

The use of energy of almost all types represents an output of global warming, acid rain, and lung concern particulates and gases. From the primitive cooking fires of the aborigine to the fireplaces and furnaces of the homeowner, to the towering smokestacks of apartment complexes, industry, manufacturing, power production, and since about 1820 transportation, fuels that involve oxidation have long been fouling our atmosphere. It is only since the expansion of the industrial age that local air pollution (read of this in the history of power engineering) has been recognized as a problem. Quite a while passed before air quality measuring and analysis apparatus was invented, statistics generated, and the same local pollution was recognized as a global problem.

The Fuel Saver's Guide is more than a money saver. It is one of many tools to help people, one person – one family at a time, to change lifestyle a bit and to prioritize lower energy consumption which will definitely help to ramp down the effects of acid rain, lung concern particulates and gases and global warming gases. One person, even including family and friends, out of over seven billion doesn't seem like much but it is. Read on.

First of all; You will see a lot of 'tweaky little things' in this guide. If done by themselves singly, each doesn't do a lot. But you won't be doing them by themselves. You will be picking and choosing whatever suggestions are possible for you, and feels right for yourself (a 'hey, why didn't I think of that' approach) and implementing these all together, phasing them all in, and phasing more in as they become possible. The sum total of these will make an appreciable measurable (and often astounding) difference in your fuel use, therefore expense. Your family will join in, of course, multiplying the effect. Then, as you pass these on to friends and relations, these people will 'copycat' you. The key to it is you yourself, becoming proactive in fuel conservation. Everybody who does this wins. Nobody loses. And to implement most of the steps in this guide cost you nothing. And the ones that do cost, most will pay back their cost in fairly short order. And here's the biggie; Even a person who scoffs at the thought of 'global warming' being mainly caused by human beings burning fuel can follow this program of conservation and derive *all* of the financial benefits from it. This program is for all people worldwide regardless of belief. It is a true revolution to benefit every individual that joins it by changing their fuel using habits towards burning less fuel. It is, among other things, a revolution against waste.

Secondly, you and your family will not be doing it alone.

Initial thought of the all-volunteer workgroup that formed the East Coast Fuel Saver's Coalition was to get a million or more copies of the Fuel Saver's Guide out there in the

shortest possible time through the same method that 'jokes' are propagated through friends by Email forwards. Propagation costs nothing, takes almost no time at all.. Just a few clicks of computer keys doing single – or even multiple address - forwards of this document will give your friends and relatives the opportunity to receive all the benefits that you yourself will be getting or have already obtained with this free guide. And many of them, perhaps most, will forward to their contacts. Propagation works other ways too. Some enclose an 'FSG' card with all outgoing mail including holiday and birthday cards. (Of course these people don't enclose one when paying fuel bills.)

Eventually, a huge number of people doing this same thing will add up to global consequence. With each person who implements the steps suggested in this guide, there will be less fuel taken from underground to be burned, therefore less harmful gases and particulates added to the atmosphere. And more of these irreplaceable underground natural resources left for our grandchildren and great grandchildren yet unborn.

But this propagation must start somewhere. And that is with you. Never believe the sly sotto voiced propaganda of the oil barons, that an individual can do nothing but pay them bigtime. He or she can. And we, as proactives ourselves, do. Please. Copycat us. Implement various fuel saves yourself, and share this information with others.

The English speaking countries, at present, are the major consumers of underground hydrocarbon fuels (coal, oil, and natural gas) These are all non-sustainable depleting natural resources. However, as this guide is public domain and there are no legalities or payments to or from anyone for copying or sending, it is only a matter of time before it starts to get translated into other languages and sent worldwide through the worldwide web.

Here, this writer urges anyone who has suitable language skills to translate it and propagate their translation. This would make an ideal school project for any advanced language study group. At present, the original FSG in embryonic form (30 pages), then periodically updated has been out there for about seven years. This new (1/11) edition is much more comprehensive and is considered by us complete and ready to go for any translation.

***Other ways to cut down on the amount of fuel burned in the world through more money saving fuel tips.***

These sort of 'skip around' various subjects. Suggest that readers stop and think a bit about each one. If that particular one fits and is possible to start today, note it's page and position on paper. Start a notebook regarding fuel saves. These are universal, most fit everyone. Each complete tip here is separated by a single empty line rather than being numbered. There are more farther on in this document, they are starred.

***Begin***

If you are an employer, consider hiring only people who have a short commute. In Chicago, one restaurant owner, in order to cut down city pollution and traffic glut, only hires people who live close enough to be able to walk to work.

More employers should think this way, modify their hiring practices towards cleaner air, less traffic, more parking space for customers in their own lots, less traffic on the throughways and byways through hiring only people who have short commutes. Employers too can do their part in cleaning the air, reducing CO2 and preserving the world's limited supply of underground hydrocarbons by following this principle.

Let your fingers do the walking – or the driving. Many items of a ‘shopping’ nature can be handled over the telephone. Comparing prices by phone or even in some cases. Internet. Much shopping, especially in the less populated parts of New England and upstate New York happens by telephone.

Grocery stores are starting to have internet shopping/delivery services. Stop and Shop, for instance, has Peapod. These services are not only for people without cars or invalids, anyone can use them.

There are mixed reports about shopping for major items over the internet. Use extreme caution here as it costs a good bit to return large heavy items if necessary.

Buy local produce, use farmers markets where available. This not only keeps your money circulating in your own area but is apt to get you 'picked this morning' produce which of course is the freshest you can get – and will therefore have a longer storage life. Here in MA we eagerly await the strawberry, blueberry, and corn seasons. 'Same day picked' corn on the cob or chowder is the finest a person will ever have.

‘Buy ahead’ long storage life consumables such as paper towels, toilet paper etc when they are on sale. Investigate the lower priced brands of these products usually found at dollar/discount stores etc. Large quantity ‘sale price’ buying of items like this can prevent many ‘emergency runs’ to the market as well as the money saved on the items.

Beware of large quantity buying of ‘on sale’ food items as the family may get sick of the item in question. However, such as canned tomatoes which have many different uses, or other likewise multi-use foodstuffs are candidates for this.

Look to your own ‘frequently out of - emergency trip’ items and stock extras if non-perishable. Items such as condiments, barbecue sauce, salad dressings and paper products are a good starter of a ‘stock 2, buy another when the second one is opened’ list.

These ‘emergency runs’ are mainly to small stores where prices are higher and cause gasoline to be avoidably burned as well. Save a good buck by having a stock, doing no ‘emergency runs’ and only shopping where and when the prices are reasonable, consistent with good quality.

An example for this type ‘buying ahead’ by this writer. There is a small closet here that is used only to stock these long life consumables. They are bought only when on sale and the sale price has been compared with other sources the same day through both sale flyers and store visits. Presently, for example, there are close to 100 rolls of paper towels in that closet. Over 100 rolls of TP. A dozen boxes of real nice Christmas cards, bought on sale in January. A case of canned tuna and a case of peas (whirled peas with salmon or tuna on toast is a favorite here) and half a case of clam chowder. Half a case of cream of mushroom soup and a mixed case of other ‘ready to eat’ soups. And yes, there are canned tomatoes, tomato sauces, mushrooms and spaghetti among other things.

The freezer gets stocked the same way, buying ‘small restaurant’ sized packages of items such as frozen breakfast sandwiches and waffles, desserts etc. These packages mainly come from a price club. Mentioning two, Sams club and Costco. Doing this with another family, they have one card I have the other and we shop together. Lifestyle here is such as none of the freezer items has ever been spoiled by freezer burn and if there’s an electric power outage there’s a genset to make our own power. Over the years this has saved the both of our families countless dollars and countless gallons of fuel.

Is this a system which would work for you?

Reconsider your vacation. Jet planes and cruise ships burn huge amounts of fuel. Tourist traps burn huge amounts of money.

Our country is fortunately chock full of beautiful state parks with tent camping facilities, many even having motorhome type sites with electricity and onsite running water.

Camping is an option here. More relaxing than those super expensive stressful jaunts.

This writer has found out after long and often painful experience that if you want to get away for vacation, 50 miles away can be more relaxing and fulfilling than 500 or 5,000 and one heck of a lot less expensive. And you can have friends over for weekend visits.

Also, it is not fun taking seven days of a two-week vacation far far away and being rushed around by tour schedules and often harassed by airport security or lost luggage, then jet lagged for 2 (or more) of those precious vacation days.

Buying fuel on a trip; Get off the turnpike to buy fuel – but not in a city. Turnpike and city prices are always higher, and lower in the suburbs a mile or so away from a turnpike exit. Some states have higher gas taxes than others so if you are planning a trip, check with the internet ‘gas price watch’ before you leave, and fill up before exiting a low price state or area. Note that the internet or ‘navigator’ listings do not list independent brands which are less expensive but of reliable quality and often in the same area as the big name fuels. Even if you don’t need gas yet, fill up when you see a low price. Incidentally; different states allow different amounts of ethanol in their gas (most use 10%). (15% is classed as ‘gasohol ‘ and injurious to vehicles not designed to burn it) Your fuel mileage goes down with more % of ethanol, up with less.

If you have cruise control, use it. It’s not just a convenience, it’s a fuel saver, as it’s electronics and mechanisms are built to do the most economical ‘easygoing’ type of acceleration and deceleration on hill and dale to keep you at speed. When they get out of economical range such as when climbing long hills, they kick out, letting you take over. Cruise controls cannot anticipate hills that are coming, so anticipate them yourself as professional ‘big truck’ drivers do, increase speed gradually on the flat or downgrade before them if you are in the clear to do so.

Manual transmission drivers; Lower the RPM of where you shift between gears. Faster RPM burns more fuel than slower. Don’t go overboard though and ‘lug’ the engine. Most modern transmissions whether manual or automatic have overdrive. Be sure you are using it when on the thruway or over 45 mph. Check your instruction book.

If your exhaust smells like rotten eggs, your catalytic converter is clogged and is costing you miles per gallon. Newer cars won’t have this smell, the converters are built differently. The ‘service engine soon’ light will be on. OBDII will show it's code.

A bad O2 or mass airflow sensor will turn the ‘service engine soon’ light on and decrease your fuel mileage by as much as 25% It may pay you to buy your own OBDII scanner (they are about \$70). It will read the trouble code and tell you what area or individual part (or connection to it in most cases) is in need of service. It will also reset the ‘service engine’ light after you replace the bad part (or clean it’s dirty connector with a spray can contact cleaner.) Drive as little as possible with this ‘service’ light on.

This collection of fuel/money saving tips will continue. But first – let's look at -

### ***What the future will bring***

In the 70's, the fuel crisis was political in nature having to do with the Far East through OPEC attempting a unilateral massive raise in the wellhead price of oil. This measure carried through and fuel prices, especially transportation and heating, reached unprecedented highs.

It's solution was also political. Our government, among others, reacted quickly to this threat and put massive amounts of backing into programs to come up with alternative sources of power and advances in hardware that the public could use to burn less fuel.

You see the results of these 70's -90's and continuing advances and alternatives today in many ways. Better insulation types, energy saving windows and doors, development of more efficient heating systems. Solar hot water system components were improved and prices became lower. Photovoltaic electricity, even though technology was in it's babyhood, began it's popularity, Many other means by which home and industries could become more energy efficient were thought out and implemented. Many books were written at both engineering and homeowner levels. Building codes were changed to incorporate these newer materials and methods. Worldwide, government and industry cooperated in the backing of research and development towards change in the ways that the public uses energy.

The US government came up with incentives and programs giving tax credit subsidies to homeowners to make these changes. There was a tax credit program that ran for about 5 years that gave people, effectively, a free solar domestic hot water system. There were many programs and grants running towards energy conservation of all types.

Industry itself got into the picture with it's own incentives, especially the electric power and automotive industries. Gone were the gas guzzling muscle cars of the 60's. Development started through both government edict and industry choice to develop engines that burned less fuel and burned it cleaner. The US auto industry experimented with smaller cars and electric vehicles, and government agencies, universities, and power utilities became the 'test bed' for them. These smaller lighter higher fuel mileage gas cars began to sell bigtime, you saw them everywhere. Imports of the same type vehicle rose and dealerships for them, formerly rare, grew in number all over the USA.

The effect on newly formed OPEC was predictable. They backed down and agreed to minor wellhead price raises. No longer did people have to wait in long lines to buy small amounts of higher priced gasoline, or heating fuel companies have to deliver high priced tankloads to their customers.

The 'emergency' was over. Government and public interest in alternative energy and fuel saving waned. But the fruits of all that subsidy and research are still here, in the better (but still not highest obtainable) energy efficiency that we have now at home and in transportation and in industry. Presently, we have the availability of hundreds, perhaps thousands of new designs and new hardware plus the energy consciousness of industry that never existed before the 70's oil debacle.

However, the 'energy crisis' of today is not purely politically motivated as the '70's crisis was. It is driven mainly by the fact that oil is a depleting natural resource.

As underground oil depletes, there isn't any hope for a significant lowering of fuel prices except as a temporary 'up and down' thing having to do with stock bond and futures manipulation and oil industry politics more than anything else. Price gouging and profiteering happens at all levels in this climate also. However; underground crude oil as well as coal and natural gas, all fossil fuels, are *depleting non-renewable natural resources being sold in an international sellers market for devaluating US dollars*. The price *must* go up as it depletes and the dollar devaluates. People who burn wood and buy it have already noted the huge increase in the price of wood. This is caused by dollar devaluation at all levels, inclusive of increased salary of the woodcutter, cost of transportation and it's fuel, taxes storage space etc even in a 100% domestic market.

The much heralded 'new sources' of crude oil are undrillable unproven and unpumpable now even at the present 'higher than ever' selling prices of motor and heating fuel. It will have to rise a good bit more, to somewhere between (USA) \$5 and 10.00 a gallon at the consumer level before these extremely hard to reach sources can be profitably proven, then tapped. These sources, if and when tapped, will then begin to deplete as all oil/gas wells and coal/mineral mines do. None are expected to be 'huge' fields. (North Sea oil, giving one example, is pretty much depleted at present. There are other 'burnable hydrocarbon' sources in the world that have completely emptied (think WWII and Ploesti) (and Spindletop plus a whole bunch of others in the US)

By the same token, all underground (or undersea) fossil fuels are depleting non-renewable natural resources. Coal and natural gas come from the same burial, putrefaction and millions of years aging process as crude oil does. Yes, coal can be used as is or made into transportation fuel. Yes, vehicles are running now on natural gas (CNG). However, there is a limit to them also. They are non – sustainable also and when they are gone, like crude oil they will be gone forever, never to return

The future of powered transportation and of home, process, and any other heating will necessarily have to look to electricity as fuel. And the generation of electricity will have to become sustainable. Government and the electric power industry have pretty much developed all the hydroelectric power that is available in the US. There are only, at present, 4 sources of huge amounts of sustainable electric power left to be developed.

One is (and don't gag when you read this) nuclear. In the worldwide history of nuclear electric power (since about 1950) there have only been 2 incidents of catastrophic consequence. Cheyrboble and Three Mile Island.

Both of these, along with a few others considered minor by comparison, have taught the industry a lot. By industry choice and by government mandate, the plants themselves have undergone great changes for the better because of these nuclear incidents. The operators receive the best training of any type of power production employees. Plant security is now better and quicker responding than Fort Knox. The plants have always been clean, emitting absolutely nothing but electricity and on occasion, clean steam (and are now designed or modified to emit as little heat as possible). Waste is now kept on site in the US, safely contained by impermeable storage and protected by heavy concrete and demineralized water. Plants are designed now and older plants have been modified to store their own waste products in this super safe and secure manner. Even so, all have fast acting evac alerts and proven evac routes by govt mandate for those 'what if' questioners.

For those who fear 'Twin towers' type attacks to turn nuclear powerplants into nuclear

disasters; check with the Air Force. Ask specifically about 'interception routes and times' for any unidentified planes headed for any nuclear reactor in the country. Otis radar surveillance site on Cape Cod MA had their own interception map with times displayed this year (05) at the Barnstable County fair, at the Air Force booth. The Naval air arm likely has one too for all their operational areas. We are ready to intercept and destroy any plane likely to do a suicide terrorist attack on a reactor. And at ground level, an 'Oklahoma' type car bomb attack can't get close enough to do any but superficial damage to the parking area and a few broken office windows, this due to fairly recent (shortly after the Oklahoma bombing) NRC motor vehicle regulations and 'Jersey barrier' protections regarding nuke plants. These fears, once reality, are now groundless due to the concern of our government and the vigilance of our military.

Fuel for these plants, the radioactives themselves, are all around us in smaller quantities and are safely used in medical, in research, in manufacturing and food, plastics, and chemical processing as well as their use in missiles and in the powerplants.

Radioactives are the newest discovered natural resource capable of producing electricity in large quantities. And they do. A good example of this is France, which produces over 50% of the country's electricity using nuclear power.

There is opposition to nuclear power. The greatest part of this is based on 'fear tactics' promulgated by competing sources of energy, ie the fossil fuel industry. The 'anti Nuke' forces are, wittingly or unwittingly, promoting the many types of pollutions including CO2 (global warming gas), acidics (acid rain) particulate (lung concern) and waste of non-replenishable natural resources promoted by the fossil fuel barons.

Asking here a question to those who are 'anti nuke' Would you rather see this beneficial natural resource be made into missiles and bombs or consumed slowly and safely, making clean steam to run turbines that generate electric power?

The second alternative is wind power. All over the world there is wind generated electricity. People of forward vision and through them, municipalities, utilities, industries and private individuals in the US have already put hundreds of wind turbines up, some individual and some in multiple arrays (called windfarms). For every large scale wind turbine put up anywhere, the electricity it feeds into the grid means that somewhere feeding the same electric grid, less fossil fuel is being burned. Less particulate pollutants get in the air and less global warming (CO2) acid rain (sulfur products mainly) and 'lung concern' particulates and gases as well.

Even the smaller scale 'non-grid feeding' systems follow this same principle, give the same advantages. These generate electricity that otherwise would be generated by burning fuels. Both large and small scale solar photovoltaic systems likewise prevent fuel from being burned. All solar heating applications such as domestic hot water, likewise. This is the reason that all of these sources are called 'alternative energy'.

Windpower is clean, abundant, inexhaustible, and most of all, domestic. The hardware used to collect it has proven reliable over many years of use in many different countries all over the world. A wind turbine burns nothing, emits nothing. It is true 'clean power'.

In Hull MA, the first large scale municipal wind turbine on the Atlantic coast is merrily cranking out over \$50,000 a year worth of electricity which runs all the street lights and traffic lights in the town through it's grid connection. When there's no wind, the grid runs them. When there's wind, the electricity is channeled into the grid.

Effectively, this machine uses the grid the same way as a car uses its battery, in a 'charge' fashion. All modern medium and large scale wind turbines work this way. Meters log in power to and from the grid and power out from the turbine. A computer connected to them figures out 'who owes who'. Hull's municipal power company, who buys and sells power from and to the grid as well as manufactures their own power with the wind turbines then bills the people for it. In its first year Hull Power both paid the town government's \$55,000 (a year's) light bill and gave the residents a discount on their own electric bills. From this one turbine. A photo of this first turbine (Hull 1) is at the end of this document

For more info, crank 'wind' and 'windpower' into your browser. You will find that these turbines are put up mainly for financial advantage to the municipality or utility or whoever owns them, the clean air and fuel saving benefits are a spinoff from that. Again, everybody wins, nobody loses but the big fuel outfits and the guys who wear bathrobes in public.

Hull MA is a good example of what can happen if both the people and municipal government think towards sustainability in electric power production. Hull erected this first municipal sized wind turbine on the East Coast several years back. Performing as calculated, it proved the point with the town government. Now there is another, 3x the output, and at this writing not operational a full year yet. This is projected to pay all municipal power costs including town hall, town barn, police and the school system. A third, which is a small 'home or farm' sized unit, runs the estuary center at the town's entrance.(10) Yes, this prediction has been fulfilled. On a good day these two wind turbines, in a 24 hour period, produce half the power used in the entire town.

Most important of all, these fuelless power producers act as a hedge against rising fuel prices for all municipal purposes. Where the surrounding towns will need to raise taxes to support rising municipal power costs, the Town of Hull will not. Nor will electric bills to the residents or businesses rise.

Say it again, there are very smart forward-looking people in the Hull Municipal power utility and in Hull's town government! Any municipality that can't follow this example is behind the times, moribund, and its voters had better start looking for and voting for people who look to their own municipality's sustainable future.

The third source is also an electricity producer. Solar collection through voltaics. You see these photovoltaic panels on poles along the highway making electricity to collect traffic data, and on road warning sign trailers. They are also on buildings and in fields.

One system local to Boston is an example for all, a large modern split level residence with most of the South facing roof covered with these panels. These feed the grid like a wind turbine does, and as a result, the owner, producing more power than he consumes, has no electric bill at all and part of his heat as well. The system was expensive to install, but over the life of it, an estimated 25 years, will pay itself off and make a respectable profit. After viewing this setup for the first time, this writer asked the owner how much his electric bill was. His answer, 'What's an electric bill? Got a nice tour of this system, the first individually owned grid feeding PV system in the Boston area.

Photovoltaics can be used anywhere there is space with sun shining on it, and where it would be impractical or even impossible to put up a wind turbine.

(Inserted note, 6/08: Defining 'lifespan' as used above. Engineers figure the lifespan of this type system being over when it has lost 10% of its rated output. Any of these

systems will continue to output useable power to just about zero percent. Nobody knows the falloff curve of present day advanced technology panels with a rated lifespan similar. Suffice to say that the 'end of lifespan', a good part of the basis of figuring payback time, is 20 years. This gives the user more freebie beyond 20 years that could even outlast the structure they were installed on. (2) To get that 10% back if really necessary (with a 'stand alone' non-grid tied system in a remote area it might be) just add a couple or so new panels to the system at that time. But it should not be really necessary as large scale systems are designed to give *more* power than actually needed to serve future uses and so they can pay back faster. (All large home/business systems except 'stand alones' pay back through the grid.). (Stand alones pay back through less or no use of fuel burning generators, and no expense to run power lines to their locations. (End insertion)

Many 'PV' systems (the 'stand alones') are self sufficient, the only source of electricity for their owners. Especially good for those who are offgrid, would have to bring in grid power at huge expense for poles and wiring or use fuel in generators. Farm outbuildings are a good example here. So are summer or winter resorts or camps. These systems all charge batteries to make power available 24 hours a day. Grid connected systems do not need batteries but can have them as an added extra if the owner desires protection against storm caused electric service interruptions.

PV has many and varied uses. A small system in CA cattle range country runs a remote water pump that used to require gasoline – and a 5 mile 'Jeep' trip every couple of days to deliver it. – and a lot of 'small engine' repair or replacement. There is a big pile of 'burned out' single cylinder engines next to that water pump.

There is a tiny (150 watt) PV system in the Boston area that charges a battery operated lawn care tractor (see the reference to these on page 25) that converts to a snowblower in winter. The electric tractors (there are two) are also the owner's emergency 120vac electric power sources for hurricanes and other power outages by use of 2 inexpensive 12V/120vac inverters. And here's the biggie; not having to buy gasoline or do 'gas vehicle specific' maintenance for the tractors makes the battery/PV 'lawncare etc' system much more cost effective and productive of income than just replacing electricity itself. The panels have already paid themselves down 100% at a highly accelerated rate and are presently a tax-clear and non-taxable income for their owner. (remember, not burning fuel – and not doing fuel specific maintenance is equal to non-taxable income)

Opinion here. On the mind of this writer is the absolute necessity of every school, town hall, police, fire station and hospital in the entire US to have either wind or solar powered electricity not solely as a backup power source, but as a grid feeder to produce income for the municipality using already owned town property to do it. See poster of Hull 1 included here as example. These municipal locations can become gold mines to help reduce municipal taxes, stave off ever rising municipal energy costs, en passant helping to clean the air through less use of fuel at electric power plants.

The fourth source, geothermal, does not, in general, produce huge amounts of electricity except where there is a huge amount of geo available, as there is in Iceland and Hawaii. However, geo does produce heat. Where there is geo heat, we should be using it. Use can be as small as partial home heat, or as big as process heat in industry. Since the days when there were only 'Native Americans' in the USA, back before Columbus, geo heat has been used as therapy for arthritis and other illnesses at Glenwood Springs

CO, Truth or Consequences NM, theraputic warm mud in GA and at many other locations from coast to coast. At Glenwood, the entire swimming pool complex is heated by geo. You can swim outdoors in a heated pool when it's snowing. However, many areas have these sources untapped and are using conventional fuels for heat.

Geo can even be 'manufactured' by storing heat wasted by air conditioning buildings underground to use in winter. The technology is here, and mature. Architects who specialize in 'green' technology designs know about it, so if building or retrofitting, this, along with other energy saving technologies should be investigated.

Last on this list. The above four are 'active' sources of alternative energy, therefore new fuel. However, there is a 'passive' source of fuel that is being tapped presently by most everybody, the greatest majority of which are non-technical people, and will most certainly be tapped more in the future due to population growth. This is basically, even though passive, a source of new fuel, stretching the Earth's supply.

That source is the fuel that is not burned by individuals and companies through increased efficiency in fuel use. Giving an example: If last year you burned 800 gallons of heating fuel, and through better insulation of your home and better control of your heating plant this heating season burned 400, that extra fuel that you didn't burn is definitely a source. Because you didn't burn it, it is still underground, or stored in the seller's distribution tanks, therefore still a part the world's supply.

The same goes for your automobile. If you spent \$50 weekly for gasoline, and through economy steps that already have been mentioned in this guide now spend \$25, there is obviously \$25 worth of gasoline weekly still in storage somewhere, unused. As well as \$25 a week more in your pocket. *What will this mean to you for every 12 month period?*

Many of the 'fuel save tips' in this guide are based on or identical to the principles that (some) governments and most all industries all over the world have been using for years, under the heading of 'plant efficiency'. Why do they do it? To save themselves money.

It is only lately that individuals have found that they apply as much to individuals as they do to huge corporations. We, the little people, by saving money on our fuel bills are helping to stretch the available world's supplies of fuel. Simultaneously, the fuel we don't use, by not being used at all, decreases the total number of gallons burned a year planetwide and helps to clean our planet's air of noxious, acid rain, and global warming gases. Everyone gains, nobody loses except the people who sell fuel. And as we strike back at the huge corporate fuel moneygrubbers and look at our more healthy bank balances, we get that warm fuzzy feeling that we have finally learned to beat a heretofore unbeatable system. Same way as big industry does.

### ***Regarding energy cost control for other than transportation purposes***

Out there now are many different ways to save on fuel costs for your home. Some of these are incremental, that is, saving so little that it will take many years of this saving to pay back the expense of installing them. Some are logical, and will save larger amounts of money in a shorter time, paying themselves off in a shorter period. And there are still others which are bright shining examples with relatively small or even no investment that will pay back handsomely over the years. With money in your pocket.

Here are a few of the 'elcheapo' or even 'free' things that you can do to beat the

system here, even if you are an apartment or condo dweller with rather low energy costs. These, along with those given earlier are all proven 'winners' in the battle against rising fuel prices and excessive fossil fuel-caused deprivations of our atmosphere. Principle; *When you save money through buying less fuel, the air gets cleaner. Along the way you give the fuel producers and suppliers who have been milking us for years a good swift kick in the pants, and make money doing it.*

There are also a few 'money saves' among the starred items that don't deal directly with fuel. Money and fuel are alike in this respect: Both can be burned excessively. However, with the implementation of knowledge the excess will slow down and perhaps, as you continue to implement applicable tips in your life, stop. Do a bit of deep thought here for every one. Where's the loss? Where's the gain? Pick and choose suggestions that suit you and phase them in. As with the 'automotive' fuel saving measures, each will do it's own small bit (or with some, a major boost for your wallet and add up to major savings per year. Power and fuel prices can only rise with time. And the value of the dollar, with time, has been decreasing.

- \* Shop for groceries on your way home from work. This comes under the heading of 'concatenation' in the page 3 gas saving tips section.
- \* Energy saving electronic light bulbs. Available at low cost mainly through government mandated power utility subsidy. The small ones, equal to a 60 watt bulb but drawing only 15 watts go for 49c ea here. Specialty types are a buck, and more complex such as complete light fixtures are \$5.00. Other areas than New England they may be a bit higher. On average, these draw 1/4 of the power of incandescents. Again, they are not cheap because they are a cheap brand, but because the price is subsidized, mainly by electric power producers by government mandate. As the government subsidies run out, mass production will then keep the prices reasonable. Don't pay high prices, look for the cheapest place to buy them. Dollar stores are usually good. A 5 gallon bucket full of these things will save their price in a year or less off your Electric bill. They are called compact fluorescents (CF's for short) When they finally wear out (years later!) recycle them where other fluorescent types are recycled. (call your town hall or DPW to find that info).

The small amount of opposition to these new energy savers is based on the tiny amount of mercury that all fluorescent types contain. Recycling contains that, reuse means that less of it needs to be produced. Also, the amount of mercury put in the air by fossil fuel plants (especially coal) over the shorter lifespan and higher consumption of the replaced power hungry incandescent bulbs greatly exceeds that which is contained in a long life fluorescent of the same light output. The efficiency difference, translated into powerplant fuel (coal), over this longer lifespan means that for each old fashioned bulb replaced, 500 lbs of coal need not be burned in that time span.

People who oppose compact fluorescents do not understand this. (The thought is also out there that this opposition through misinformation is fostered by the fossil fuel industries. The more CF bulbs there are in use, the less fuel they will sell to powerplants. One billion is a tiny number when attempting to estimate the number of old fashioned high consumption light bulbs in use in just the USA). *Note that these same carping complainers do not dis the countless millions of big mercury containing fluorescent bulbs presently in use in the markets and malls, just the tiny ones in people's homes.*

There is a principle at work here. And that is taking stock in advice from the naysayers, people who condemn before they investigate. Rather than just 'dissing' these bulbs, these people should act to increase fluorescent recycling in their own communities, and get on fuel saving programs such as what is shown in this document. (Running across this sort of person would be a golden opportunity to share a CD or thumb copy of this Fuel Saver's Guide guide)

- \* Cook more in your microwave rather than on your stove or in your oven. These require no long warm up also cook faster. This writer's kitchen has had the big one (a built-in) for over 15 yrs and for about 9 yrs has had two, the second one a half pint.

In the warm months, between the outdoor grille and these 'nukes', the stove hardly gets used and the gas bill shows a good difference, electric bill doesn't show the nukes at all. The big one draws about 1000 watts. A thousand watts for an hour here costs about 17c. (one Kilowatt Hour or 1 kwh)

But it's never been on for an hour. Everything gets done in very few minutes. For most cooking, as is done here, say goodbye to that power hungry electric stove and oven for most of your cooking and save in the vicinity of \$30 a month, or gas, about \$20 for the average family. Also, microwave use minimizes hot kitchens in Summer which reduces refrigerator, a/c compressor, and exhaust fan run times.

Half pints go for about \$40 now at Wal Mart, these, or even full size models pay for themselves in fuel saved real fast.

(Note one advantage of also having a half pint. The little one uses less power than the big one, is used for all the 'little' jobs. (coffee warming, defrosting) while the big one does the rest of the meal. Meal prep time decreases accordingly. There are many times when the big one is not needed at all. (individual freezer meals etc)

- \* Single lever control hot/cold faucets. *Never* open them in the middle – as there they mix to make lukewarm water from both sides, causing piping loss of heated water. Hot comes up slower and wastes both water heat and water.

If you want hot, move the handle all the way to hot to get it up through the pipes faster. When hot is up, then mix it. You will be surprised at how much faster hot water comes up in the bath. (a long pipe run in most homes) If you want only cold, put lever all the way to the right to 'cold'. The whole family should learn this. How? You (the reader) must teach them. As with all other tips.

- \* Don't use the kitchen exhaust fan in the heating or cooling seasons unless absolutely necessary. You'd blow heat or 'cool' out that you have already paid for.

There are 'heat exchanger type' fans out there that don't, but they are pricey and need contractor installation. Well worth it in new home construction.

Likewise, the bath fan wastes heat. If it goes on when the light goes on, separate the circuits or use a different light. As with the kitchen, use the fan only when needed.

Note that many bath vents have no outside louvers to close when 'off' and draw heated air even when shut off. Check this with cigarette smoke in winter. If it's drawing it's costing you heat. A removeable (velcro strips) cover will stop it.

Note that the main reason for the fan is to remove excess humidity from the air, which fosters mildew. Therefore, fan should be on when shower or tub are in use, and a good while afterward until the bath is completely dry.

- \* Limit hot water use. Use cold water detergents in the laundry and take showers rather than tub baths. The new 'water saving' shower heads save not only water, but the power used to heat it. Use less water in your bathtub. It's as relaxing as a full tub.
- \* Hot water from tub, shower, laundry, and especially dishwasher can have it's heat extracted and recycled. See your plumbing contractor before you build or modify.
- \* If you must drink bottled water, choose a brand produced close to home. (Less transportation needed for it, less fuel burned to get it to your local store. The same principle applies to all grocery items. Find sources of locally grown produce. Why not make bottled water yourself? A simple charcoal type filter on the kitchen faucet will eliminate the 'swimming pool' or 'musty' taste of most street water systems and well systems and if used only for cooking /drinking water and ice cubes, will last a long time. Spring water bottles can be refilled this way and frozen for long lasting 'picnic cooler' ice that is, when half melted, drinkable. Ice water is in all cases more satisfying (and definitely healthier) than soda pop. And cheaper when you make it yourself. This writer, a weekend camper, has been doing this for years.
- \* Use foam pipe insulation to insulate hot pipes that go through unheated spaces. More heat will get to the rooms that need it, and faster, with a shorter burner run. Also, use spray foam in the crack between the floor and wall on the first floor, pulling back the carpet if necessary. Adding insulation to cellar walls will save you expensive heat.
- \* Teach everyone in the family that lights not needed should be turned off. Even electronic energy saving ones. TV sets not being watched should be turned off. a/c's and fans likewise. It costs a good percentage less to run a radio or stereo for 'noise' than a TV set. And you don't get 'sucked in' to watch it. Which gives you more time for yourself. It is up to us to instruct the young about responsible energy use. It is not taught in school. (update 6/08) It is now in many progressive schools)
- \* It may pay you to rewire your heating system so that each individual room has It's own thermostat. There is no reason to heat (or cool) unused bedrooms etc. If you are or will be building, consider this type of heating control. Some retrofits can be accomplished by using bypass pipes and valves for hydronic, turnkey or sliding dampers for hot air systems manually controlled from the cellar. Note that Senior Citizens in general require more heat for health reasons than the average person. Don't complain if a Senior's room is 'hot'. Resistance to chill goes down with years.
- \* Open shades on South facing windows to catch solar heat. Close them when there's no sun. Draw shades and drapes on North facing windows fulltime in the winter. Insulated shades are available their best use is North side for winter, next best is South, to keep the sun's heat out in summer. (North side air is normally cooler all year round). The 'window' sides of south 'sunny room' drapes should be white for reflection in summer, black or a dark 'leaf green' color for absorption in winter.
- \* Consider attic insulation. Look for drafts you can stop using foam spray or other means. Keep storm doors and windows in repair. If your windows are old and leaky, consider replacement. A cheap alternative is putting clear plastic film 'full'

window covers inside over the window including the frame and sash each winter. This kills drafts and saves heating fuel considerably.

- \* Outdoor plantings of tall bushy evergreens on the North side will break the force of the chill north winds that rob your home of heat. Wide overhangs on the south side shade your house, especially picture windows, from the sun in Summer and let the sun shine through in winter. Many architectural designers specialize in this and other types of passive energy efficient design. You can find them at builders energy shows or 'Earth Day' type shows (mentioned later in this guide).
- \* Windows, even the new energy saving type, do not seal completely unless they are locked shut. Check this at the start of every heating (and cooling) season. This also increases your security. Burglars would rather pry than noisily smash a window.
- \* The new type 'indoor storm windows' of clear sheet plastic that heat shrink with a hair dryer seal much better and tighter than the older types. It pays to put them on North side windows or any drafty window even if you already have double paned glass. In Russia, noted for it's cold, they use triple paned glass. Plexiglas is better than plastic sheet but takes longer to pay back it's cost. Use this on the 'lossiest' windows that you have. It's better looking and durable, lasts for many years.
- \* A quick cheap yearly tune-up for your heating system. If hot air, replace it's filter and vac inside all removeable registers. If ducts are uninsulated in the cellar, insulating them puts more heat upstairs faster making burner run times shorter.  
If hydronic (baseboard) heat; Vac underneath all baseboard heaters, inside if necessary. Make sure they are clear of airflow restrictions (rugs etc) underneath. Swivel the louver more open for more heat where you need it, or closed for less. Louver adjustment is also the way to balance the heat between bedrooms.
- \* Realize that money that you save on fuel can be put into more fuel saving measures for your home. This increases your home's efficiency and pays for itself. One of the many reasons that the person who sees major saving on fuel bills should not blow that extra money away.
- \* Empty Nesters; Both summer and winter, keep the doors shut to extra bedrooms in addition to cutting down heat going to them. An unused bath likewise can be shut down but don't let it freeze and burst the pipes. Same with unused or seldom used cellar and otherwise playrooms. Why heat or air condition unused space? Note that in milder weather these spaces should be ventilated to prevent mustiness. Give them air circulation but not powered, use nature's forces.
- \* An easy project for the homeowner; a solar heated outdoor shower. Cape Cod (MA) has many solar outdoor showers. Solar heating them is no big trick. Essentially a 30 gallon or more uninsulated flat black painted tank standing or laying in an insulated box, one side exposed through glazing to the sun. Shiny foil inside the box reflects sun to the back of the tank. Feed it with a garden hose (which should be laid out in the sun as it will, if black or green, be a 'solar collector too).

Use a 'water saving' showerhead and get several warm showers a day from 30 gallons. Tank (or tanks, two paralleled work better) should be a hot water tanks rescued from the dump with insulation removed so the sun can heat them. Drain the system in winter. Tank(s) (which will be tilted) should have drain close to the ground and reachable for this reason. Remove and empty or blow out all the hoses.

For more heat and a longer season of use, put an insulated door on the front that gets closed at night and on rainy days as these radiate heat away when the sun isn't shining on them. These will pick up heat even on hazy partly cloudy days.

Also, for a longer season, insulate inside the box with styrofoam panels and staple/tape a clear plastic front on it. If a lot of use is anticipated, use 2 or more tanks laying down – each being open to the sun. Orient the long side east/west, Tilt the tank mounting box a bit south, 90 degrees to the noon sun in mid July for good hot water til Mid Oct (all year in the deep South)

A system should have a mixing valve for the showerhead as temperature can build up over unused days and make the shower uncomfortably hot. Also, there should be a temperature/pressure relief valve on the system to comply with code.

Often, people, especially youngsters, leave the water dripping. Rig some sort of 'spring operated valve' with a pull cord so that the valve closes itself. It should be in the cold water input line to the tank. Takes pressure off the system when it's not in use. This whole thing, even the hot water, can be 'piped' with garden hose and few, any, soldered fittings. Hose need not be new, check the trash. Keep 'hot' hose to shower short for pretty much instant hot water, best efficiency.

- \* If you have a ceiling trapdoor or folding stairway going to the attic; Insulate it. There is likely insulation in the ceiling (attic floor) but none for the trapdoor – which is not sealed against heat loss either. Heat rises. Don't let it rise out of your living space.
- \* Don't buy a bunch of battery operated geegaws for children's presents, batteries are expensive energy and usually don't get recycled properly. Besides, most of this stuff is pure junk and doesn't last long. Consider educational gifts instead. The old fashioned 'erector set' type plaything – and the newer equivalent, Legos – have created a lot of future engineers. Books develop children in uncountable ways. (Just be sure you know what the books are saying.) The older classic children's books develop imagination and a love of reading. The newer ones don't appear to do that.

Neither does TV programming in general. Be careful of what your youngster is seeing on TV. The very young do not know that much of what's on there is not real life as it should be. Especially daytime 'soaps' and evening 'thrillers'. The seamy side of life is often portrayed. Don't let it become the 'norm' for your youngster.

- \* Holiday lights on Christmas are a tradition here. But there doesn't have to be a big mess of them just because the neighbors have them. Our tradition in this house is a single candle in the most prominent window on Christmas eve, and a small plastic tree in a different window for 2 weeks before and several days after with tiny lights on it. Even though small, it is on a timer.

Several neighbors near here use a couple thousand watts of spotlights for over a month, most go to the end of January. Also those people mainly appear to drive big gas guzzlers. This shows thoughtlessness, but they will learn to think as

energy prices spiral up. (1/09) A couple of them have since switched to displays consuming less power. Pretty beats gross ostentation any day.

- \* There is no reason to join in the latest fad, Halloween lights. A bunch of expensive orange and black plastic stuff from China and lots of spotlights (wasted watts). (edit 08 – fad seems to be almost over as of 07 – Boston area. ‘Faddy’ stuff most often winds up in the trash soon. (Hope it all gets *recycled*)
- \* A computer tip; All computers 7 yrs old or less have energy saving features built in. But the features won’t work unless they are turned on.

Having a screensaver does not save energy. You save only if your computer is, instead, set to put itself and your monitor in ‘standby shutdown’ (sleep).

There are settings in your ROM to shut the hard drive motors off after a set time and to do the other stand bys. If your machine completely blacks out the screen after a few minutes if you don’t type or use the mouse, you are likely using all the features. If not, best to have your ‘computer nerd of choice’ do this setting. Only an expert should change ROM settings. Meddling with it could put the machine in a rather expensive hospital. Windows must also be set for an ‘Energy Star’ monitor which when in standby, turns it’s ‘on’ light orange or blinks, showing low power use. If your computer is less than 4 years old, it likely has these features implemented.

NOTE that these stand bys themselves draw power. Best way to shut the machine fully off after closing Windows is with a switched lightning protected power bar. This home office has 3 computers. Each has a switched power bar. Each now draws *nothing* when it’s bar is switched off. And is lightning protected as well, on or off.
- \* While on the subject of ‘standby’. There is a new electronic measuring tool available named ‘Kill A Watt’. This tells you how much power any 120VAC device draws, and best of all it has a clock built in that gives you cumulative time that the device has been run. You can find out, for instance, exactly how many kilowatt hours your TV set (or any other plug-in appliance) uses a month, and from there determine it’s monthly power cost by using the rate sheet in your electric bill. The more expensive model has a computer. You crank in your KWH rate, it tells you in dollars and cents how much it costs you to run your entertainment center, crock pot, or any item that draws less than 15 amps.

This tool sells anywhere from \$69.95 down to \$39.95 if on sale. If you want to document your electric useage for a report or compare various items as to their thirst for power, it’s the thing to have. Instance; it told this writer to use this computer rather than the other one to do this ‘Fuel Saver’s Guide’ edit along with everything else possible at about half the power consumption. Electricians will also find this handy for other uses as it calculates power factor.

It is not necessary for everyone to have one of these to save money on power, common sense along with pertinent fuel saving information will suffice. However, this is the tool that will tell you *exactly* why your light bill is so high.

Incidentally; you will find that your audio system ‘rated and advertised’ watt figure is far above the amount of power that it draws. Reason: Audio watts of consumer products are measured and calculated on a different scale than ‘AC power’ watts. Example here, a pretty hi class brand new Sony all in one with a subwoofer. Rated

audio power (in big letters on the box it came in, and in it's ads) is 460 watts. It doesn't draw near that from the power line even wide open with loud music.

AC input Readings; off (Standby for remote control) 18W. Normal volume playing a CD 39W. Wide open, same CD passage (too loud to stay in the same room with) 74-107 W varies with music. *All audio systems have this disparity of figures between measurement and advertising.* A true 460 watts of audio would easily drive a dozen or more big horn speakers in an amusement park. And instantly fry the three loudspeaker arrays that came with this stereo.

('10) Note that many new stereos now have no rating on the box or advertising.

Reason: sales of the 'high advertised power' units slumped to zero as thinking people started to learn that watts cost money and confused 'EIA music power watts (which those in the know call 'advertising watts) with true electrical watts.

As a standard feature this stereo has a 'power saver' function that kills the clock display when turned off but still allows the remote to turn it on. Surprisingly, it's clock and display used much more power than the remote receiver. Even so, it's now on a power bar and shut off with that switch. Check any newer electronic items you may have for power saving features – and use them.

In the market for new? Favor new items that have a 'power save' switch or setting. Also, favor 'energy star' items. This meter has proved the savings of many items.

- \* All those little transformers used around the house for toys, radios, phone and tool chargers etc draw power whether the item is being used or not. Unplug them from the wall rather than just shutting off the item or unplugging the phone or tool. Also, look for transformers built into the house electrical system to run items no longer used, such as intercoms, disused alarms, or old doorbells. The thermostat on your furnace draws power all summer long. Shut it's power off at the main electrical box or with the burner's 'emergency switch' when heating season is over.

Anything with a remote control draws a good bit of power to keep the remote receiver alive.

Electrical engineers and electricians call these useless electrical thieves 'phantom loads'. A phantom load is something that draws power but gives you nothing in return. A good example here, the above mentioned stereo receiver that has been measured at 18 watts when it is shut off. This phantom load runs 24 hours a day (as they all do) 365 days a year, and with electricity here costing 17c per kilowatt hour, it costs quite a few dollars a year to keep it ready to receive it's remote signal.

Seeing as the remote is either lost or has dead batteries most of the time, and unneeded for all but the more complex functions, the stereo got plugged into a multi outlet spike protector with switch and is turned on now with that switch. No more phantom load from this stereo. As a bonus, it's now lightning protected.

This writer has seen many 'home theatre' type arrangements that need 3 or 4 remotes in order to give full use of all components. All should be put on the same multi outlet switched spike protector, why run several remote receivers when everyone's asleep or when nobody's home? Lightning protector power bars are not expensive, here they run about \$6.00. They pay for themselves in less than a year.

- \* Your refrigerator will use less power if you keep its condenser clean. With a vac and a long brush, carefully clean the louver and fan area underneath or at the

rear. This area picks up a lot of dust, clean it yearly. Also – don't keep the door open for long. Get in, get what you want and get out. Why cool the kitchen with it?

- \* For winter, check your outside door seals and door closing. This may need repair or adjustment. New seals are standard hardware. If there's a draft at the bottom, get a door sweep or make a 'door snake' to put down at the gap to minimize the draft. Incidentally; door sweeps that use double-sided tape to stick on won't stay on. Stick them on, test for proper fit. Then drill small holes in them for half a dozen #4 or #6 flathead wood screws with washers to keep them on. Interior doors going to unheated spaces can be done the same way. Feel for a cold draft under the door in winter. If one is there put on a snake or sweep.

- \* To find a draft, use a cigarette like the pros do, even if you don't smoke. Seeing which way the smoke goes will also tell you a lot about air circulation in your home.

- \* As to drafts and heat losses; Homeowners are beginning to discover 'thermal imaging', as industry has been doing for years. This is a photograph of your home in the heating season, by which a special digital infrared camera picks up areas of heat that gets wasted outdoors by such as poorly designed or sealed windows and doors, insulation voids, vents, attic issues etc.

In 'hot' climates the photo will show roughly the same thing as to cooling losses when taken on a hot Summer day. However, likely the whole building is not air conditioned and 'cool' does not rise as heat does, you won't get as complete a picture as a 'winter, heating system on' gives.

Many heating and insulating contractors do this. Here in Southeastern MA the charge is nominal, \$50 for most single homes which becomes a credit towards any work done by the same contractor. There is no obligation beyond payment of the nominal photography charge. Your local 'green' or 'sustainable' organization should be able to direct you to someone who does this.

Thermal imaging in the past was quite expensive before modern digital techniques were developed. Only science and industry used it, industry mainly to control the cost of process, plant, and office heating.

(11/09) In Boston's South Shore area, Sustainable South Shore, the local all volunteer envirogroup now owns their own thermal imaging camera. It must, naturally, be used when the heat is on in winter. Google them

- \* If you use an old TV set with a lot of vacuum tubes in it with a digital channel Converter throw it away. It takes about 3x the power to run an old tube type TV than a newer solid state TV uses And... the new solid state TV will give you a Clearer, even a HD (high definition) picture. Without a converter.

- \* Another TV tip. If you live within 75 miles of a major city (or more than one) You will be able to get 'free off the air TV'. This is digital, clean, and ghostless All you need is a good antenna (preferably amplified) to pick it up. This writer Is doing that and gets 22 channels from 3 major cities, 21 of them are HD and include the major networks plus several new ones. Variety is such as to please any age group or personal taste. ALL of these free channels are free for life.

The cable and satellite companies want to make money off people by delivering more channels where 'more than sufficient' is not necessary for this family.

Perhaps it is the same for your family. Test your reception of possible free Channels in the area by disconnecting the cable box and putting your old roof antenna or rabbit ears back on the TV. You will likely have to scan for new channels that aren't programmed in, as with most new TV's the only channel programmed in is the cable (or sat etc) box. Have your TV's instruction book out or have your 'electronic nerd of choice' do that.

As to people who have done this? most of them were happy to divest themselves of a \$60 or more a month cable or sat bill. AND the addiction to spending too much time sitting down at the boob tube doing nothing important.

- \* When boiling spaghetti etc, never turn the gas flame up 'high'. This sends the heat beyond the side of the pot where half of it gets wasted. Heat should be on the bottom where most all of it is used to cook. The control knob almost  $\frac{3}{4}$  of the way up is fine here for 'quickest rolling boil' in the biggest pot we own but you should eyeball your own burner and pots to find the amount of heat needed. Water boils quicker if you put the pot's cover on, saving you stove fuel. Make a habit of it
- \* Another cooking tip; Size your pot to the amount of food cooked. A pot too large takes a longer time to boil. Have a small frypan for individual meals, a couple of hot dogs or eggs etc. Faster cooking using less fuel.
- \* Mystery packages of leftovers at the back of the refer get thrown out. Why make them at all? Cook smaller amounts – and if a meal does create a package, make a priority of serving it as part of the next meal. Food waste is a dollar drain that can be beat too, just like energy waste.
- \* Eat at home more. If cooking is a bore or a chore, you're doing something wrong. Take advantage of supermarket prepared foods for the complex time consuming stuff. Develop the boring recipes into something new and flavorful. Try out different ways to prepare – such as steaming veggies corn etc. instead of boiling, grilling different items on a skewer, doing 'quick baked potatoes' in the microwave (punch holes in them with a fork first so they won't 'rupture' etc. Cooking can be fun and always less expensive than phone orders and tips for delivery. Get the kids into this, and Dad too. Reserve restaurant (or restaurant take out) meals for only the special occasions.
- \* Bring your lunch to work. As above, vary the routine and menu, take 'special occasion' days to eat lunch out. Homemade lunches can be creative! Experiment.
- \* Be sure that you understand and can compare grocery store unit pricing. Store brands are usually lower per unit. Price per unit is also the reality check on a sale item, or a bigger than standard size box, especially cereals and detergents. Use math as a reality check on food prices (see math section below) Use comparison between sale flyers of different grocery stores as a reality check on actual market prices, considering, of course, that all of the flyers and coupons have an expiration date.

This writer does not usually bother with coupons, as most of them deal with items that can be obtained below the 'with coupon' price either in a store brand or generic, or at a different store. One exception; Costco Sams Club BJ etc coupon mailings, if you need the item or if it's a 'buy ahead' non-perishable such as coffee. While on the subject, don't forget to factor in the cost of fuel when doing any 'coupon' shopping. Costco is a bit over a 25 mile round trip here. Presently (09) about \$3.50 gasoline cost.

- \* Dining out? Make your own appetizers, have them before you leave for the restaurant. This can be a fun thing, less expensive than restaurant version and if you desire, bigger (or smaller for dieters). It also leads to much less of a tab when you get there, less appetite all around. Variant; Make a peach melba, giant shortcake or some such for dessert after the restaurant meal.
- \* Eat healthy. Even with medical insurance, doctors are expensive and time consuming. Consider vitamin supplements, at least a good multi and additional vitamin C. One Gram (1000 mg) of vit C per day along with a good adult multi (which also contains C) can't hurt you and may prevent a week of agony in the cold and flu season, or lesser colds anytime. If you are prone to colds or allergies, 3 grams of C would be more suitable. Most doctors don't prescribe this, assuming that most everyone gets enough in their food. May have been true once, but not with today's 'fast food' and 'minute mini meals'. Don't believe 'minimum daily requirement' figures, as this is based on just above where a person starts to show depletion symptoms (think WWII German concentration camps). More of any won't hurt you, will help you.
- \* Anyone who travels by auto and has a laptop computer should install 'wi fi' on it. This allows free internet and email right from your vehicle from the parking lot of establishments that have the service. Whole Foods, Panera bread, newer McDonalds restaurants and many Wal Marts motel and hotel chains have it. All you need is a detector costing you perhaps \$12.00 at Wal Mart to find the signal. When your detector gets the signal, boot up, look onscreen for the one that uses no encoding, that is the free one. If you get the message 'cable not connected' while attempting internet access, quite often it is a 'spurious' message and you can disregard it. It can mean that the company presently has an 'outside line' disconnected or is having trouble with it. Or it could be that your computer is not allowing your browser to properly talk to your wifi setup. Type in your needed URL in the explorer window at top and hit go. Even with the error message it usually works.

These free services are pretty quick.. You must have a provider to use this service for Email. If you don't, several services including Google offer free email service (Gmail.com). No email 'provider' is then necessary as your free Wifi hookup and free Google act as the provider.

Of course there are 'satellite' services that enable wireless internet service from anywhere, but you pay monthly (\$60) for this service and need the hardware for it. hardware is just a tiny USB trancierver. Some newer hi end laptops have it built in.
- \* Don't keep the coffee pot heater on all morning. It burns the coffee to an acrid taste if on too long and burned coffee costs watts to burn it plus watts for another pot,

unburned, to drink. If coffee needs heating do it 'in cup' in the half pint microwave

- \* Never run the dishwasher unless it's real full. To save power here, interrupt it's cycle when it goes on 'dry', open the door and shake off excess water from cup bottoms. Remove all plastic items to a 'dish drying' area as they retard drying. Keep door open until everything is dry. Here, dishwasher stays open to dry all night. The electric heater inside (and fan in most) use more power to dry than the wash cycle uses.
- \* Another dishwasher tip. To minimize it's use (these take a lot of energy) use recycleable paper or plastic products. Coffee cups and spoons were a big issue here. Now, using paper mainly (biodegradeable, also town accepted into the commingled recycle pickup if not foodstained) has cut dishwasher use and hand dishwashing better than half. Lots of visitors here and they have accepted the change, most are copying the philosophy. Dollar stores usually have these products cheap.
- \* Set your lawnmower's cutting height a bit shorter. Let your grass grow a bit longer before you mow it. You could save up to 10 gallons of gas a year this way, and save time for yourself, too. Put your season's end leftover lawnmower gas in the car so it won't get stale, giving your mower a start up problem in the Spring.  
When it's time to replace it, consider electric power, Gas mower engines are not as efficient as automobile engines and have no emission standards or specification, therefore emit more VOC's, CO and lung concern gases per horsepower than cars or trucks do. Not to mention the stink and danger of spilled gasoline while filling them.
- \* Wash your car with a bucket and sponge. Only prewet and rinse with the hose. Get a nozzle that shuts off when not squeezed. Water is expensive, why waste it?
- \* Buying new appliances: Only buy 'Energy star rated' appliances. Price is slightly higher but you will make it back in saved energy, even more now as home energy goes up in price. All new computers are 'energy star' by design. But not all appliances. As to video and audio; they are more efficient now than ever, but still best to check the watts they draw (on the sticker in back or embossed in the plastic) before you buy a new one. Some cost less power to run than others.
- \* The icemaker in your refrigerator uses electricity. Shut it off when ice is not needed in quantity, old ice gets stale. Also, shut the door quickly when inserting or removing items, as losing cold you have already paid for is as bad as losing heat. If you need ice in the wintertime and it's cold enough, put your trays outdoors. It costs nothing for electricity and often freezes faster. (in New England, Canada)
- \* It is actually less expensive to do your laundry at a laundromat – if it's real close by than to do it at home, if you don't have a lot of it. AND educate the youngsters not to throw a few small items in the washer to do them, wait for a full load.
- \* People doing yard sales, tag sales, or flea marketing used goods, both sellers and buyers, are recycling these useable items and this is good for the planet. And the pocketbook.

- \* Heating systems; Remove cover of your thermostat, adjust anticipator to 'longer.' Saves lots of fuel as with short cycles, heat continues going up the chimney every time the burner shuts off unless you have an automatic damper. (2) Drop one nozzle size on oil burners if stack temp is over 400 degrees after running 15 minutes or more. No difference in the amount of heat, as the extra heat was being wasted up the chimney.
- \* Seal hot air duct / floor interfaces with mastic or duct seal – or HVAC type (not Hardware store type) duct tape. (HVAC type withstands heat better). This can be obtained from plumbing supply houses.
- \* Rather than letting water run to get it cold to drink, keep a couple of jugs of filtered (buy a filter for your faucet) water in the refrigerator. By conserving water you can often beat the 'stepped rate structure' based on gallons consumed that most municipalities use. Check the small print on the back of your water bill for this structure. Also; Putting large containers of water (many small bottles of water in plastic containers will do) in your refrigerator section reduces wasteful 'short cycling' of the refrigerator's compressor. And you will always have ice cold water to drink. Another trick; freezing bottled water gives you ice for tonics in your picnic cooler as well as icewater to drink when the tonic's gone. See other 'bottled water' tips.
- \* If you will be building, employ a designer who is familiar with passive solar and other energy saving concepts. These don't cost much at all when designed in. Consider a vented skylight above the stairwell to get rid of summer heat. It works. This writer has one. Hot air rises to exit there, pulls in cooler air from cellar and North side open windows even if there's no breeze. Here, it stays open all Summer and rain doesn't get in. Heavy rain, it gets closed plus in late Fall for Winter. Previous house needed AC in the bedrooms. This one, newly built, doesn't.
- \* Tape down light switches that are often turned on unnecessarily by mistake. Porch lights, pole lights, outdoor spotlights etc.
- \* Not an energy save – but a money save. Everyone who watches DVD movies is apt to have DVD's in their collection that need not be seen again. How about setting up a 'DVD swap' among friends? This could be done a fun activity for a church group or fraternal org, either as the informal ongoing type, or on a regularly scheduled evening. Everyone brings in DVD's and lays them on a table and others who also have them laid out walk around and make choices. No money changes hands, just DVD's. This could also be worked with CD music or even video or music tapes.
- \* Another DVD/CD tip. Many public libraries have both CD and DVDs that can be borrowed as if they were books at no charge. All you need is a library card. As with rented DVDs there's a hefty late fee so prioritize quick return.
- \* Your utility bills often contain other printed items that many people just throw away. Read these items, they often contain energy saving tips, discounts on energy star rated home appliances, energy saving home improvements etc.

- \* People who rent, by conserving fuel and water normally paid for by the landlord, can often 'hold off' a rent increase caused by higher costs to the landlord. If a multi family, mention this to and cooperate with the other tenants on this. It is also a good opportunity to share a CD copy of this guide with your neighbor so that they will understand why all types of energy conservation are necessary.
- \* Put up your storm windows earlier in the season, well before the furnace needs to run. You will be warmer on those first chilly nights without requiring heat.
- \* Computers; Your laptop uses about half the power that your desktop uses. With a USB wireless mouse and keyboard and a cooler added below, these will do a lot of real work with the feel of a desktop. Huge capacity external hard drives are available for USB. This edit of the Fuel Saver's Guide is being done on a laptop so equipped. Incidentally, this laptop sits on a small wire cake cooling rack which cost 50c at a dollar store instead of a \$30 cooler from a computer store, uses no power to cool it.
- \* Woodburners; Store your wood so as to let it dry – as dry wood gives more heat and less creosote. A loose tarp over an outdoor pile allowing the breeze in on all sides may be all you need.
- \* If you have central air, shorten it's season by installing an attic fan to draw hot air up into the attic and out the attic vents, draw in cooler air through open windows on the North side or from the cellar. An attic fan is a good retrofit for any home and will reduce the number of days the air conditioner(s) needs to run. In many parts of the US, it may completely stop much of the need to run the air conditioners.
- \* Consider a 'geothermal heat pump' climate control system for your home. These are electric and use the Earth's underground temperature as both a heat source and heat sink, allowing the system to both heat and cool with higher efficiency. If you already have conventional central air conditioning, a heat pump, or a water well, half of it's already there. The new 'geo' aided systems are a great source for radiant floor heating. These both should be considered when building.
- \* Consider *alternative energy* for your home.
 

Yes, by all means. However, it does not pay to install a system that spends most of it's time feeding losses. Tighten up on those losses first. New door and window seals where needed. Duct and pipe insulation. Energy saving showerheads and light bulbs. Setback thermostats. Attic insulation, hot water tank insulating shroud.

Zapping the losses beforehand will ensure that you will need a smaller alternative energy system for your premises. You will pay less money for it, therefore less debt service on the loan needed for most systems. Alternative energy can 'go up the chimney' just as fast as the energy you are using now. Again, tighten up first.

*Passive solar energy* involves design of your home (and in many cases the grounds) to take maximum advantage of the sun's action and natural airflow to help both heating and cooling it. Such items as overhangs on the South side to shade big windows in Summer but let the sun enter in Winter, trees to screen

Northside winds, convection cooling with opening roof vents. These and more can be retrofitted to many existing homes. Information on passive design can be found on the Energystar website. Some architects specialize in it.

*Active solar energy* for the home involves using such as roof or ground mounted panels to collect the sun's energy and use it for water or air heating. A different type of panels are used to make electricity. It is more cost effective with faster payback to put in solar domestic hot water preheating than to put in solar electricity. Some custom designed newer houses – or even retrofit systems - use both.

*Solar photovoltaic panels:* Wind turbines: This home-generated electricity pays back handsomely if you are offgrid and must use a gas or diesel generator for power. The most cost- effective use of solar/wind electricity is to replace gasoline or diesel fuel. If 'bought power' comes to the area, the system can then be modified to feed the grid, therefore gaining a payback even when there is no other use of it's electricity.

Their major use in 'ongrid' homes is to automatically, legally and literally 'run the electric meter backwards' which is the way they pay back. They feed the electric grid even when there is little sun (or wind) whether you are at home or not. This is done by adding a 'synchronous inverter' to the system, which the alternative energy contractor's electrician installs. These uses hold true for home/farm wind turbines or PV on the order of a kilowatt or larger.

All 'small' wind power or photovoltaic (PV) panel 'emergency battery charger' type systems also have a fulltime use to run computer equipment, water pumps, chick brooders, 2 way radio equipment etc. This way, even the 'emergency' systems pay back by less 'bought' electricity' use when power is up, even without a synchronous inverter.

Many of the larger emergency' systems charge relatively large battery arrays at 12 or 24 volts. Some are 48 volts. The largest of them, in addition to battery charging run synchronous inverters that put electricity into the grid when the battery is full giving payback over a long period of time. Those with synchronous inverters are called 'grid feeders'. These 'battery' systems are common in island environments where bought power may be sporadic or even nonexistent. Where 'bought power' does not exist, the inverter need not be synchronus, therefore less expensive.

The most common larger 'ongrid' systems don't require a battery, their inverters run the electric meter backwards (literally and legally) when the wind blows (or with PV, when the sun shines. Battery backup can be added to these later for emergency power. However, the battery part never pays back even a percentage of it's own cost, is only recommended for 'power critical' applications such as large computer systems or medical support systems.

PV/wind systems are completely automatic, requiring no attention. PV is, in addition, a great option for a municipality that for one reason or another cannot have windpower. There is no 'nimby' (Not In My Backyard) opposition to photovoltaic. At least none has appeared to diss it on the systems installed so far.

*Solar heats water excellent,* work great even here in chilly New England. However, you still need a regular powered hot water tank. When the solar is operating, it feeds the regular tank so it's burner need not come on when you draw

water. Recovery time is less, you get more hot water storage as you would be feeding solar heated water to your regular tank. Solar domestic hot water systems operate year round. They, like PV, are completely automatic. As to where to get the parts for these systems; Most alternative energy contractors will sell individual components to 'do it yourselfers'. And, being in your locality, can give you 'area specific' information such as proper angle of collectors. This angle must take into account any 'permanent shaded' areas in the collector's view of the sun. IE: if the West is shaded by a building after 3pm, the angle tweaks East a bit to catch more morning sun. Another factor is the growth of trees which could shade the collector. An excellent book is recommended in the book listing below which gives the shadow prediction formulae for any photovoltaic system anywhere on the globe.

- \* It seems that a lot of progressive schools – primary mainly – have lately (08) gotten into 'enviro and energy use education' either as a segment of regular science classes, special auditorium programs, or as an after school activity.

Here is a chance to dialog with your children and partner with them as to implementing various 'energy saves' in your family. When these 'little people' talk referring to what they have learned on these subjects in school, they are talking about their own futures in a world with diminishing energy supplies and higher costs of whatever sources will be obtainable. Listen to them, partner with them, and as a result, get closer to them at a time when other families are drifting apart due to outside influences. Let them 'teach you' a bit about the enviro education they have even if you know it already. Make it a two way discussion. You will add to their knowledge too when you explain to them the enviro reasons why you put in all the CF bulbs or why you are doing less trips in the car. (They may misinterpret the financial reasons due to lack of maturity). Don't let enviro awareness become a passing fancy to your children. Help them to make it a lifestyle change.

- \* A good cheap 'hot water helper' using no energy or solar panels is a preconditioning tank – some call it a 'tempering tank'.

Essentially this is a hot water tank without insulation on it, not connected to a fuel source, which picks up ambient temperature where it is located. This is piped between the main cold water line and the existing water heater's cold water input. It increases water heating system efficiency, therefore decreases burner run time, also decreases hot water recovery time.

Many are next to the existing hot water tank. A lot of them are in hot attics, especially in the South, and if you are building, consider this location for yours. This tank location needs reinforcement, and should be at an outside wall, as even a 30 gallon tank of water is quite heavy. There also should be a drain pan underneath, draining through the wall to outdoors to catch any possible condensate or leakage.

Cellar or garage location needs no drain pan. Do not put tank or additional piping where it could freeze in the winter. Size should be about the same as your regular tank or a bit smaller. Many laundromats use real big ones or multiple small ones and duct the dryer output vents to a box built around them to recover dryer heat, keep water heating costs down.

- \* Moving? Starting a new family? NEVER rent furniture. Giving one of the many reasons, if you should lose your job or become temporarily disabled, the heavy monthly payments on furniture rental would bankrupt you – and the repo of the furniture, because of so called 'wear and tear' charges would still leave you owing the rental outfit money.
 

Two options here. (1) a furnished apartment or house. (2) Selecting good but used furniture from the Salvation Army or Goodwill stores and used furniture stores starting with the basic bedroom and kitchen table and go on from there. If the move appears permanent you can expand on that by replacing the used one piece – or a whole room full at a time with new, then selling or contributing the used items.

Could tell you stories about this. Just a quick example; A fellow this writer knows rented a TV set and wound up paying four times it's purchase price in only two years. There is no 'legal maximum' percentage on rental charges as there is on loan finance charges. Upon good legal advice, he quickly terminated the rental contract. But could get no remedial repayment of his excess from the renting outfit.

Beware of anything that could be classed as 'legal usury' (loan sharking). In the example above, the fellow didn't 'do the math' but went ahead and signed the contract. Had he hit a calculator first he would have walked right out of that store.

Incidentally, that rental outfit is still in business. 'Bad business deals' are not illegal.
- \* Have you ever noticed that people who turn lights on never seem to turn them off? Unless, of course, that person is the one who pays the electric light bill. Educate your family as to this, as well as other good energy-saving moves.
- \* Building? A new home heating unit, proven effective in chilly Northern Japan, uses a small diesel engine to make electricity to run your electric meter backwards (legally) while the engine is producing heat for your home. If you must burn oil here's a new way to do it. The electricity you make subsidizes the price of the fuel. Note that this guide is not recommending the burning of fuel, only showing you an alternative and reportedly more economical way to burn it. Beware of the maintenance that all Diesel engines need, and of course it's lifespan.
- \* If you need new windows and don't have the resources to have them all replaced, do the North side windows first. That's where the cold blasts in the worst and there is never any 'sun warming' to compensate.
- \* Recycle, recycle, recycle. Bring your own durable bags to the grocery store. Find out everything about your town's recycling programs and use them all. Yard sale/ tag sale your unneeded or outgrown useable items or contribute them to local charities. Contribution of durable items is recycling too. The obverse, cruising the yard sales and flea markets, church fairs and secondhand shops to buy needed items is also recycling, the other half of it. Both halves of this are also a form of recreation. It is fun, also rewarding. And you meet a lot of nice people.
- \* All rich people stay rich because they 'think yearly' in regards to matters that cost them money in addition to matters that make them money. The 'new rich' often fall into the hole of 'gross ostentation' and fail due to disregard of this principle.

- \* Investigate both government and utility programs that will help you to lower your fuel usage. Many are free and many that are not carry discounts (subsidies or tax advantages.) However, beware of programs that require you to spend a lot of money or that offer only marginal improvements or those with unrealistic figures as to fuel saving. If you implement as many as possible of the free or relatively inexpensive suggestions in this guide first, you may find a total drastic reduction in your fuel consumption which outshines even the wildest claims of many of the expensive commercial fuel savers. Instead of one commercial saver, you do dozens of free ones. Then, after that, if you choose and it fits your needs, implement the commercial one.
- \* Example relevant to above. What good is putting a new furnace in your house that claims 20% energy savings if you are losing a large percentage of your heat and cooling through poor or no weatherstripping of windows or doors? The furnace may take years to pay off, the weatherstripping might cost you \$100 if you do it yourself. And . . . that hundred should come back to you as less payout for your next fill of oil. With A/C it will show as less payout for electricity. The principle here is to take an overview of what needs to be done and do the simple cheap ‘do it yourself’ stuff first. Make a list. Get materials prices. Make a ‘hobby’ of finding and squashing these constant drains on your wallet. If you don’t know how to do these simple jobs, quite often materials suppliers have ‘do it yourself books’ or free courses on how to use their materials. Examples: Home Depot, Lowes, Ace Hardware, and many farm suppliers.  
If you are considering solar energy of any sort, tighten up your house first. Having less loss to feed will make more efficient use of *any* heating system.
- \* Flatscreen TV’s having a ‘plasma’ display draw a lot of power. Don’t buy one.  
Don’t scratch or dull your screen by washing it wrong. Don’t let people abuse the remote control. Always have it on a lightning protector. Damage to these or any other home electronic product is not covered by *any* warranty, only internal breakdown. Also, check your service contract. Most contracts require that you remove the TV from the wall or from it’s entertainment center before the technician will service it
- \* Educate your children not to follow the latest fads as to clothing toys etc. The child is an individual with his/her own talents which may never surface and get developed if that child gets into ‘herd mentality’. Besides, those fads are only devices used to mass market items of questionable value directly to the young – to make them want something that has a limited (by fad, fashion, or shoddy construction) lifespan.  
Choose instead durable educational items. Choose clothing that will highlight their best features as the young ladies and gentlemen that they are. Introduce them to good orchestral music rather than common ‘rock superstar with loud guitar’ types.  
Children pick up a lot of habits and desires – both good and bad types – before the age of 10. Endeavor to make these ‘good’ habits (including, of course, the responsible use of energy). Above all, teach them not to be ‘gullible’, as that is the main type of behavior of youngsters who gets into using street drugs.
- \* Try ‘generic’ or ‘store brands’ of supermarket food paper goods etc items. The

main reason that they are less expensive is that generic or store brands do not have any separate distribution networks or advertising which the consumer has to pay for as part of the purchase price.

- \* Don't look down on 'dollar stores' but check out what they have to offer. It's nice to pay a buck for a two dollar item – examples, dishwashing liquid, paper plates. But don't get caught up in 'impulse buying' of items which might seldom or even never be used. Or 'dollar candy bars' mainly on low shelves. (Hint – don't bring the kids.)
- \* Before the Korean war period, most every 'home gardener' had a rain barrel for watering at least part of the garden. Easy to set up under a downspout. This will show up as a saving on your water bill. And at most locations the water is better for your garden whether veggies or flowers (no chlorine or other chemicals)
- \* If you don't have one at work, set up an 'IRA' account for yourself. It's money in the bank that will come to you when you retire. With the dollar depreciating like it is, your social security will not be as valuable as it is today. IRA's can be drawn on in an emergency. Deal with a company of good repute that has been around for many years.
- \* Drive carefully. Drive sanely, with full attention to the road. Do not text or even use your cellphone while driving. Don't do 'divided attention' driving of any sort, Keep your mind on the road. Never get behind the wheel after drinking or while having any sort of drug reaction. Among the usual reasons for these warnings are the many additional expenses that will accrue due to getting yourself into any sort of traffic accident. Your insurance rate category will change upwards. Damage to your own (or even somebody else's) automobile is seldom completely paid for by insurance, not to mention the peripheral expenses, time, and and trouble it will cost you to have even a minor auto accident.

Even such as getting a parking ticket is created by faulty thinking on your part. Faulty thinking causes many types of unnecessary expense. An automotive example here, choosing the wrong route for a trip causing lost time and much idling in traffic or extra unnecessary miles driven. Plan even the simple trips. With proper planning much valuable time and many miles (and dollars) can be saved. Example here, a trip to the 'other side' of the closest city (Boston) is best undertaken at 5:30 AM instead of 6 when traffic becomes 'slow or stop and go' Another; Thinking you have enough gas in the tank to make your trip and being wrong, instead having to buy it far away an an expensive city or turnpike station.

Back to auto/truck fuel economy for a bit. Your right foot can be your friend or your enemy. Enemy, of course, in reference to above. Speeding tickets are expensive. However, that foot can be your friend and help you burn less fuel.

Years ago, many people put a new gauge on their dash or steering column. This was sold as a 'mile o meter.'. It was a simple vacuum gauge You would feather off the gas pedal to get the highest vacuum reading without losing road speed. The same principle works on today's cars. Install a vacuum gauge plainly visible if you must. However, you might try to 'feather the gas pedal off a tiny bit' without one. If you have a tach in an automatic tranny vehicle, the tach reading will go down a slight bit

but road speed doesn't change. If you had a vac gauge, at this point it would go up. Try it without any sort of gauge. Feather off a tiny bit – you may sense the engine working 'easier', a slight lowering of engine noise but no change in road speed. This fuel saving technique works best on the level throughway in the right or center lane at below 63 mph but it works most anywhere even in long boring constant speed traffic. Make this sort of feathering a 'habit' it will save you gasoline dollars.

JC Whitney has this gauge called a miles per gallon' gauge. Other suppliers may carry it. Some people who really understand the parameters of their engines are also or instead, using scan gauges. For more info regarding fuel saving 'driving techniques' (hypermileing) there are several websites, two of them listed further on.

Back to 'home, lifestyle etc' tips.

- \* Put up a clothesline for small washes, don't use the dryer. Small washes can be done by hand in a plastic tub or even in the kitchen or bath sink  
If the kids are in the habit of bringing a few gym clothes home and throwing them in the washer, then dryer, introduce them to the short cycles that use less electricity and water. Variant; get some extra clothes from the laundry basket to throw in with them. Good habits are best learned young.
- \* Wherever possible, shop individual merchants in your own city or town. This keeps your money circulating in your own community, with people who share in paying your own town taxes, school fire dept etc expenses. The success of local small business is a vital part of any community – and as these expand, will lead to new jobs – especially for high school and college age people in your town.
- \* Many of the 'constant charge' devices (electric razors, toothbrushes, cellphones etc do not need to be constantly charged. When you know that they are 'full', unplug them and see how long they run. Most all of these, when the battery is full, shut off the charge to the item but still draw electricity. Nip this in the bud if your item runs fine for a few days by unplugging it's wall wart or line plug when charge completes.
- \* Too much trash to deal with? Help yourself and help the planet by recycling. Most every municipality has some sort of program, and recycling helps make a cleaner more sustainable planet by reusing valuable natural resources.  
Opt out of junk mail making your preference known at [DirectMail.com/junk](http://DirectMail.com/junk) mail. Be sure to check **all** the 'no' spots. Even one 'yes'; will keep you on the list. The computer that reads these forms will then take you off the master address list that 99% of the time will bring you more throwaway mail than you get now. There are other lists too that have an 'opt out' both mail and telemarketing. Seek these out.
- \* Food is 'fuel' too, for the body. Eating healthy and not over or under eating will keep that body in shape to do what it has to do. Sleep is 'fuel' too, so the body can recover from the stresses of the day. Automobiles, given bad fuel, will perform poorly, may suffer permanent damage. So will human beings. Taking a good multivitamin and additional vitamin C daily will help you keep healthy, avoid colds and flu.

- \* Defining 'getting high'. Using plants or chemicals of any sort, it's addiction. Why? Because those plants and chemicals themselves are addictive. This is an unrecognized (by you) medical problem. Seek medical treatment. Even 'weekends or parties only' is a health problem that must be treated until it goes away. Addiction wastes your valuable time, your health, and your money and supports a system of people who know this, and don't care a bit about your reduced health or your decreased lifespan due to your use of their products. All they want from you is your money, their profit, regardless of what they say to sell their product. They are not 'friends'. They are moneygrubbers, and want to sell you drugs etc at a profit to pay for their own habits and if large dealers or even businesses (liquor) put your money in their own banks.

Don't do business with these people or hang with these people. **You are smarter than they are.** This writer knows this as a fact. How? Because you downloaded or otherwise received and read with interest this far into this document.

Drug use beats down health and costs a sizeable portion of a users income. Users are losers. Don't be one. Seek instead 'natural highs' which cost you nothing. (Instance; your act of defiance to the urge to smoke a joint, take a pill, or whatever formerly turned you on and winning that battle is a great long lasting high in itself.) Kiss the whole 'getting high' crowd goodbye. Addiction is not fun.

Along with that, examine your use of alcohol and tobacco. The same principle applies, the only difference being that these are legal.

- \* On the same subject; How much of your valuable time is spent with such as 'social networking' or in general, internet use. If either of these or even both are the only things you want to do and take a huge percentage of your time, you may be addicted to them. Addictive/compulsive behaviour can take many forms, with many different subjects, all of which take much of your time and cost much of your money.

Are you a 'shopaholic?' This too is addiction. Look at it straight in the eye and look at all the useless clutter in drawers and closets caused by it. Then add up the unnecessarily spent dollars represented by this clutter.

If you are going to be addicted to anything, let it be to freedom from financial worry for your family and to yourself, as well as your family's health and well-being. And get rid of the clutter. There are many charities that could use that stuff. .

- \* Examine your lifestyle for ALL unnecessary expensive habits. Example; A thermal mug of coffee made at home to drive to work with instead of bought coffee saves time and money. Have a couple less beers watching that football game on TV. Don't go to that rock concert. Stop that 'impulse buying' such as movie star gossip or sports magazines at the supermarket checkout. Finding out where the little (and often big) habitual dollar drains are and squashing them gives a huge return yearly. Grab a calculator and figure just one of those little habits yearly. The results will surprise you. And - don't justify the expense. Examine it in depth. Instance; the magazines tell you a lot about very little, none of which affects you. And they clutter up the house. The coffee? Did you know that the cup it comes in costs more than the product in it? You are buying mainly their advertising and image. Exactly the same with the beer. If you really like the beer or wine make it yourself to your own taste. Or cut it down a few notches, rather than habit make it 'special occasion'. If you

can't do that, you may be 'borderline alcoholic', also classed as 'addictive-compulsive', a medical problem. It's the time to squash these habits entirely, before they get worse.

Yes, it is uncomfortable to think of these things. But being a computer user, you are a smart rational person who has the ability to deal with these issues logically. And if you need help, it's out there.

- \* Realize that a lot of people don't have to spend small (or sometimes large) amounts of money pretty much constantly to 'feel good'.

Consider that the best feeling a person can have in these troubled times – other than freedom from health issues - is financial security, freedom from financial worry.

With the steps given in this guide, you have a start in that direction. Look for ways that you and family can change lifestyle a bit and have relaxation, recreation, and fun costing you little or even for free. And as a result, a bigger bank balance. Often much bigger,

And while on the same subject – a lot of outfits seem to be marketing what they call 'financial security'. Don't think these a panacea – as proved by the recent stock market bobbling and needed govt bailouts. Your own bank account with interest and stable government-backed short term CD's from your own bank or credit union are the best bet for any of us in the 'working class'. Say it again, shop the banks.

**WOW** that's a lot of tips. Where does one start?

With the ones that save you the most, naturally, especially the free ones. The saved money will help you to pay for the ones requiring you to buy materials. Examine your own and your family's lifestyles. Have them read this guide too, if mature enough. Make a printout (or use printscreen for the single pages that you need) and do some underlining. Prioritize the program, and start it today as the sooner you start the sooner you save. And stay with it. Habitually saving energy is worthwhile, a positive rather than a negative-going habit and puts money in your pocket.

The ones involving heat and A/C losses require lead times, should get done before the heating (or A/C) season begins for maximum gain. If it's already winter when you read this, don't be afraid to do such as door sweeps and other air leakage now if they can be done from indoors. Also, in winter it's easier to find cold spots or drafts. After the winter it may, in many localities, be difficult to find needed insulating materials on the store shelves until Fall. Buy these in late winter (they may be on sale then) for jobs that must be done in Summer (during your vacation) or when weather allows.

Lifestyle changes can (and should be) done immediately. They cost nothing. Many of them (especially the automotive and habitual ones) you will see an immediate major drop in expense.

The 'utilities' tips (electricity, gas, heating fuel, water) will take perhaps 3 months to all phase in and show a total measurable gain – especially water, which in most communities is billed quarterly. Apartment people; getting other tenants into this program can often hold off an increase in rent, as the building's expenses being down will show the landlord's computer a gain, therefore no need for a rent increase.

***All members of the family should participate in this fuel/money saving program. Instance, someone else driving your car will, if they do not understand the 'driving and use' tips, will drive it the 'old way' without thought of maximizing MPG and cancel out a good part of your own savings. This is the major reason why some people are not seeing the gain that they should and quit.***

Let them know the enviro reasons you are doing it as well. Some will misinterpret the financial ones. Don't be put off if people, even your own family members call you a 'cheapskate'. Just tell them that you have stopped being a 'waster' and have them read this guide. This program is for families, all members, even beginning school age (they begin by turning their own bedroom or playroom and bath lights off when leaving the room.).

Repeating; Start now. It costs you nothing for most of these tips. Make a 'hobby' out of it. You will find that beating the system is, among other things, fun.

### ***Human factors***

Literature and media, especially TV programming on the subjects that adversely affect us the most, especially in the pocketbook, should be the most prominent. They are not.

However, popular literature has affected us. Over many years, slick image advertising of high energy use products in both popular literature and on TV seem to have developed a mindset in the public that favors high energy use products. Especially automobiles.

Note the autos you see on TV. Powerful, new, expensive. Not like in real parking lots in your own location. The people (actors/actresses) who drive them appear rich, comfortable, happy. The auto commercials reinforce this image. Success as seen on TV and in any type of advertising equates to the ownership of a shiny new overpowered expensive gas guzzler. This principle carries over to other products too. Note the 'image' in beer and other commercials.

It is unfortunate that the public has bought into these advertising fantasies.

. On the 'wish list' of most any of us humans is the same as we have been seeing on TV for years. But somehow, it becomes reversed. The big heavy gas guzzler comes first. Success will follow. This is a baldfaced lie and the whole point of image advertising. Get the public to believe that they can't get along without some product in order to be successful and happy.

With the energy use realities we face today, this mindset has to go away. It's a fantasy viewpoint. With it, the obverse, the image of smaller economical cars or older cars as belonging to either cheap or unsuccessful people must go away.

This changing of the public mind has started with the rousing success of the hybrid cars, notably Toyota's Prius. And of 'plug-in electrics' – especially the minis in states where they are road-legal, and in Scandinavia and Europe. Thinking people are moving to lower energy use and alternative energy as a way to shift their hard earned dollars from dollars wasted through auto tailpipes and home chimneys and utility meters (and yes, down the drain as excessive water use) towards the things that really bring success and comfort for their families. Items such as saving with today's higher CD rates starting to come back, becoming debt-minimum or even free, future education for the children, or

retirement security. People are learning to do the simple grade school mathematics that save them money in the grocery stores and that expensive clothes or toys do not make a happy well adjusted child. Or adult.

People are learning that they don't have to 'follow the crowd' any more, or follow the fantasy of a brand name image. But this learning is making a slow start.

Here, in the Fuel Saver's Guide is a jumpstart on that. Use your own mind. It's a good mind (again, as proven by the fact that you are a computer user). Don't let image fantasy or fashion drag you around. You got a start here. Go for it.

### ***In the far future – 50 yrs from now - Where will power come from?***

The next stages of the depletion of fossil fuels will likely be heralded by fuel rationing, as happened during WWII. Then, each auto or truck owner was issued 'gasoline stamps' by the government which had to be given to the gas station along with the fuel's purchase price. No stamps, no fuel. Many of the older senior citizens remember this. Those who were driving in this country and in Canada during WWII.

The future may bring us a 'swipe card' similar to a store bought phone card for a similar use. When it's empty, like a phone card, it won't work any more. That person will have to walk until the next month's card is issued.

You may see this as a 'gloom and doom' prophecy. However, it is the historical way our government was able to provide the massive amounts of fuel that was needed to win World War II against Hitler and Tojo and simultaneously allow sufficient fuel to the civilian sector with the least amount of disruption of public function.

In the next stages of fossil fuel depletion, conventional fossil fuel of all types will be depleted to the point that only the barest of emergency services will be allowed to use it. Electricity will have to be the fuel source for the rest of the people. And – the massive amounts of electricity now generated by fossil fuels must, by necessity, switch to other sources, sustainable sources, to run their generators.

As it stands now, the world is rediscovering wind as an electric power source. However, population is growing and we will need massive amounts of power to feed this growth.

As much of the world's land area is politically or terrain-wise unsuitable for windpower, there is research going on now to find other sustainable sources of electric power. So far, results have been negative.

*Magnetohydrodynamics* (the Tokamaks) have only recently been able to put out a tiny bit more power than they consume. Billions of dollars have been spent to do this. Results are still inconclusive regarding the whole concept. Even if these do become viable, they will require huge investments of materials to build and huge investments to maintain. In the opinion of many including this writer, the yet unproven science of magnetohydrodynamics is going nowhere but to the scrap yards.

*Tidal power* is only available in a few coastal areas. This would take gigantic construction effort over many years, and the biggest project of this type envisioned so far in the US has been calculated to consume much more energy to build than it would eventually produce over 50 years of operation. Closing up the Bay of Fundy to make tidal electricity sounds good and also sustainable. The media seems to love the concept but it could never be cost effective. And the power produced would only serve a portion

of a growing New England. Not the 'Eastern half of the country' as distorted by word of mouth transmission (or in some cases, by the media). Small tidal projects may be cost-effective but there are many ecological (and financial!) reasons why other 'fuelless power' systems such as windpower should be developed in the same area first.

At present there is small mainly unfunded research going on in many parts of the world in a new area which is showing promise in the labs. For want of a better name, it is called '*cold fusion*'. Transmutation such as happens within nuclear facilities is taking place, but without the emission of radiations and without using radioactives. One form of this has been described as 'you heat up a closed container, measuring the heat input, and get more heat than what was measured going into it coming out of it, but nothing inside burns'. A different experiment happens in a thin film layer, measurable energy gets released. Neither type is a chemical reaction or phase change, or shows material depletion.

About 9 years ago one of these tabletop demonstration was set up at MIT Boston (Massachusetts Institute of Technology, the East's equivalent of Cal Tech). This demo performed well for its week long test period. The media, however, bypassed it. An article in Playboy magazine a few years before the demo gave cold fusion a black eye and ever since, the media won't touch it.

The people involved in this are PhD level, nucleonics or particle physics. There is a worldwide gazette where these people report their findings called 'Cold Fusion Times'. Reading the articles, the average college grad would understand about every 6<sup>th</sup> word. Even Tech grads, unless they are Nucleonics people. (11/09) There is another publication on the subject out now – periodical type - but haven't the name of it yet and it seems to not google from here. It is likely expensive)

This science is too young yet, and almost unfunded as well to come to any major findings that would impact the near future energy scene. However, if it receives major funding, advances such as operable hardware could happen fast in this field.

There are huge corporations controlling energy lobbies in all governments worldwide attempting to retain their 'status quo' in regards to the present main energy sources of fossil fuels. These 'powers that be' in worldwide energy distribution only see their own programs as being valid and will go to any means to prevent any new source out of their control being funded if discovered. Therefore, politics being in control of all countries, and being lobbied into a 'status quo' position on energy, the likelihood of even one country starting their brightest scientific minds on this quest for a new source is moot.

Scientific research has its own politics. That seems to follow the 'not invented here' or 'follow the leader' type of thought. As a result, the scientific community itself, except for a few independents such as the 'cold fusion' school, will not get off their haunches and open up discourse on possible unresearched energy sources. Neither will the big universities who fund these people.

What is needed is a massive worldwide effort, no expense spared, to find a sustainable energy source in the field of what is normally a science fiction buzzword, and that is *fusion*. Hot or cold fusion, it doesn't matter. Fusion is defined as direct matter to energy conversion. The implementation of Einstein's formula ' $E=MC^2$ '.

The matter of choice to be converted? You guessed it. Nuclear waste. A permanent solution to both HLW and LLW nuclear waste disposal. .

Actually, anything could be converted. Grass clippings, bottle tops. Calculations using the Einstein equation comes up with such a gigantic number of ergs, the unit of energy

measurement, suggest that, not to be facetious, a pot of cold coffee using this not yet discovered or implemented conversion principle could yield half of the electric power needed by all US homes for a year. A paper clip, if all of its atoms were converted into energy, would put out more power than the Hiroshima atomic bomb. But in the form of electricity.

The effort to develop fusion as a new source would need to parallel the all out effort of the 'Manhattan' project of WWII that sparing no costs, involving countless university and industry scientists and resources and even duplication of effort during some parts of the project, developed the bomb of Hiroshima.

As a project type this is what it would take. But there would be a major difference. No secrecy. Up to the minute findings communicated between all involved research labs in the world. Massive involvement of the scientific branches of all universities, and of all industry worldwide. Here, we would not be looking for something of military value, but something to feed the growing power hunger of the entire Earth. Something clean and green, and most of all, *sustainable*. Whether or not it be fusion.

But it hasn't started. And this search won't start until people, being fed up with the pollutions and the wars and the damage to the Earth's atmosphere, oceans, and land masses being caused by the present energy source, fossil fuels especially crude oil ask for it. We, the 'little people', have to advise our elected as to this vital priority.

The first step towards a sustainable future are that each individual person who reads this, along with their family, getting into energy conservation as shown here in this document and others similar that are picked up along the way. Don't listen to those uninformed people – even highly educated people who say 'It won't help globally' as this is not true in your case. It will certainly help you financially. Globally is a spinoff.

The second step is a massive switch to municipal, industrial, and home windpower, solar power, and geo power. All are immediate programs that can happen now and will benefit us in our lifetimes and in our children's and grandchildren's lifetimes.

**Yes, you can do both of these steps now.** You now have sufficient information for the conservation part. There is also a good start here for alternative fuels in your life. And you have power in both your ability to back proven pro-enviro candidates (not just promised, but proven) and in your vote for candidates that when elected will push to mandate the second step.

These will not only be a benefit to you yourself, but multiplied by the millions who will transmit and receive this document by forwarded Email attachment and 'free CD copy' and by thumbdrive learn about this also and implement this in their own lives, the sum total effect being a significant benefit to the planet. This is an 'action' program, not just 'book knowledge' to store up. All who read this will act on it in part, and slowly phase in more of it, as saving money makes sense to all intelligent people.

Again; The first step is to use the knowledge enclosed here to save money for yourself and to let others know how to do that also by forwarding this Ebook. Print it out. Share it with other people by print, by thumbdrive, by CD copy, and by email attachment. Let them know the web address where you downloaded it from. Print and distribute the 'website cards'. Make CD copies and give them to your friends. Mail them with your Christmas cards. CD's in bulk (100 lot) are cheap, perhaps 15c. Is a friend neighbor or relative worth that?

The future is up to you. Through the proliferation of this document and your communication with your local government, your Senators, your Congressmen and local govt officials. We need fuelless windpower. We need solar power and geo power. Beyond these, We need new sustainable energy sources. We need them **now**.

## **END section I**

## **Section II Additional Resources**

### *A little mathematics*

C'mon. Get real. I'm running a computer and you want to do baby talk?

All grade school stuff. However, applied a bit differently. Applied to real life to help you save a few more dollars here and there. Giving a couple of examples;

Every metalworking machinist in the world has a 'quick lookup' table that gives decimal equivalents of fractions and vice versa. Experienced people in this trade don't need the table, they have it right in their heads. It's easy to learn this head math. The secret is that everything a non-machinist needs of this table is based on the thirds (.333) and sixteenths (.0625) and eighths (.125) and derivatives such as quarters (.125x2=.250 = 1/4) Look at a table closely, you will see a pattern there. Believe it or not, this can save you money in the supermarkets. Instances;

Oranges are on sale this week, 6 for \$2.00. How much each? (Is this a real sale or not?) Easy – the answer pops into your head. That's 3 for a buck, 33.3c each. But how does it pop in there?

What you actually did (likely without realizing it) was to (1) simplify the problem quickly as the number is a nice 'divide by 2' – then you inverted the resulting number – 3(oranges) divided by 1 (dollar), (3/1) becomes 1/3) and converted it to decimal, expressed it in 'money' form. (\$.333 or 33 1/3c). Think about that process. Simplify (if necessary and possible), Invert then convert. Often you must do the same thing a little different but it's still the same 'quick head math.' process.

Giving the example here of 3 items for \$5.00. Obviously, over a buck each. No need to simplify. Invert makes the number 5/3 (5 thirds) which expressed in money is also over a buck. Convert makes it 1 2/3. The 2/3 converts to the decimal .666 or 66 2/3c. So it's \$1.67 (\$1.666 rounded off)

### ***Simplify – Invert - Convert***

If you've never thought of it this way and don't know your decimal/fraction table, carry one with you. Practice makes perfect. Or carry a calculator  $5/3=1.666666 = \$1.66$ .

There are quite a few people shopping in the markets using calculators but you won't notice them until you are aware of that and start looking for them. Sometimes a lady who looks like she is fishing in her handbag is actually using the calculator inside of it.

Another way to use that calc is to determine cost per X units, oz or pounds on items which are not marked with unit pricing (such as produce). Once you get into this 'math bit' you will see other applications of the same thing. The stores use calculators to figure their profits. You will be using one (or 'in your head' math) to minimize your expenses. You now have a true figure to compare the price with other markets or sources.

Yes – this will certainly save you dollars in the markets. But how does this simple mathematical 'trick' among others based on simple Junior High School math save you on fuel?

Example; Going to a store that is miles away from your regular store just because it has a sale – the oranges as an example. If you factor in the price of gas to your expected purchases it may not be a sale at all, just more driving time for you and perhaps a loss.

Remember, it's a round trip with the first 5 miles of each leg (going out/coming back) getting about half of your normal 'city' mileage due to 'cold engine/chassis' driving.

If your vehicle gets 20 mpg 'city' and the store is 10 miles away with no throughway travel, that a total of 20 miles round trip, 10 of them (cold miles) at 10 mpg the other 10 (warmed up) at 20mpg. That 10 mile away store at today's fuel price (\$4.00/gallon as of 6/08) will cost you (looking at the fuel chart on page 4) 40c/mile for 'cold' miles, and 20c/mile for warmed up miles. That's a total of \$4.00 +\$2.00 or \$6.00 for fuel (not the \$4.00 that you quick estimated). Oranges are normally 50c ea. 3 for \$1.50 Each one you buy you save 16.7 (17c) as comparison (.50-.3333) equals that. Buy 10 you save \$1.70. But pay \$6.00 for fuel. And when you get there, they might be just juice oranges.

(edit note; 4/09 We round off the figures and use nice round numbers to show you the principle. If you use a calculator and known numbers of your actual MPG and mileage you will get a true answer for yourself (only) that is quite close to and in proportion to the above example with an average vehicle. With a guzzler, fuel cost will be higher and with such as a hybrid it will be lower than the example.

Using a scooter or LSV don't even bother with the 'driving' math, it will be peanuts. LSV's and scooters cost a penny or less a mile to run, Only thing you lose is travel time. And . . . if it's a nice day, the ride is fun so you don't lose time, you gain fun.

This is the major reason that we recommend doing all shopping close by and concatenating all shopping to one day (perhaps every 10 days). There are several others but not getting into them here.

Here's the other part of the way to save a good dollar on grocery items. Suggesting to all readers that they get on the mailing lists of all big grocery stores within a 5 mile radius. Better still, the ones in the same direction fairly close to each other. (In this writers location, there are 7 different franchised large grocery markets plus Wally's within a 4 mile radius, 5 of which send weekly mailers)

Go in and register at the service desk of every big market within 5 miles. Getting a check cashing card puts you on the mailing list. Weekly, get these flyers together from your mail and pick and choose bargain priced items, make a list for each of those markets on one sheet of paper. Then, having a list showing all the bargains at every market, shop

them all together at the same time on the same trip. Concatenate the weekly grocery sales and simultaneously concatenate the grocery trips. Now, all put together, you save big. This writer has been doing that for perhaps 30 years, - much of that carpooling with a friend or using an electric vehicle to save even more - and estimates that thousands of dollars and hundreds of gallons of fuel have been saved by the process. And the shopping flyers go into the recycle bin here, again helping sustainability of the planet.

One more 'quickie' on the same subject. Every area seems to be sprouting what is best described as a 'yuppie and rich people's shopping malls. Some have grocery stores. It has been found by more than a couple of ECFSC people that there are no bargains at these malls, they seem to prey on the 'hi end' income people in their areas, those who don't 'count the cost'. Another, the obverse – shopping areas for 'working class' people are apt to have the better prices.

And... there are 'price clubs'. If you grocery shop bigtime, investigate these. Sam's Club, Costco BJ etc. But don't 'overbuy' at them. Some prices will be better among regular retail stores that are more flexible as to area competition. Always compare with other stores before you buy. Especially with items that need service policies to extend warranties. Policy periods and costs are not the same everywhere.

It's not about being a cheapskate. It's about common sense.

Smart shopping / smart thinking / smart use of dollars makes sense.

### ***Thinking yearly***

This is what all industry, even small business and all municipalities have to do to survive. Before these entities do anything, they count the cost. If they ran the way many people, even many families do, they would soon go bankrupt. As many people and families have.

Individuals, even families today mainly run in a haphazard manner. This starts by buying items that appear affordable but in truth, only lead to more consumer debt, the digging of a financial black hole and jumping into it with no way out.

Basically, in an individual or family situation, unlike big industry, there is no need to have professional bookkeeping skills or make reams of paper projecting yearly costs. Applied Jr High School mathematics and the use of a hand calculator, and an old fashioned ledger book and a scratch pad will do. And it can start any time, not just at the years beginning, and is done 'on the fly' (as needed). Don't bog yourself down attempting to estimate the coming 12 month's expenses, percentage losses and gains etc. Just find the leaks you have in your own expenses now and plug them up.

There is a principle applied to personal or business finances of any type that goes '*if your outgo is more than your income, your upkeep will be your downfall*'. Income as stated here is net paycheck(s) and any other funds coming in, and outgo of course means 'total expenses'. Downfall of course is escalating, useless, and expensive consumer debt. Once in hock to the credit card outfits, which happens to many people, it is almost impossible to escape. But there is a way.

It is not our purpose here to give a course in individual or family bookkeeping. Our purpose has already been well defined.

You have already been given many good examples in this guide of how to cut that 'outgo' down by doing things that you may never have thought of before – which at first seem to be trifling tweaky little things. But when added together and thought of on a yearly basis, these add up to serious money yearly.

A person implementing these tips and examples will start to see it as a bit more

balance in each monthly bank statement. The one you use to pay your living expenses, utilities and gas/supermarket credit card with. The amount is variable and dependent on the number of different 'energy or dollar' saves' you implement. It won't show as a 'blazing star' because bank statements are monthly you will only see 1/12, less than that the first few months you start implementing these changes and this is hard to discern, as in most cases it is within normal variation in that account. The upward curve on this is not linear. The upward trend of this curve rises as over the weeks and months, even years you continue to implement the same 'tweaks', keep on doing them and adding new ones.

Many people don't know this as it's not in print anywhere this writer knows. However, it is a major reason why many people 'give up' on any sort of saving program. They will implement a couple of money savers they see in perhaps AARP or Readers Digest and look for it's result in their bank balance. They see nothing for say two months so quit. Two months is only 1/6 of a yearly gain on only a couple of small tips and would be within normal variation of most accounts. These people would be better off if they didn't look at the difference in balance at all, they would have continued that program.

A heating fuel save only shows in the winter. Cash gasoline buys will show as one less bill to pay (gas credit card – or less balance owed on your regular card. That is, if you still use a card for gas which was recommended against previously).

***You will only see this increased bank balance if you can resist the 'all too human' urge to splurge which blows away the accumulating saving.*** A small surplus growing monthly into a larger bank balance than is normal for that account. In a relatively short time it will equal an extra week's pay (but tax and FICA clear, non taxable). Continuing the program and adding tips will enlarge that non-taxable 'phantom paycheck'.

This requires an iron will. Patience. Here you must learn again, as you likely did as a young child, that pennies grow into dollars, dollars grow to tens, twenties, fifties and hundreds if left, unspent, in the bank.

**Don't fritter that money away. The most efficient thing you can do with it when it has grown to an appropriate figure is to decrease the amount of consumer debt service (interest/ finance charges) you pay.**

In other words, pay off your Visa or other card accounts as they are charging you *a lot* for owing them even if you buy nothing new on the card. If you don't owe on a card, decrease your debt service (interest charged to you) in other ways, perhaps by getting a 'payoff figure' from the company that handles your automobile financing or auto insurance. Most companies – even banks - give a figure lower than the total of payments if paid ahead. (Some don't want to lose you as a cash cow and actually charge you more than the total if paid ahead. Beware – refuse that figure and when finally paid, never do business with that company or finance company again!)

An option would be, if your financing agency allows it, would be to 'double pay' each month sending two payments. But if you do, save your 'proof of payment' in case their records can't keep up with this inflow. If you don't keep good records of items like this, perhaps it's time to start a ledger book rather than relying on your checkbook. This family has a ledger and uses it. All bill pays go into it. A benefit for those who don't – a ledger book makes it easier to track energy and utility savings. DO NOT rely on a computer. A computer can go boom. A ledger book can't.

‘Pay in full’ can’t be done immediately, as it will take a year or so for an appreciable ‘surplus balance’ to grow. Consumer loans are expensive. The point is to not make any new ones and as quick as possible, pay off the ones you already have.

After this has been done, perhaps even during the ‘double pay’ period, that surplus balance (which will still grow as you are still spending less on energy and implementing more tips) can be used to enter into other forms of energy saving as well. For instance insulation, a newer more efficient heating plant or even an alternative such as solar aided domestic hot water. Perhaps it will be large enough in time to leverage you into a new (or by that time preowned) fuel efficient hybrid. Impossible? Put a calculator to work and see how much debt service you pay yearly. Results will surprise you if you are an average family. If you can pay off the cards and put NO debt service money in the finance company’s pocket you will, instead, keep ALL of that money in your own.

Again, the first thing you must do is to lower – or better, eliminate completely – your consumer debt. It is not efficient to pay in the vicinity of 20%, one dollar out of five, as a ‘service charge’ and interest on your revolving loan for mainly household items. To pay that same loan, a continuation of it, long after the item you originally bought on it is worn out or even thrown away. Yes, that payment if regular enough helps your credit score. However, the point is to make a change, to be able to run your household (or individual life) so as not to normally need credit, to be your own banker. The goal is to slowly grow and maintain a bank balance big enough to draw on if say you need a bigscreen TV or car repair or some other unexpected item. Also, to have a savings account or one or several short term (a year or two) CD’s that grows through interest. (only about 2 points now but it was about 5 several years ago. (10) It is slowly rising presently. Check ‘federal credit unions’ for these they can do business with non-federal employees now.

Many people have run their lives so as to be able to do this CD thing including this writer and several other ECFSC participants. (If your checkbook balance becomes ‘excessive’, lop off several grand and open a new CD with it for more % interest rate.)

If you want to go on vacation, or buy a big item, by all means use the card, but be sure to take advantage of any ‘no interest for 30 days’ offer and pay it off from your expanded bill pay account when you get home. If you don’t, as of the 31<sup>st</sup> day you will get a ‘surprise’ unnecessary expense. Note that computers count weekends even holidays as ‘days’. Real people no longer are involved in any efforts to extend a time limit.

In the same category, monthly bills. Never pay them late. The ‘demand and interest’ (late payment fee) on a homeowner’s quarterly real estate tax, water bill, or motor vehicle excise or mortgage is no laughing matter, a totally unnecessary expense as long as you keep aware of due dates – better still, pay the same day you receive them in the mail. All household bills; the key it, prioritize.

Exhorting you to ‘think yearly’ and count the cost in other matters as well. Drop expensive habits, even if it means gently saying good bye to people - even relatives - who use you, or cause you to spend a pile of money.

Example here in New England, a friend invites you to take a day trip with them to Foxwoods (a huge casino in CT). The odds are that it will cost you bigtime. Gambling is not fun, It’s time consuming work which costs you money. In the long run it is always a major expense even if you win. Which is rather rare. (If you want to gamble, it could also be an addiction and there are support groups and cures for that, seek them out) (A lot of people have satisfied their gambling urge by playing penny poker, kitty whist,

hearts or blackjack with friends on a regular weekly basis. Keep it at a penny, never escalate even to a nickel..... you could lose some friends. Or money, or both.).

A lot of the common pursuits of the average person (parties, football games, chic restaurants, rock concerts, designer clothes from yuppie shops, gambling etc) are in reality, totally unnecessary constant drains on the bank account. Choose instead, economical forms of recreation and vacation. Don't be a sap for a sales pitch. Or run with 'expensive' crowds.

Establish yourself whether an individual or family into a sound financial position as a priority using your own bank account to do it rather than depending on any corporate investment promise. And get a decent IRA or other retirement plan. These too are interest bearing but on the whole, non-taxable.

All the better to meet the struggles of the future as the costs of living, especially energy, rise.

## **END section II**

### **Section III**

**Recommended reading** Most available through Amazon or Barnes and Noble and other booksellers. But check your (free) public library first.

#### ***SUPERSHIP The story of the supertanker By Noel Mostert***

isbn# 0-394-49480-6 Published by Alfred Knopf inc, NY distributed by Random House Inc, New York Copyright 1974

This book takes you for a trip on Ardshiel, a British registry supertanker. Even though the copyright date is old, the entire report is the same today. However, today's supertankers are much larger and there are more of them. A 'must read' to understand the transportation of crude oil and the reasons why for the good of our oceans and atmosphere it must diminish or even cease. LNG tankers are also discussed here.

#### ***THE HYDROGEN ECONOMY The creation of the worldwide energy web and the redistribution of power on Earth. By Jeremy Rifkin*** printed 2002

This has a misleading title. It's really about OPEC and the politics of big oil. Bin Laden is mentioned along with a gaggle of others having to do with oil's upward spiral. The 'hydrogen' part of this is meant as a primer as this is mainly a study in politico-economics relating to energy. At any rate, hydrogen is seen now by the engineering community as only a temporary solution to only a few of the world's energy storage needs. If you run across people who try to blame our government, even our President(s) for our high fuel prices, ask them to read this book.

***THE EMPEROR'S NEW HYDROGEN ECONOMY* Daryl McMahon.** General alternative energy – including the reasons why the much touted ‘hydrogen power’ is not, and never will be a world solution for energy storage. Available from Barnes and Noble website or from website listing below.

***ENERGY TECHNOLOGIES and CONVERSION SYSTEMS* Keinbach-Salvagin**  
isbn 0-13-277344-99-00 copyright 1986 Prentice-Hall

College level (but an easy read) overview of different alternative energy systems many of which were developed – or studied and improved in response to the 70’s energy crunch. A good starting place for those interested in alternative energy.

***PRODUCING YOUR OWN POWER*** 1974 Rodale Press isbn 0-87857-08808 (in the organic gardening farming series) As above, for home and farm. Includes construction details of a quite decent flat solar panel design for domestic hot water on pg 229-232.

This writer built one almost identical using corrugated panels from a wrecked garden shed and other ‘recycled’ material well before this '74 period. Total parts cost bout \$100. Energy save, \$15/month off the electric light bill, as hot water heating was electric (back when electricity was 7c a KWH). This ‘home handyman’ project is one of the major ‘energy cost cutters’ which can pay back it’s own cost in less than a year.

Homeowners, if you’re not all thumbs and you can solder copper pipe fittings and can do reliable (and code approved) potable water plumbing you gotta try this. It’s quick, cheap, and works super. Incidentally; in MA there is no need for a permit for minor homeowner additions to supply plumbing – and of course the electric part is 'plug-in'.

Contrary to popular opinion, solar panels need not be on the roof. Mine were on the ground at the proper azimuth and elevation. Anything you put in the sun is going to get hot. The trick is to design it to get real hot, make it big enough to do your job, and to take the heat, with minimum loss, indoors to be stored so it works at night too, and put it to work.

A tank full of domestic hot water being heated is it’s own ‘storage system’ which makes solar hot water the easiest and cheapest solar system to build. (Piping diagram used here, but with a small electric 'zone' hydronic heating circulator added to the loop and timer to run it from 10 to 3 days is in this book, pg 238. Piping around the added tank for heat transfer to the domestic water was bout 100 ft of heavy duty garden hose wound tight semi flattened out then the whole thing was insulated with fiberglass batting. Circulating fluid was boiler (not automobile !!) antifreeze solution). (auto antifreeze gums up hydronic circulators in a short time) (A separate tempering tank as mentioned here previously was a first stage before the solar heat exchanger tank) (Both tanks came from the dump.) The warmed (or even real hot some days) water then fed the electric heating tank input instead of cold water. This is the way that all solar hot water systems work to assure you of getting the same temperature of water every day, rain shine or snow.

One thing not said in any builder’s plans; Cover your panel so the sun won’t shine on it until your water is circulating to cool it. Otherwise the collector will get hot enough to burn you and to melt plastic.

Also, green blackboard (chalk board) paint proved itself more efficient than readily available flat black paint for the collector absorbing surface. Particle size of the pigment of special black solar finishes are different than those of commercially available flat

black paints and the particle size of this green blackboard paint did the trick about 20% better than the flat black on the market then. For the electrical/electronic/tech crowd; A solar hot water heating panel is only a heat sink built to sink the sun's heat to your domestic hot water tank's cold feedwater supply. Simple and not even slightly technical. (Solar air heating is also covered in this book in a simple non technical way.)

**MOTHER EARTH HANDBOOK OF HOMEMADE POWER** Mother Earth Press, from the '70's energy crunch' era. This one emphasizes the home handyman / backyard mechanic construction / application of alternative energy. Great general reference. A thick paperback red cover many libraries still carry it.

**THE HOMEOWNERS HANDBOOK of SOLAR WATER HEATING SYSTEMS** Rodale, 1983 ISBN 0-87857-444-1 or 0-87857 445-X. great for professional installers of water and PV panels. 246 pgs, antifreeze system as described here on it's pg 31. All 'collector orientation' data and shadow prediction methods and formulae given here for all US and Canada installations. Note that most normal installations do not need this shadow prediction math/geometry, only the difficult 'crowded by buildings and trees' installations do. Or this can be found by observing and charting/marking shadows both summer/winter, of course figuring in the height of your South tilted panels.

**IN THE 70's ENERGY CRUNCH PERIOD, A DESIGN CAME OUT CALLED THE "ISC SOLAR FURNACE"**. A book was written about how to build it, a paperback. This design was somewhat like a garden shed in the back yard with an oversized angled roof/wall and a cellar, with it's south facing angled roof/wall being the collector and the inside and cellar full of rocks to store heat. Head size rocks in the whole building were heated by forced circulated air from the top to the bottom of it's cellar distribution channels and it could use that hot air as-is or heat exchange it to water (using built-in 'de-insulated' hot water tanks) to duct or pipe the heat to where it is needed. All of the cellar storage area and shed were heavily insulated. Heat stored all Summer and Fall would be added to winter sun. A great design, easy to build. It could also be built entirely above ground, works as well but with less heat storage.

It had one problem, found only after several people built them. The heated air in the whole system would get moist from slight ground or roof leakage and cause mildew in the airflow to the house. Therefore recommending no air exchange with the house, only circulating boiler antifreeze/water to transfer heat to the house and domestic hot water.

Unfortunately, moved and lost the book so no publisher or ISBN data. Perhaps you can find it. Or even using the sketchy description here build one. (note – slightly tilt the cellar floor towards a formed sump and put a 1/2" pipe with strainer in it to 'shopvac' out any water infiltration. Plans did not have that improvement – builders developed it. Another caveat, thoroughly wash the rocks before they go into the building, also any door leading into it should be heavy well insulated and weatherstripped. Rocks above ground should be restrained from movement sideways as there is expansion/contraction going on which eventually will 'bulge' the building, losing it's airtight integrity. A small vent should be in it, screened against insects and vermin, and aimed downward to prevent water infiltration. All materials used should be 'outdoor rated' and don't use chipboard anywhere in it. This can be used to extend your present 'solar hot water' season to all year round and huge additional capacity if it is not presently large enough for your needs.

**LOW CARBON DIET /LOW CARBON LIVING** Empowerment Institute NY.- Ecoteam- By David Gershon. ISBN 13: 978-0-9630327-20 ISBN 10 0-9630327-2-0 copyright 2006. An exceedingly easy to use and to understand workbook for all ages and group types. This both teaches an individual how to lower a family's carbon footprint, mainly by energy saving, and recycling, contains check blocks and other fill-ins to add up and calculate the amount of global warming gases that these actions have removed from the atmosphere. A great action program for enviorgroups, schools, scout activities summer camps, adult enviro education etc. Group purchases get a discount.

All you need for the program is a workbook for each individual, there are no other costs. Best yet, a single individual can do the whole program themselves, this is not necessarily a 'class' activity. Then start a group, go on to teach others. See website listing.

**BLUE COVENANT** – The Global Water Crisis and the Coming Battle for the Right to Water By Maude Barlow. ISBN 978-1-59558-186-0 copyright 2007 Water is threatened too for many reasons, especially potable water which takes energy to process and distribute it. Don't take this as 'just another gloom and doom book, as there are answers locally and globally, such as watershed protection. Governments worldwide need to act. And the answer *is not* 'privatization' ie corporate ownership of water rights and distribution. The 'big money boys' want to do this everywhere. Don't let it happen.

**The PARTY'S OVER** – Oil, War. and the Fate of Industrial Societies by Richard Heinberg ISBN 13: 978-0-86571-529-5 or (10) 0-86571529-7 copyright 2005. A striking cover picture, a man with a gun to his head about to blow himself away, but the gun isn't a gun. It's the fuel nozzle of a gasoline pump. Need not tell more.... but this is heavy on 'what shall we do in a future world without oil?

A good look at the Hubbert mathematical analysis of our underground oil reserves in this one. Applied science and math. A look ahead giving resources and alternatives, not just 'gloom and doom' forebodings.

(edit 10/09 – a lot of financial news lately about companies who are seeking and have found new oil reserves. How long do you think that they can continue to find them? And development (drilling pumping etc) being capitalized at today's rates, how much will any new fuel from them cost us? Don't be misled by media reports of what is certainly fuel industry whitewash of an inescapable truth - that underground (or undersea) fuel is a non-renewable disappearing natural resource.)

**LIVING WELL IN A DOWN ECONOMY FOR DUMMIES** Tracy L.Barr copyright 2008 ISBN 978-0-470-40117-0. All sorts of stuff here not particularly dealing with fuel or energy, but a potpourri of little known tips, lifestyle changes, job seeking tips, educational items and freebies. Part of the well-known 'for dummies' series. Any bookstore handling the series, if it is not in stock, can order it for you.

**ENVIRONMENTAL GEOLOGY** Carla W. Montgomery, Copyright 1986 – edits through 2003 and ongoing. ISBN 0-07-366195-3

A college book for Earth Science majors. This clearly written and beautifully illustrated 'coffee table' size book among other things shows the mechanics of the Earth's changes including volcanic activities, plate tectonics, glaciers, deserts, polar ice melt, seal level rise, air and water pollution, even goes into environmental law. Comprehensive as to the

only planet that we have, this Earth. If you, after downloading or otherwise receiving a copy of this fuel saver's guide, still think that the present enviro crisis is political hokum, read this book. It shows the scientific basis of how people are affecting the stability of both specific local areas and through that, the the entire Earth. Instance; the South Sea islands (Micronesia, etc) are getting smaller and will eventually become uninhabitable due to tidal current changes and sea level rise this book shows why.

**EZEKIELS MEDICINE.** By S. Coffman Just published 2010 no ISBN yet. Getting healthy, staying healthy. This treatise, well documented, eliminates the laborious chore of sifting through oft-conflicting claims regarding various vitamins and the so called health nostrums, many of which are quite expensive. Doctors also are expensive.

Nothing is sold here, everything needed by the average person available readily at, for instance, Wal Mart or Whole Foods etc supermarkets and not pricey. Book is listed by Amazon .Com and can be ordered from there but is not available everywhere.

Note: Googling this you could come up with something else entirely, not related to it. E M appears to be a multi-purpose website but try it anyway, the book may be on it. Seems to appear and disappear if you search for it by name but try anyway. This writer, even though a healthy Sr citizen, picked up on a part of the above program with a good multi and a separate gram (two in winter, total 2.5 grams) ascorbic acid (vitamin C). - also a tablespoon of sunflower oil daily. Also, especially, avoiding a food colorant called 'red 40' and a bunch of other listed items. From this writers experience, the program has kept winter colds and flu away, and other colds all year long.

There have been many books published recently on the subject of energy and especially alternative energy. These are mainly college texts for engineering courses. Another series of books are for the installers, practical guides. These all tend to be expensive and are not presently available through public libraries. However, an internet search will reveal these if you are interested in digging deeper than this guide covers.

Recommending the 'easier to get' publications listed here first. The info itself is timeless, there is 'nothing new' in the newer unlisted books that will help the homeowner, although they will certainly be of much value to the student, engineer, or contractor.

### ***Resources for energy saving hardware and information;***

This fuel savers guide is by no means a complete reference. Neither is this resources section. Inviting the reader to investigate further, make the gathering and implementation of info on this subject a 'hobby'. It's fun, It will all save you dollars, and at the same time, be good stewardship of the Earth and it's sustainable future. Apartment dwellers who intend to build or buy in the future will certainly be able to profit by having this additional knowledge to help make a wise buying choice. So will building contractors.

***All over the country*** there are such as called 'Earth Day shows' (Earth Day was Fri Apr 22 in 05,. the shows are usually on the Saturday closest to Apr 22nd) or 'Energy Fairs'. (which can happen any time of year) These are apt to be on the premises of, or allied with universities or area 'green' or 'Sustainable Earth' organizations. The big show South of

Boston on the Coast for instance, is on Earth Day weekend (the Saturday closest to April 22) and is called 'Sustainable Living Festival' in Hull MA sponsored by Sustainable South Shore. (08) attendance, a bit over 3,000 people. (09) Other cities and towns local to Boston are starting to have their own energy related shows. Seek these out in your own location.

There is much to be gained by attending these shows such as local sources of hardware for solar and energy saving applications, demonstrations of new products in the field, and hardware manufacturers literature. Scooters, electric scooters and bikes, hybrids etc, organic gardening and organic food suppliers, contractors who install solar systems and even builders specializing in green designs are liable to have displays. There are also apt to be short free seminars on many energy-related subjects along with educational activities for youngsters, food, and music to make a fine, inexpensive, and educational family outing

In Hull MA, there is a bonus. Across the street from the show there is a huge indoor merry go round for adults and young alike, usually open for the show date, and the area is well known for it's many fine restaurants, especially seafood, to fit any budget. And on top of that, visitors to this show will be able to take a short side trip to see and photograph two municipal wind turbines in operation in the same town. Hull 1 (see poster included below) invites people inside the tower during show time for a nice informative talk on Hull's wind machines plus a 'question and answer' session by the town's power board engineer. It is a feature of the show.

The organizations that run all of these shows anywhere are headed by people of forward vision looking to the future of the Earth, the only planet that we have. Not only energy, but the planet itself must be made sustainable for future generations. Don't put these people down as 'hippies' or 'fringe radicals', or joke about them as 'tree huggers' or 'world savers'. That's exactly what the fossil fuel barons want you to do. Many are degree engineers, Earth scientists, or educators who understand the long term effects of global warming on climate and weather change and sea level rise. These people have the solutions as to what the general public must do to help ramp these effects down.

This energy revolution is not political, neither left nor right wing, nor is it any political party's platform. It is mainly individuals, families, and both large and small business people mainly unknown to each other finding new ways of saving dollars on fuel costs.

It is also a loose coalition of concerned people, each doing their own part of what is necessary to achieve a sustainable planet for the future of generations yet unborn, and educating the public without charge so that each person will have the information necessary be a part of this effort. These are the 'sustainable' and 'green' groups. ECFSC, the all volunteer coalition who produced this fuel savers guide, is such a group.

There may be a group like this in your own area. If so, you might like to attend a meeting, perhaps join in one of these independent groups. Meeting times and places are often found in the 'what's doing' sections of local papers. Note the website listing for MA which lists many town and area groups. Google your own area for enviro oriented sites which may have similar listings. And check the 'what to do this weekend' section of the newspapers, especially before Earth Day.

**In New England;** (and likely under other names in other parts of the country)  
Altwehls, New England's largest alternative transportation show. This show from it's

very beginning and throughout it's history has greatly helped to popularize the concept of alternative vehicles, especially hybrid automobiles when little was known about them. Presently (09) the show's focus has switched to 'fleet' vehicles both large and small. Their website, even filled with photos of previous shows, could not possibly display all of the innovations in ground transport that had their premier East Coast public showings here.

**Energy Shows or Energy Fairs.** In New England, NESEA (Northeast Sustainable Energy Association) has a yearly 'contractors' energy show called 'Building Energy'. This runs 3 days in midweek at the huge expo pier in Boston, showcases the latest energy saving hardware for buildings and homes, also energy efficient building materials. Date is on the NESEA site each year. The focus here is sustainability - with short (up to an hour) seminars on how to apply different mfg'r's products to new construction and to retrofit the new materials and equipment.

Seminars require advance registration, and have an admission fee but the floor show (at general admission cost, less than a movie) is the real attraction here. At least half the show was demonstrations of different systems by various manufacturers whereby a home can be made to produce it's own electric power, fuelless hot water, and even it's own pretty close to fuelless heat, both in new construction and retrofit. Energy saving upgrades of all types were demonstrated. The movie 'Transforming Energy' had it's New England premier at this show, a free auditorium showing to attendees, many who afterwards bought the CD with performing rights.

Both active and passive solar is king here, with second going to small wind turbines starting at 400 watts to the multi kilowatt 'home and farm' range. There were a whole gaggle of energy savers too, such as advanced insulation. Some was for 'big commercial building' contractors as well as home builders or homeowners. Much of the hardware could be installed or implemented by a fairly proficient 'do it yourselfer'.

Midweek shows are apt to be sparsely attended, but this one had a fantastic crowd, all prospective or ready customers from as far away as New Jersey wanting to bone up on these new technologies. This year, (07) the show has it's third day as 'public admission' day (not limited to preregistered builders) on Mar 15<sup>th</sup>. Look it up for following years on the NESEA website (listed). This type show is the bellwether of more to come all over the country and Canada. Watch for them. The 70's energy crunch had energy related shows. This era's crunch will certainly spawn more, all over the country (and all over the world)

### ***Hardware dealers and farm suppliers are involved in home energy improvement***

National chains such as Home Depot, Lowes and Ace Hardware have pamphlets, even free seminars on how the homeowner can increase the energy efficiency of the home. This saves money compared to contractor installation of the same hardware. Farm supply catalogs and stores offer many new insulation products, pellet and corn kernel stoves etc.

Manufacturers of energy saving items and alternative energy hardware have brochures. Considering building? Some architects specialize in low energy use designs using both older well proven techniques as well as this new technology hardware.

There is much good stuff out there that wasn't out there even five years ago. Solar

powered attic fans, grass seed that needs little water and less mowing, super efficient insulation, LED and CF 'whole house' lighting, solar heated hot tubs and a bunch of etc's. Get on with this stuff. Do the shows. Get the literature. Choose a clean green lifestyle. It helps you. It helps the planet, it helps the US economy. Everybody wins. Nobody loses!

### ***County library systems***

Many libraries in any given area are connected by computer so that a person can access the whole system, and have a book delivered free to their own area library. There are many books on all aspects of energy in libraries. Much was written in the 70's 'fuel crunch' period that is of value today. (See above book recommendations, only a sample).

Back issues of National Geographic' magazine have much documentation in regards our planet's changing weather patterns, ocean currents, sea level rise, and other physical evidences of the phenomona generally known as 'global warming'. And of course, now that the subjects have become popular, new books are being written.

### ***Movies***

Highly recommend seven movies, all available on DVD. For sources, see the website listing on the following pages. There are more, google the subjects. However, these *seven are 'must sees'* to understand the total picture regarding the damaging effects of fossil fuels to our planet, as well as the global efforts going on to ramp them down. They are particularly valuable for classroom or school auditorium showings

**(1) An Inconvenient Truth.** This gives documentation regarding the effects of global warming. The media in general will not touch this controversial subject. If they do, it is with bias. Get the information here, unvarnished and accurate.

Edit note 4/08: This is the first one that should be viewed, as it helps to understand the reasons why we need the others. Mainstream media panned this movie 4 short years ago. They have changed their tune. Global scientific investigation has since proved that it's not a laughing matter now.

**(2) Transforming energy.** This one is about the absolute necessity of alternative energy as a solution to the problems of global warming and the end of cheap oil and gas. It clearly shows that we can, and we must eliminate our dependence on fossil fuels.

By Chuck Davis. See website listing. 1 hour.

**(3) Who Killed the Electric Car.** This tells the story of GM's highly successful EV1 Plug-in electric sports car and why all of them were recalled from lease, never hit the open market. (Regardless of GM's recall and crushing of these vehicles, plug-in electrics are out there now on the highways and are being built by others, so the electric car is not dead. Only GM's are, and California's tough emissions law has had it's teeth pulled through GM's political clout) The implications, political and industry wise, of GM's move are something everyone should know about.

(10) Thank you GM for 'reversing this curse' and coming out with the VOLT.)

- (4) **Six Degrees Could Change The World.** Here, we see how global warming has already affected different parts of the world including the coral reefs of Australia, the ice fields of Greenland, and the Amazon rain forest., all vital parts of our ecology. Clearly shown, how existing technologies and remedies, when applied, can help to dial back the global thermometer. A National Geographic production aired on the National Geographic channel. ISBN listed, 978-1-4262-9402-3 90 minutes
- (5) **Kilowatt ours.** Shows you how to save energy and reduce your carbon footprint. This movie is being shown, among every other that appears here, publicly by local 'green groups'. 55 minutes.
- (6) **Human Footprint.** Our carbon footprint. What we consume, where it comes from and how much does the average person use in a lifetime. **Not** dry statistics but delightful live and animated examples using typical products themselves. Great for primary school showing, informative even to the longtime environmentalist.
- (7) **Saved by the Sun.** Our children yet unborn are subsidizing our excessive use of energy. PBS – Nova
- (8) **Crude Awakening.** On Netflix, our underground supplies of oil.

(5) (6) and (7) For these and other environmentally oriented CD's, check out both the National Geographics website and the PBS (public broadcasting, aka educational TV.) websites. PBS here is **shop.WGBH.org** Your own local PBS may have a similar site. All enviro movies from both of these sources are recommended for public viewing.

**An additional CD** of a bit different category. The 'Cape Cod MA' group, Clean Power Now, which is the advocacy group for a proposed (and in finally successful political negotiation now) offshore windfarm, is offering a CD which shows, among other things, part of a group-sponsored trip to Finland's offshore wind farm.

Also, CPN is the source of several 'windpower advocacy' items including tee shirts, bumper stickers, round 'windpower yes' auto side window or even people stickers. These all carry pictorially the clean power now message with wind emphasis, are generic and can be used for wind power advocacy anywhere, not just an offshore windfarm. Get them for a small donation to Clean Power Now. Addy in the website listing below.

**Beware** of becoming enamored by the few developed but not yet mass - produceable energy solutions (futuretech) shown in several of these films. Today's energy solutions are, however, perfected, clearly shown in them and readily implemented, and if hardware is needed, it is readily available.

Note that there are many new companies and corporations in this field, as well as names we are familiar with. A new field creates new companies and jobs as others are lost due to obsolescence or economic downturns.

As the use of alternative energy grows, the condition of our economy will grow. We help our country's economy as well as our planet and ourselves by switching to energy saving measures and products and to alternative energy.

One last comment about these movies. Most clearly show how other countries are dealing with the problem. It is not a 'USA' only phenomenon. Many people who 'poo poo' this enviro effort cite other countries, especially China with it's huge population and industry as not complying with any 'green' standards at all. Wake up these naysayers and knockers with the simple fact that even China has found out that fuel costs money and shouldn't be wasted. Yes, the whole world is going greener. Kick that naysayer in the butt and tell him to get real. These people are throwing money away by not thinking green. And give them a CD copy of this guide (if they know how to read).

***Buzzwords to crank into your browser; (one at a time)***

scoot, scooter, scooter parts, EV, electric vehicle, EV parts, windpower, Hull MA, biodiesel, emerging vehicles, CO2, climate change, sea level rise, windfarm, NEV or LSV (low speed vehicle), alternative energy, solar electric, electric ox, Sustainable, solar energy, solar hot water, greaseburner, biofuel, geothermal, Tesla Prius Hybrid Ebox GM Volt Nissan Leaf rain forest long John (long Tom to some people) also the 'google' references in the text above. Some of these buzzwords have huge numbers of references. Google any subject in this guide that interests you, especially the Earth Day and Sustainable Earth orgs in your area for dates and locations.

***Websites of interest*** in no particular order. Note; Follow the links on these sites. The http:// www. prefix of all of these is normal default inserted by most computers. If it's not inserted, do it yourself as in http://www.xxxxxx.xxx A period must be after the www but not printed here you must put it in when you type the address. Besides this, google any subject in this guide that you are interested in. **\*Warning\*** Don't trip out on info overload. Info alone will not save you money or help 'green up' our planet..Acting on, putting fuel saving info into practice in your own life will.

altwheels	Google 'Altwheels festival' Boston MA
www evworld.com	Daily news on alternative transportation and energy.
www world.org	Links to top 1000 environmental sites.
www massclimateaction.org	Network of communities working for 'clean and green' in MA. Most MA 'sustainable' groups are allied with and get resources from this network. This site is a source of Ecoteam's 'low carbon diet' workbook
www hullwind.org	Hull wind turbine info (also see the town of Hull website)
www eaaev.org	Electric Automobile Association, nationa. Conversions.
www acpropulsion.com	Packaged AC drive system for The plug-in EBOX. See the 'examine' subheading for Ebox info Ebox itself on Wikipedia Wiki/AC_Propulsion_EBox
www neeaa.org	New England Chapter, Electric Automobile Association <i>This is also a source of the newest edit of this document. Document is updated yearly, newest gets on about Feb</i>
www izip.usa	Electric assist bikes and commuter Escooters
www nesea.org	Northeast Sustainable Energy Assoc nesea.org/greenbuildings open house is the largest sustainable event in the northeast USA.

[www.eere.energy.gov/](http://www.eere.energy.gov/) US Govt energy site  
[www.homepower.com](http://www.homepower.com) Alternative energy, Home Power magazine  
[www.throughlineproductions.com](http://www.throughlineproductions.com) CD, 'Transforming Energy'. A 'must see'.  
[www.gasbuddy.com](http://www.gasbuddy.com) and [gaspricewatch.com](http://gaspricewatch.com) gas prices local and national. Check both.  
 Pricewatch has a nice easy map. Neither appear to list independent brand stations which may be cheaper. Also, these have fuel saving tips beyond what you see here. ALWAYS check these sites before going on a long auto/camper/motorhome/business trip.  
[www.energystar.gov](http://www.energystar.gov) What the Energy Star rating is all about  
[www.aps.com/mycommunity/FutureFuels/FF\\_8.html](http://www.aps.com/mycommunity/FutureFuels/FF_8.html) (NEV's in actual use in AZ getting 275 miles per gallon equivalent)  
[www.empowermentinstitute.net](http://www.empowermentinstitute.net) Low Carbon Diet workbook  
[www.himacresearch.com](http://www.himacresearch.com) Fish Covey etc vapor carbs. The J. Bruce McBurney technical treatise. **Note, experimenters: danger in messing with vaporized gasoline**  
[www.fuelvapors.com](http://www.fuelvapors.com) More on vapor carbs, patent copies, all expired on this CD. See above warning  
[www.econogics.com/TENHE/](http://www.econogics.com/TENHE/) Alternative energy, hydrogen facts / debunk  
[www.massbike.org](http://www.massbike.org) bicycle advocacy (MA website)  
[www.commute.com](http://www.commute.com) carpooling (MA website)  
[www.nedra.com](http://www.nedra.com) Electric drag racing – dates places pix etc.  
[www.fueleconomy.gov](http://www.fueleconomy.gov) US Govt energy site. Publishes yearly automotive fuel economy ratings. Check this site before considering a new vehicle, and download the entire yearly listing each yr and file listing to keep track of 'used vehicle' rated fuel economy.  
[www.greengreasemonkey.com](http://www.greengreasemonkey.com) recycled cooking oil as diesel fuel. conversions  
[www.nationalgeographic.com/channel](http://www.nationalgeographic.com/channel) Movie – Six Degrees. And more.  
[www.greenerchoices.org](http://www.greenerchoices.org) Lots of green and energy saving hardware  
[www.vectrixusa.com](http://www.vectrixusa.com) Futuristic electric scooter styled motorcycle.  
[www.floridaeaa.org](http://www.floridaeaa.org) Battery Beach Burnout info (also nedra.com)  
[www.greencar.com](http://www.greencar.com) Green Car Journal, quarterly magazine. All the latest developments. Futuretech, but has good info regarding what's out in the marketplace today.  
[www.solartoday.org](http://www.solartoday.org) Bimonthly magazine, solar systems, developments, contractors etc.  
[www.zapworld.com](http://www.zapworld.com) all kinds of scoots and NEV's Note that this is not the only scooter site. Google the subject.  
[shop.wgbh.org](http://shop.wgbh.org) (note periods) Enviro CD's  
[cleanmpg.com](http://cleanmpg.com) Developments in vehicle mpg. Hybrids. Hypermiling.  
[www.earthday.net](http://www.earthday.net) [www.earthday.gov](http://www.earthday.gov) Earth Day info  
[www.mygreenhouse.com](http://www.mygreenhouse.com) TV program listed below. Energy saves/altenergy  
[www.energyhog.com](http://www.energyhog.com) For the youngsters. And older.  
<http://techno-fandom.org/~hobbit/#prius> Hypermiling the Prius (and others incl hybrids)  
<http://99mpg.com> hypermiling the Honda Insight hybrid

www motherearthnews.com green living, organic gardening, alternate energy.  
This has been a valuable source of AE and 'green living'  
info since well before the 70's energy crunch.  
www Bicycle-Engines.com 50cc 2 or 4 cycle gas engine kit for your bike  
www TransAtlanticElectricConversions.com gas to electric parts, lithium batteries  
email EVAmerica@AOL.com. EV Conversion parts gas to electric (download catalog)  
. www oilcrisis.com 'Hubbert's curve, peak oil production/consumption.  
www cleanpowernow.org Windpower advocacy, matls, news re offshore wind

**Television** is beginning to have programs devoted to 'greening up'. PBS 'Ask This Old House' and Ion Life 'My Green House' are notable here, more may be on the way. Google PBS program guide in your area for channels/times in your area. These are both on digital HD 'free antenna TV' no cable or satellite connection required, just antenna if withing range (about 75 miles) of the channel's transmission tower.

PBS/Nova also has much info on climate change – look up the program 'Extreme Ice' - both natural and man-made records of percentages of CO2 are locked up in arctic ice cores over the millenia telling of peaks and dips of global warming/sea level rise gases. With world population and industry increase, % of CO2 has sharply risen far beyond any of these naturally preserved records. All the more proof of reasons why we as a people need to lower our total carbon footprint.

Also, check out the MIT Boston website and the new prefab house designed there which produces more power through it's solar heat /hot water/ photovoltaic electric roof than it uses. Prefab, portable and affordable, it is shipped on 2 trailers and has several options re: mounting needed for setup. It can even have a full basement. At this point (10/07), the prototype is mostly built in one of MIT's parking lots and is using Prius batteries. It will be dismantled and trailered to a big energy symposium in Washington DC in early '08. Hopefully, this design will be picked up by a major mfg of prefabs and be in production. Perhaps you might see it offered in the prefab market by '10. It takes a good while for a prototype to become a product. (Update 11/08) There is one in this market very similar. If in the market for a prefab look this type up at your chosen manufactured housing supplier's sales office

Above sites and many unlisted here have practical solutions for the present beyond those covered in this guide. Follow the links. However, begin your fuel saving program now, today. start with the easy and low or no cost suggestions given in these pages.

Don't get off the track and look to a future 'pie in the sky' to solve our energy problems in the near future. That's a cop out, and will save you no money. We, the little people, through our actions concerning our own use of energy and our vote, have more power than the government - any government - does to make this world sustainable, one person, one family at a time.

The choices below exist for every vehicle user or owner, renter or homeowner, business owner, and multi dwelling or commercial property owner in the world.

(A) “Should I pay more for total energy used yearly, the same, or pay less?”

(B) “Should I be I a benefit to the planet and future, a detriment to it, or not care.”

Choose wisely.

The participants of ECFSC thank you for your help in creating a sustainable planet and will end with a final applicable thought. An ancient Chinese proverb.

“ The one who removes a mountain begins by carrying away small stones”

**END**

### ***ONGOING ADDENDUM as of R46 6/08***

UPDATE NOTE: Numbers in filename and on the title page bottom indicate later or earlier edits by ECFSC. Higher number is the latest. Example, this document is Revision 52, 12/ 10, previous edit was R51. W means word/open office, P means PDF. Identical. Number on cover bottom is Open Office word count, filename etc.

This is an ongoing project, and the newest edit can be downloaded from the web from NEEAA.ORG among other sites. There is a new edit approx every year (our deadline is in October) as new tips come in or websites in our listing appear and disappear. New one hits the web about Feb. Advising Recipients to check for an update every year or so, and download the newest edit. Which will be, like the present one, FREE PUBLIC DOMAIN

EDIT ADDITIONS Numbers in parentheses (example (08) within the text indicate the year the addition was inserted. FSG has been around a longer time than the earliest, the first one was only 30 pages. We keep these numbers in mainly for reference points for our own editing. Some show variances of fuel prices etc. Note that not all updates additions and changes have 'insert' markings. Bear with us, this is not scholarly technique but it helps us so we can better help you.

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Additional page 104 is an example brought to our attention by a fellow who actively promotes FSG at various functions he attends and at every other opportunity. He made the bulletin board tacker / giveaway card macro up separate, we added it to the guide. We are asking people to share this free public domain guide, he is doing a terrific job at it. A short conversation with him showed that he and family are happy as the proverbial clams – having fun and making a good number of bucks by finally being able to beat the fuel tyrants and a big bunch of other thoughtless habitual dollar drains. Several of our tips came from this happy family as well.

Thank you. These will certainly help our free distribution.

### The editor

**Pg 104** Macro of a bulletin board tacker or business card, giving the name of the website downloaded from. Feel free to make your own website card promoting FSG, print on green paper (we do but white will do, 24 lb is best), cut it up with a paper cutter into cards and distribute to individuals – ask them first ‘Do you have a computer that does internet?’ The PDF conversion has these cards as well. These cards were made using the setup included in MS Word 7. If you have no printer, bring FSG on a thumbdrive or CD to someone who has one and print it, use it as a master to photocopy more.

**NOTE:** extra ‘ghost’ outlines which may show on it will not print, just the cards will.

**Webmasters:** Please put the R number (full filename) and date on your download description to make the process of people updating their own copies of FSG easier. Thank you.

**Webmasters:** Create and add your own site cards using these as a model and add them to your download as a separate file. MS Word 7 has the blank macro in it. Open Office can do it too and has direct export to a PDF file that is immune to ‘net’ damage. NEEAA is a long lived non-commercial site and will always have the latest edit of FSG. Note that the filename is now coded by month/year of issue.

**NOTE:** In the Word /Open Office file, logo with website on **p 104** may not show unless the ‘view’ is set to ‘page layout’. However, the cards will print when called for.

**NOTE:** **Pg 104** may look off center onscreen, but it is OK when it prints as it is ‘on center’ for paper cutters, one less edge to cut. The light outlines if seen onscreen will not print, only the cards print. The PDF file for internet transmission does not show these phantom outlines.

**NOTE:** Page numbers given in table of contents and printing instructions refer to the PDF file only. The open office file may be different by one number due to pagination changes needed for the conversion process. For the PDF conversion, we thank the creators of Open Office, which is shareware. All editing has been done in Open Office.

**NOTE:** On some computers especially laptops or older ones, the logo pix on the promo cards on **page 104** will load slowly. This is normal, your computer has a lot of work to do to show these pix. Some older laptops take almost a minute to display these pix.

**NOTE:** If you are going to print this double sided and bind it the ‘off center’ wide margin of alternating pages must be on the left (space for the spine) for the cover, left for the foreword, left for all posters and alternating left and right for all other pages. We did not do this for the file as it makes it difficult to read onscreen. If you use a 3 hole punch and a ring binder this is not so critical, but for a tightly bound book it is. We recommend 24 lb paper single sided and 3 ring binding because pages are longer lived and can be removed to photocopy. Even so, it does not hold up to long careless use. Why print at all? So it can be read in bed also shared with the computerless.

**NOTE** It is not necessary to print it all unless you want to share it with someone who has no computer. Back it up first, you don’t want to lose it. If you have a laptop or notebook, copy it to these via a thumbdrive. You can share it ‘by thumb’ or by CD with other computers

Then print out the POSTERS PLUS ONLY WHAT YOU NEED FOR YOUR OWN IMMEDIATE PROGRAM OF SAVING. Print out the math part so all in the family will understand this and the pg 3 driving tips poster plus 'driving specific' info (your foot can be your enemy) beyond the end of the starred tips section for all drivers in the family. If discussing fuel saving with someone who has no computer, print relevant parts out for them. If they have a computer but no internet, make them a disk copy or thumbdrive it in, This file is meant to be shared there's lots of ways to do it.

**General printing instructions:** Save this complete file to your hard drive. Permission granted to print out a copy or several for yourself and to distribute **free** copies of the entire file or excerpts on CD, on paper, or by USB thumbdrive or by Email forwarding.

TO PRINT:

The easiest way to do this is single sided on 24 lb (longer lasting) paper, then 3 hole punch it and put it in it's own 1" 3 ring binder. If it will receive heavy use, there are '3 ring reinforcing strips' avail at Office Max or Staples. The older 'stick on rings' do not last long.

If you require 'hard binding', follow your printers instructions for alternating 'left-right wide margins. Then print the ones requiring color separately, use them to replace the black and white ones already printed. Then hard bind as you would any other 100 or so page document. Set aside th resulting stack, add a blank rear cover.

. Then Print 6 or more of each poster as giveaways or bull lboard tackers. Print more site card sheets. Cut the site cards up and give away to friends etc. Posters; Put em up at work, on campus, public notice boards etc.

Again; Easiest way, don't print it at all. Just print the posters and site promo cards for distribution. Also, whatever pages you need to help your friends save too, if they are computerless.

**We cannot overstress the need to share this free Ebook.  
Share it, share it, share it.**

Thank you

the East Coast Fuel Saver's Coalition

PS: *WHAT?* There's no local envirogroup in your area? Why not start one? Get two or three like thinking enviro proactive people together, set a monthly meeting date, start your group growing by free showings of enviro movies, promoted by posters you make up and by free listings of 'where to go' in your local newspapers. This, of course, is all volunteer. You need people to roll their sleeves up, and WORK.

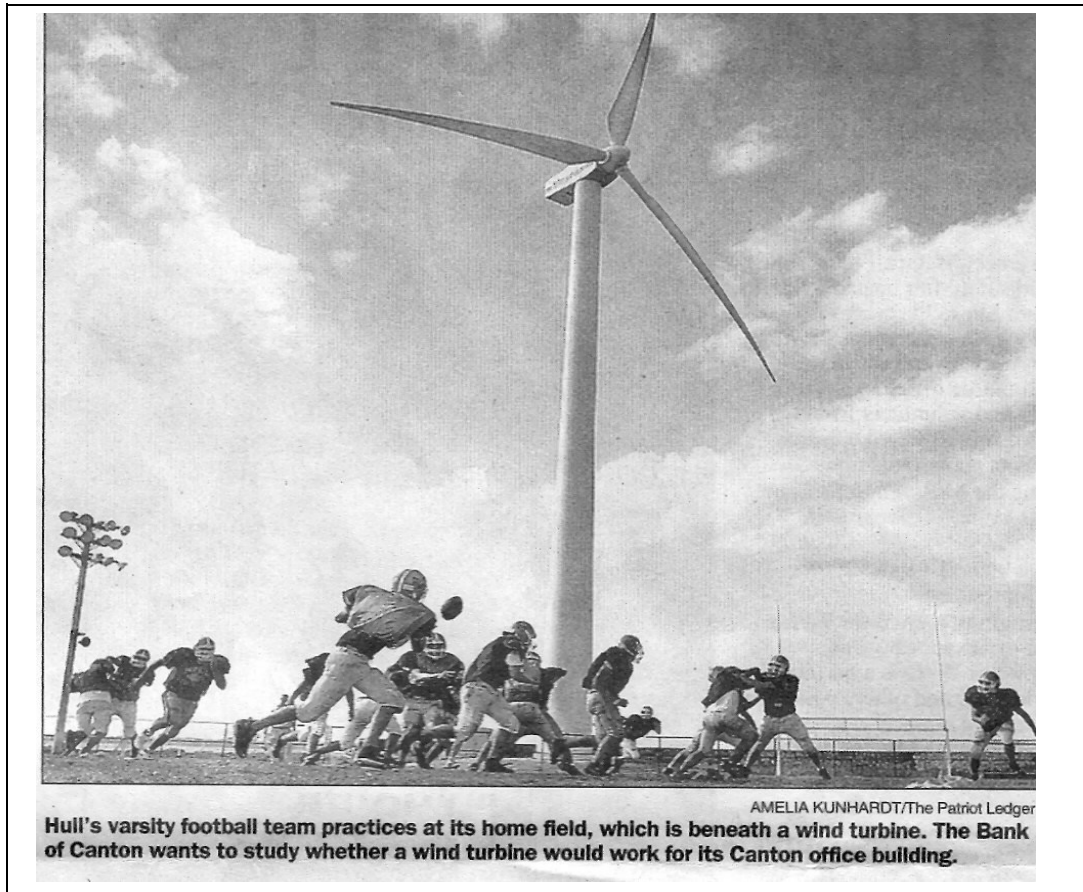
Quite often, your local library can give you a free meeting place to show these. AND may have some of the movies to loan you. A church basement would also do – and they may have a movie projection setup that will play the CD's.such as recommended in this document. Have free coffee and munchies available. At the showings, invite membership into this new group. Give each new member a CD containing this guide so that you will all be on the same page. And pick up on a project that you can help with. Recycling is one, wetlands protection, park cleanup, less idling of engines especially near schools, distributing energy oriented info such as you can get from your local power organization, even sharing this guide at no cost to you by giving out it's website. Perhaps, once you gain resources, your new organization could even start an Earth Day show. It's costs will be paid by selling exhibitor space which pay for your rented tables. Several enviro shows hereabouts have been given free space for these by the town's school department.

There is an agency in most every state that is a free resource point for new envirogroups. Seek these out. The MA agency is in the website list. Check it out. Many local enviro orgs have been started this way.

Thank you for your considering this additional thought.

# Why is this photo so important?

(think about it for a bit before you read below)

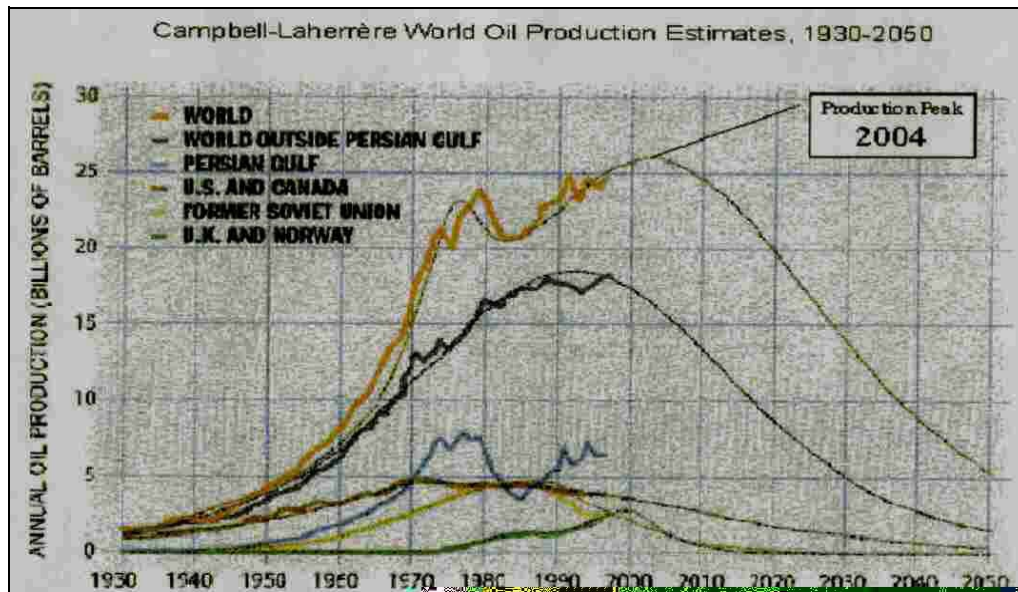


Yes, windpower is vitally important to our planet's sustainable future. However, siting of a turbine can be difficult due to opposition of people not educated in the subject, stating objections that time and again have stymied town governments and 'tabled' windpower proposals. Siting is usually the issue that comes up and NIMBY (Not In My Backyard) opposition can prevail if 'windpower yes' forces are not vigilant and active. Second issue, that of acquiring real estate quant suff in an 'unopposed' area to plant the tower is a costly thing, beyond many town governments.

*This picture shows that a wind turbine can be planted on already owned town property (right next to the High School athletic field) and does not impact the property it is on, given thought to it's proper siting. A football thrown from the field at the tower by a player will most certainly hit it. This is not a 'trick' photo. For further info go to [Hullwind.com](http://Hullwind.com) or the [Hull MA website](http://Hull MA website).*

*(Photo credit Quincy MA Patriot Ledger)*

## HUBBERT'S CURVE The limit of petroleum supplies



Note the top line. The tan roughly superimposed on the greenish brown and black. The thick tan one is the total of all the world's output of crude oil that has been pumped which continues as a thin greenish brown downcurved line to show future pumpable oil, which is the 'Hubbert' mathematical projection. Different oil rich areas that make up this total are the colored lines below.

The thin black demand line goes right along behind both the mathematical projection and actual pumped oil figure. So far, supply has kept up with demand. Note disparity in the 70's, early 80's

However, this curve predicts that the sources (including any untapped at present) will dry up and will not be able to supply demand. Note the 'mountain peak' then downcurve on the 'total supply' line. At the beginning of the peak the thin black demand line behind it continues upward, going off the chart. This happens because we live in an ever expanding world with ever expanding needs for petroleum as countries industrialize and the world's population continues to increase.

We cannot continue to remove non-replenishable natural resources – which are the three fossil fuels (coal, crude oil, and natural gas) from the ground forever. This is not an opinion. It is not a 'right or left wing' philosophy or election platform plank. It is cold hard simple mathematics.

We must stretch our energy supplies through energy conservation and alternatives while a coalition of the world's finest scientific minds search out a permanent solution to what the energy for all time to come is to be, and start to develop it. This coalition hasn't even started yet.

*Wake up, people. Wake up your governments. Our grandchildren and their grandchildren yet unborn need you to act now.*

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Note; The outlines, if showing, will not print.

Note: This is off center intentionally for paper cutters. One less edge to cut.