STRIVING for ENERGY INDEPENDENCE

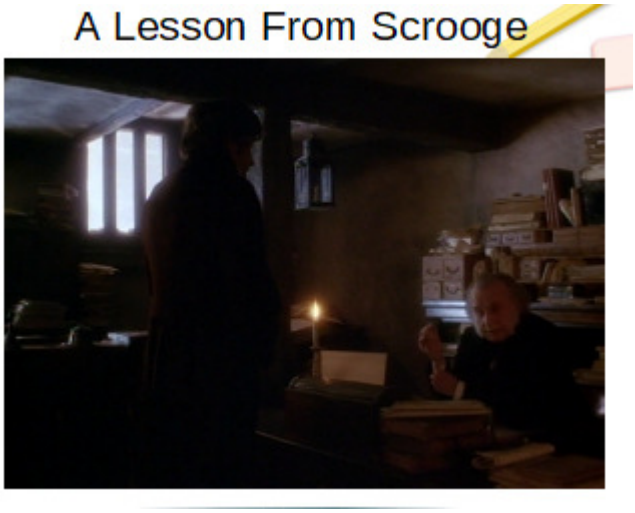
- We are NOT experts!!!!
- As the title says, we are STRIVING for energy independence, but we have a long way to go.
- This is about our journey so far.
- There will (hopefully) be more to come at a later date.

As the title of this presentation says, we are not experts. We are striving for a goal of energy independence, but we are not there yet.

This presentation is about our journey so far, the "tuition" we've paid along the way – up to this point, and where we hope to take our next steps.

Our first lesson comes from George C. Scott acting as Mr. Scrooge (Note that this conversation is not part of Charles Dickens' *A Christmas Carol;* rather, it is an example of the literary license often employed in the making of movies from books, however, it provides a very useful example for us.)

Bob Cratchet: "The fire's gone cold Mr. Scrooge."
Ebenezer Scrooge: "Come over here Mr. Cratchet."
"What is this?"
Cratchet: "A shirt."
Scrooge: "And this?"
Cratchet: "A waistcoat."
Scrooge: "And this?"
Cratchet: "A coat."
Scrooge: "These are garments Mr. Cratchet. Garments were invented by the human race as protection against the cold. Once purchased, they may be used indefinitely for the purpose for which they are intended. Coal burns. Coal is momentary, and coal is costly."



I would add electricity, propane, gas, wood, etc…are also costly. So far as I've been able to determine at this time, ALL forms of energy require fairly significant outlays of time and/or money in order to harness and use them.

My point is, there are few, if any, places in the intermountain west where you can expect to have any significant degree of energy independence if you insist on keeping your house at 70-75 degrees so you can wear a light t-shirt or dress a baby in a t-shirt and diaper all year round.

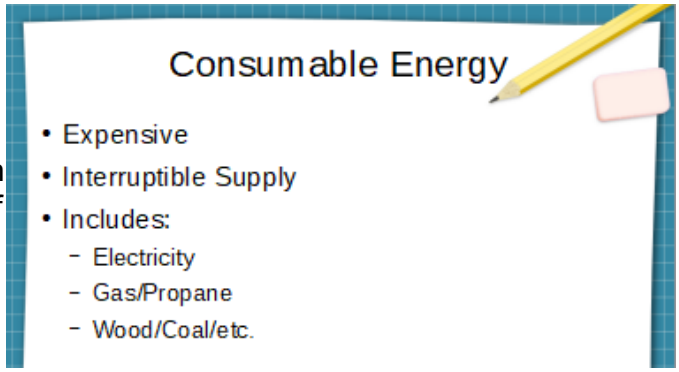
Realistic expectations are critical to the development and achievement of any degree of energy independence.

Yes, I've read numerous ads on the internet for supposedly free or very low cost ways to provide energy for your home, or "bullet-proof your home energy" and I've even spent money on purchasing several of the assorted electronic "books" that are purported to give you all of the information you need to build these systems for yourself. They are nothing but barnyard muck.

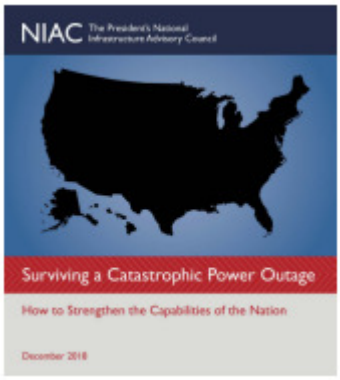
To date, the only thing I've come across is one scam after another. The worst of them charge you a fee to gain access to yet another ad and another opportunity to fleece the desperate wannabe user of "free energy". I am happy to report though that I have not fallen for any of the multi-layered fleecing opportunities.

Reduce or Eliminate Dependence on Consumable Single Use Energy

Here's the goal we are working toward: Reduce or eliminate dependence on consumable single use energy. This would include gas, propane, wood, coal, and electricity. Realistically, in the area we live, we will probably always need to use some consumable energy, but, we can work toward reducing it as much as possible.

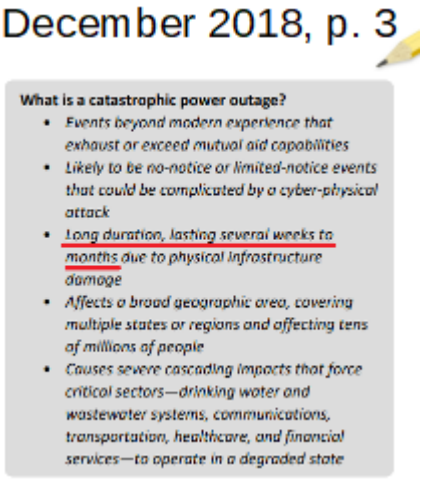


Virtually all consumable energy is expensive. Yes, there are varying degrees of expensive, but it's all expensive.
All consumable energy is interruptible in supply. The electricity coming from the power company can go off with or without warning, for varying lengths of time and for a variety of reasons. I think most of us have experienced power outages as a result of weather related incidents and occasionally even traffic accidents. They are a normal part of life, but thankfully, in most areas, they don't occur very often. However, there are several events with the potential to take down large portions of the national power grid, or even all of it, for an extended period of time.



In December 2018, The President's National Infrastructure Advisory Council issued a 94 page report called, "Surviving a Catastrophic Power Outage" website: https://www.cisa.gov/sites/default/files/publications/NIAC%20Catastrophic%20Power%Outage%Study_FINAL.pdf

(I have no clue why the link is split up like that. You will need to copy/paste the whole link if you want the document.)



Here is their definition of a catastrophic power outage. Pay particular attention to the third and fifth points. Note that the duration may be several weeks to months, and there would be significant cascading events as a result.

Other sources have suggested that depending on the cause of the catastrophic power outage, it could actually last for years, but, the good news from that is that, if you survive the first 6-8 months of such an event, you'll likely survive no matter how long it goes on – or at least until the antibiotics and other life saving drugs have run out and you need them.

Remember, by definition, anything you need to sustain life, you already have a lifetime supply of it. So, how long do you want your life to last? And the lives of your family members?

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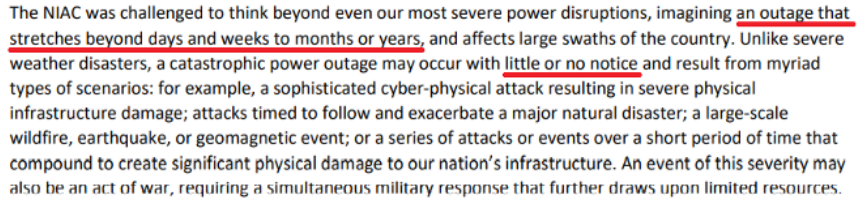

The NIAC was challenged to think beyond even our most severe power disruptions, imagining an outage that stretches beyond days and weeks to months or years, and affects large swaths of the country. Unlike severe weather disasters, a catastrophic power outage may occur with little or no notice and result from myriad types of scenarios: for example, a sophisticated cyber-physical attack resulting in severe physical infrastructure damage; attacks timed to follow and exacerbate a major natural disaster; a large-scale wildfire, earthquake, or geomagnetic event; or a series of attacks or events over a short period of time that compound to create significant physical damage to our nation's infrastructure. An event of this severity may also be an act of war, requiring a simultaneous military response that further draws upon limited resources.

This is another screen shot from the Dec. 2018 report. Note that here, even they admit that this catastrophic power outage could go on for years and has many potential causes.

Cascading loss of critical services may well include drinking water, waste water, communications, financial services, transportation, fuel, and healthcare.

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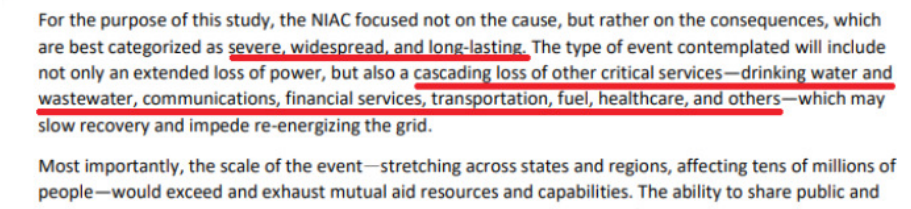

For the purpose of this study, the NIAC focused not on the cause, but rather on the consequences, which are best categorized as severe, widespread, and long-lasting. The type of event contemplated will include not only an extended loss of power, but also a cascading loss of other critical services—drinking water and wastewater, communications, financial services, transportation, fuel, healthcare, and others—which may slow recovery and impede re-energizing the grid.

Most importantly, the scale of the event—stretching across states and regions, affecting tens of millions of people—would exceed and exhaust mutual aid resources and capabilities. The ability to share public and

This means that in addition to being prepared to live without electricity, we each need to be prepared to live without:
Clean water from the tap
Sewer services
Internet
Telephone
Cell phone
Bank access
Credit card access
Driving to the store – which won't be getting re-supplied anyway
Propane
Natural gas
Doctor/hospital services
Prescription medications
And so on,
For as long as the power is out – potentially a year or more.

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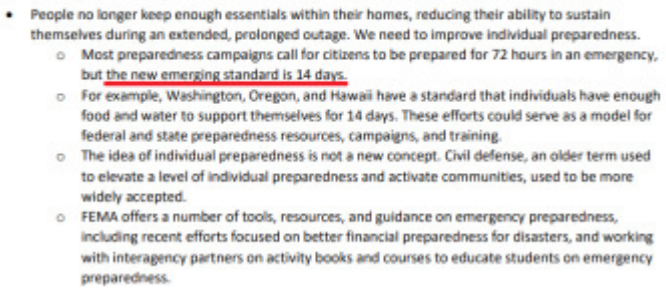


- People no longer keep enough essentials within their homes, reducing their ability to sustain themselves during an extended, prolonged outage. We need to improve individual preparedness.
  - Most preparedness campaigns call for citizens to be prepared for 72 hours in an emergency, but the new emerging standard is 14 days.
  - For example, Washington, Oregon, and Hawaii have a standard that individuals have enough food and water to support themselves for 14 days. These efforts could serve as a model for federal and state preparedness resources, campaigns, and training.
  - The idea of individual preparedness is not a new concept. Civil defense, an older term used to elevate a level of individual preparedness and activate communities, used to be more widely accepted.
  - FEMA offers a number of tools, resources, and guidance on emergency preparedness, including recent efforts focused on better financial preparedness for disasters, and working with interagency partners on activity books and courses to educate students on emergency preparedness.

Do you have a 72 hour kit? Hopefully the answer is yes, but it's not enough.

As this says, the new emerging standard is 14 days, but, in light of what we've just heard about the potential for this to be weeks, months, or years, that 14 days seems more appropriate for a Bug Out Bag than for a home preparedness plan. Still, it is a step in the right direction.

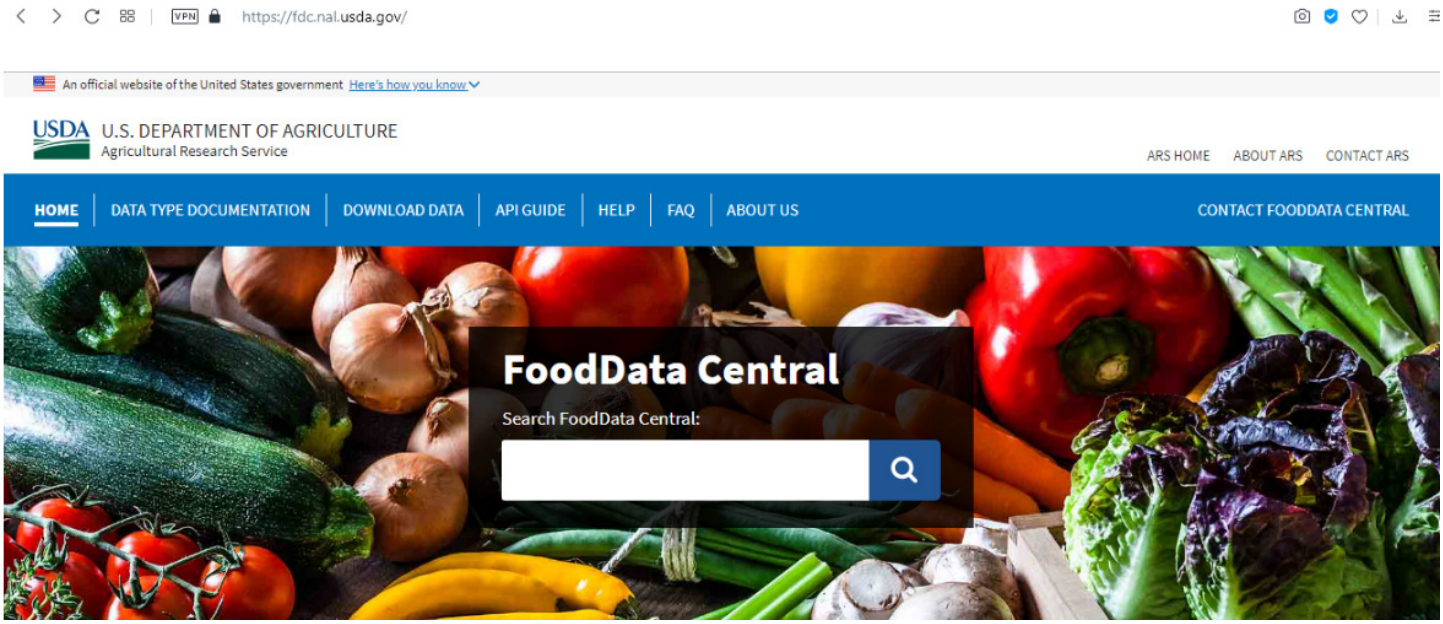
While we're on the subject, here's a word of warning about food storage. I've seen quite a few websites and books over the last few years making some very dangerous claims about ridiculously small amounts of food (a mix of legumes and grains) being able to feed a family for a year and require very little space or money.

Food Storage Caution

- Feed a family of 4 on $300/year
- Bean soup
- Scotch Broth
- PT Barnum was right
- If it sounds too good to be true...

Legumes (beans) are very nutritious, and they have been and continue to be widely used in combination with grains to sustain life the world over. In this claim, all of these books and websites are correct.

However, they go from there to sharing a recipe for a mix of grains and legumes that amounts to approximately 65-80 lbs of legumes and 10-40 lbs of grains which they claim will feed a family of 4 for a year. However, when you actually go to the USDA nutrition information website, which currently (Jan 2021) looks like this (but changes every couple years)



and look up the nutrients in the recipes, you will find that they are telling you to store an amount of food for a year that, for a family of 4, will have you eating somewhere in the range of 80-150 calories per person per day.

That is less than 1/10th of the calories you need to prevent death by starvation.

Bean soup and Scotch broth, and all of the variations on the theme, are very nourishing. I'm not disagreeing with that part of the story. Rather, my disagreement is with the quantity of grains and legumes these people tell you to store to feed your family for a year. There are sufficient legumes to feed one person for a year, but way too little in the grain category, even for a single person.

In other words, if you store, and expect to live for a year, on less than 300 lbs of grains AND 60 lbs of legumes PER PERSON, you are setting your family up for literally starving to death in a very short period of time, regardless of how nutritious the "base" of your stored food is.

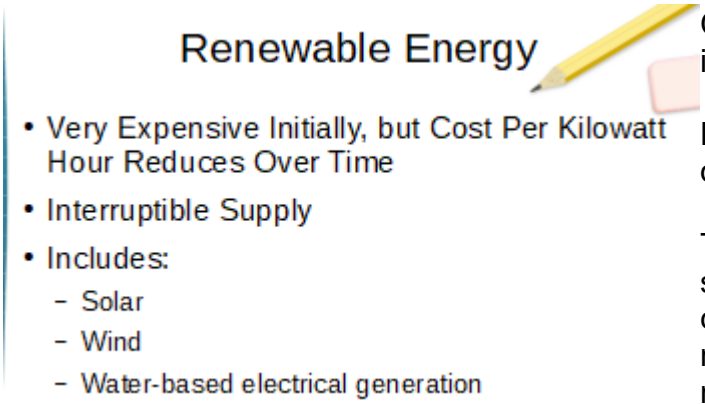
Quite frankly, in my mind, any source that shares this kind of nonsense as a purported food storage program obviously has not done their basic nutrient research homework, has not tried living on it, and is just passing on information they gleaned from another source – which calls into question the validity of everything else they publish/share.

“Armchair preppers” generally actually know far less than they claim. I’ve known several of these people through the years. One in particular, up in Idaho, that was considered by a great many people to be a marvelous example of preparedness, even went so far as to put a lock on the door to the food storage room so his wife couldn’t practice using what they had stored and thus draw down their supplies.

Don’t believe everything you read, either in books or online.
If it sounds too good to be true, it most likely IS too good to be true.

Before you trust life to anything, test it!!!!!

In this example, follow the recipe precisely and try living on it for a week or two. Don’t take anyone else’s word for it, regardless of credentials or slick presentation. Try it yourself.



Okay, enough of that and back to discussing energy independence.

Renewable, or “green” energy is all the rage these days so let’s talk about it in more detail.

This includes Solar, Wind, and Water-based systems. Some people include geo-thermal in this category as well, but since that is out of the reach of most families, I will not be discussing it beyond this mention.

Since water-based systems require a steady source of flowing water, they are not a system I have done serious research into, but, if you happen to have a year-round stream or river flowing through your property, this would be an option you could research. Just remember that unless the spring(s) which are the source of the water are located on your property, the water can be dammed or diverted and your access to it thus eliminated or reduced. And springs occasionally dry up.

Wind energy can be harnessed via a windmill for purposes of pumping water from a well, or harnessed via a dynamo (generator) to create electricity for your home.

Be aware though that in many areas, if you have a windmill that is high enough and large enough to power your home, you may have an added expense with permits for killing birds, specifically endangered species, because like it or not, want it or not, windmills in all of their forms do kill birds. The smaller and lower to the ground they are, the less risk – and the less power they will generate for you.

If you live in area that has a lot of wind on a regular basis, this might be a viable option for you.

Just remember that a wind powered system only works when the wind is blowing.
We actually live in an area that usually has sufficient wind so, we are looking into this option as a back-up for stormy days when the solar panels are not generating sufficient electricity.

Wind energy can also be useful – as most of us already know – as a substitute for a gas or electric clothes dryer. I've even heard of, and seen articles written by people who claim you can still dry clothes outside on a line when the temperature is below freezing. Speaking for myself, I have no desire to add hanging wet clothes outside in the winter to my already fairly significant outdoor winter chores, but I do hang clothes outside when the weather is nice, and inside when it's cold or wet.

Solar energy is probably the most available and most widely useful form of renewable energy. It can be used for cooking, drying clothes, heating of both water and air inside your home, and for producing electricity.

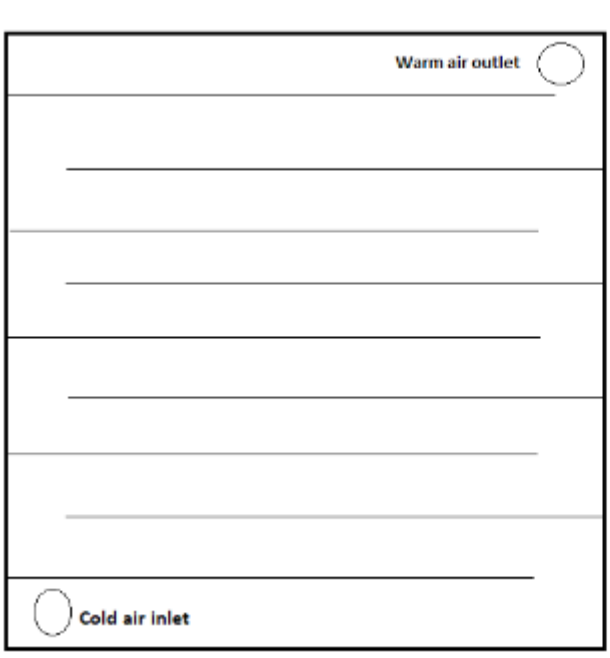
Solar cooking is a topic for another day, and I know Linda is well versed and has probably already addressed it for this group.

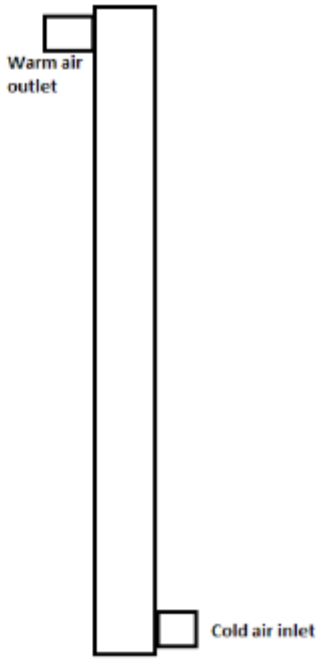
Using the sun to heat your home is pretty basic. It just involves letting the visible wavelengths in during the daylight hours, while keeping the infrared energy in day and night.
You probably already do this to some extent without even thinking about it.

For example, in the winter months, you open the curtains on the south side of the house in the morning to get as much heat as possible inside as soon as the sun comes up, and you close those same curtains as soon as the sun goes down in the evening to minimize heat loss (infrared radiation loss) to the cold outdoors, thus trapping as much of the sun's heat (and heat from other sources) as possible inside your home for the night.
In the summer months, you probably close the curtains toward the sun – especially in the late afternoon and evening – to reduce the amount of solar heat coming into your home.

In both cases, the heavier the fabric used for the curtains, the better. Lace and sheers are nothing more than pretty. When it comes to both privacy and preventing heat (infrared) loss, they are utterly useless, providing only a false sense of privacy, especially at night.

Taking this a step further, you can build a passive solar heater.



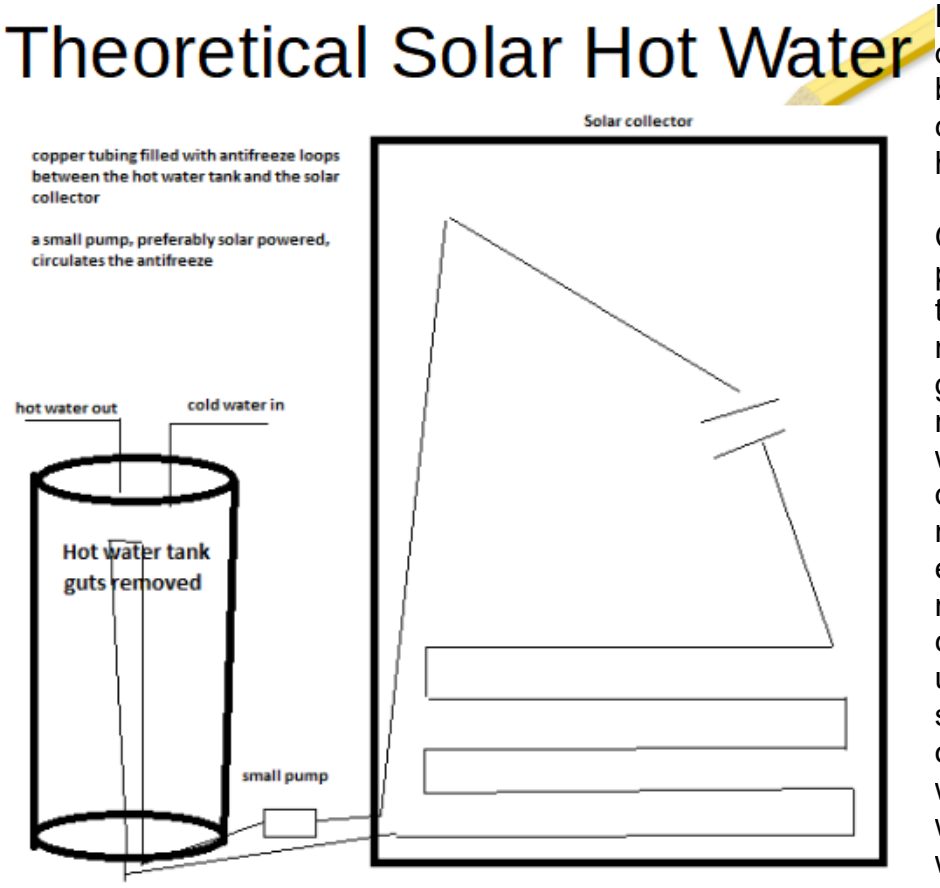


It's really a very simple system and one that I've built several times through the years for use in different homes I've lived in.

As I've shown it here, it's designed to be built of wood and glass, with black spray paint covering all of the surfaces inside the box, and high temperature caulk used to seal the glass to the wood box. It is then anchored to the outside of a wall that gets a lot of sun in the winter. A hole is cut in the side of the house for the warm air to be piped into the house. A small solar powered fan can be added to the warm air vent for better air circulation if desired.

The version I've made for non-permanent installations uses cardboard, tape, plastic wrap, and black spray paint, and it sits in a south-facing window. Because mine have been cardboard, both the cold air and the warm air have entered the box from the same side, inside the house, and they have necessarily been small, but still put out a surprising amount of heat on sunny days. There are no exact measurements needed. It will work with whatever space you have for it. Nor is there a specific number of baffles needed, although the longer you can keep the air moving through the black area, the warmer it will get. Also, if your cold air inlet is outside of the house, you should probably plan on covering it with some screen to keep insects, arachnids, and reptiles out, and, since you will be starting with freezing cold air, you'll need to keep it in the black box longer.
As cold as it gets here, this kind of a system is supplemental for daytime use only.
The warm air inlet should be closed off at night to prevent accelerating loss of heat to the great outdoors when sunlight is low.

A bit more complex, and something I've only read about, but want to build, hopefully this spring, is a solar hot water heater.



Here you can see the basic design idea. Like I said, I've not built one of these systems so I cannot say with any certainty how well it will work.

One thing I can tell you is that putting water in black containers to heat it in the winter is only mildly effective. In fact, I have 15 gallon black rubber tubs inside my chicken coops to hold their water. If the temperature doesn't drop too far below freezing at night, it usually gets warm enough during the day to stay mostly liquid overnight. Since the coops have clear roofs, they heat up quickly in the sun, significantly warmer than the outside air, and so does the water. Even with the additional warmth of the coop, it doesn't get warm enough though that I would want to use it for bath water, but it's fine for the animals to drink from. On cloudy days, it doesn't warm up very well, but then, nothing solar works very well on cloudy days!

Here you can see my solar powered clothes dryer in the foreground and our solar electric power generating panels just beyond it.

Most people choose to put solar panels on the roof. We chose to do a ground mount system since we have plenty of land available and ground mount has several advantages over roof mounted systems.

On sunny days, our panels generate all of the power we need for the house plus extra to sell to the power company. Cloudy and stormy days, they don't do as well.

This brings me to a brief discussion of "tuition", i.e. the cost of the lessons we've learned.

First, and in my mind, foremost, is that any power generation system that is also hooked to the grid – the electric company power lines – can and will be designed so that when the power is out, your system is also shut down so you cannot get any power.

TUITION--
What have the lessons we've learned about renewable energy cost us?
And,
How can you avoid making the same mistakes?

This is accomplished with the installation of micro-inverters that convert the power coming from your system from DC to AC, which is what most homes and appliances use.

Trouble is, and one of the details the solar companies don't bother to tell you, these micro-inverters require power coming IN from the grid in order to work.

This is a safety feature to protect personnel working on the power lines in case of an outage.

The transformer located between your home and the power lines reduces the huge voltage coming from the power company to the lower voltage needed by your home.

It also works in reverse.

It will take a tiny trickle of power coming from your home or generation station and ramp it up to a lethal voltage that could kill a repairman working on the lines or a downstream generator.

Another "tricksy" feature of these micro-inverters is that they allow the power company to shut down your generation ability by varying the frequency of the power they are sending out. This means that if a lot of people have home generation capabilities – wind or solar – such that the power company is receiving more power than they want (for any reason), they can turn off your generation ability without affecting the power reaching everyone's homes. So, it's a bright, sunny day with not a cloud in the sky and you think you're cranking out lots of extra power to sell back to the power company, but, without any sign you can see, the power company has changed the power in the lines from 60 hertz to 61 hertz and your system is turned off.

There is a way around this nonsense, but it's a wee bit expensive.

The key point of this lesson is that if you get some form of alternative generation capability installed for your home, and you want to have power available at all times, DO NOT agree that it would be nice to sell your excess power to the electric company. As soon as you agree to that, it won't make any difference how many times you've told them that the ONLY reason you are installing solar (or other) is so that you will have power even when the grid is down.

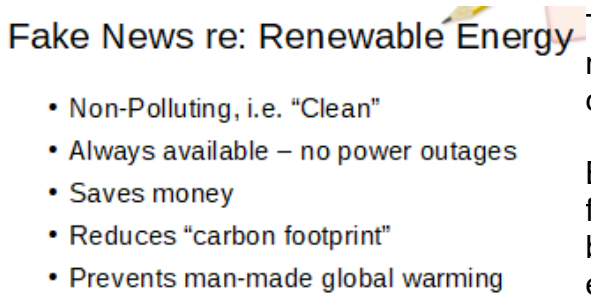
If you do the installation yourself, and also have power coming from the electric company, be sure to install a cutoff switch.

If you are considering adding on-site power generation to your home, you should plan to install an appropriately sized battery bank in order to be able to use your system when the grid is down.

Another option that many people go for is to install a back-up generator that uses propane. These will work for you as long as the propane lasts, which, most of the time, means they are fine. However, in an extended grid down, or catastrophic power failure situation as discussed earlier, you may still find yourself without electricity if this is your only back-up.

A good battery bank and generator cut-off switch (required if you are connected to the grid because of the potential for sending power out to the grid as just discussed) will cost almost as much as the power generation system itself, at least in most cases.

This area of batteries is another area where we've paid some tuition. We didn't understand that once we bought the batteries, they would need to be periodically re-charged even though since I was purchasing them one at a time to get enough storage capacity without a huge initial outlay, they weren't in use. Bad idea.



There's a lot of fake news in the media and Congress regarding renewable energy sources so let's tackle that challenge very briefly.

But first, you should know that these comments are coming from a former environmentalist who started reading on both sides, discovered the hypocrisy of the leading environmentalists, and reformed her thinking.

Yup. I'm one of the reasons they want to censor the internet. So, let's take on a few of the false claims.

First, there is the absurd claim that these energy sources are non-polluting, i.e. that they are "clean energy" or "green energy" as compared to the use of fossil fuels or nuclear power to produce electricity, both of which are labeled as "dirty energy" or "polluting" or as causing global warming or global climate change. I suspect that most of us have, over the last 10 years or so, learned of some of the vulnerabilities of nuclear power, which is clean most of the time, but horrid when it goes wrong.

Unless you live fairly close to an electrical generation plant that burns coal or other fossil fuel to create power, my guess is that your view of the sky is not obscured in any way by pollution from the many power plants around the country. In fact, the air in the entire United States is far cleaner today than it was 50 or 100 years ago. There are MANY factors involved in that, for what it's worth, but, that's not my topic for this evening.

I recently had the opportunity to drive through an area where I grew up – over 50 years ago. During my childhood and teen years, that area had horrible air pollution from both factories and refineries. The sky was always somewhere between thick gray and muddy brown, and it stunk to high heaven. Recently, although the factories and refineries are still fully operational, the skies were clear and the air had none of the old stench. I was stunned by the difference.

Okay, that doesn't address the issue of acid rain to the east, nor the issue of disposal of nuclear waste, but I'll get there.

This claim of “non-polluting energy” utterly and completely fails to account for the pollution created by the manufacturing of the various components, many of which are made from petroleum products and other toxic chemicals, and they require refined petroleum products on a regular basis to remain operational. But, they are mostly made in China, or other foreign countries, which means we’re simply moving the pollution to another part of the planet where we can’t see it, but where it still pollutes the planet’s soil, water, and the atmosphere.

Furthermore, if global warming was real and a legitimate man-made problem, simply moving the site of the pollution to another part of the planet would do absolutely nothing to solve the problem. Yet more proof of the hypocrisy of the environmental movement leaders.

It also fails to take into account the fact that because solar panels are black (i.e. highly absorbing) in both the visible and infrared wavelengths, they increase the temperature of their surroundings.
This is particularly true of large solar farms used by power companies, causing the artificial heating of the environment, which the environmentalists are supposedly super concerned about. This artificial heating of the environment also threatens the survival of a number of desert dwelling species of both plants and animals, some of them endangered, because desert areas are the preferred location for solar farms since they tend to get the most sunlight, have the lowest population density, and the least expensive land. More environmentalist hypocrisy.

Wind energy, as previously mentioned, is responsible for killing large numbers of birds, including endangered species such as eagles, again, supposedly a concern for the environmentalists, but not a large enough concern apparently for them to stop insisting on transferring large amounts of generation capability to massive wind farms which kill literally hundreds of these endangered birds every year. The blades for the windmills are typically made of plastics and fiberglass mixed with resin – more toxic petroleum products and other toxic chemicals being released into the environment with their production, and potentially their disposal when they break.

Next is the claim that renewable energy is always available. That is only true if you have a substantial battery bank, as already discussed. And yes, the power companies have massive battery banks at or near the wind and solar farms. Just because you don’t see them, doesn’t mean they don’t exist!

Of course, the manufacture and disposal of batteries is yet another source of serious pollution – much of which takes place in China, or other countries in that part of the world, but we don’t have to deal with it here, except as regards the disposal. Nevertheless, they are still polluting the soil, water, and atmosphere with some very toxic substances.

Reducing your “carbon footprint” in one area of the planet only to transfer it to another area is fake environmentalism, and fake concern over fake man-made global climate change. Period.

If the true concern is for the planet rather than controlling people, polluting another area of the planet to “spare” your own area should be completely unacceptable to you. The fact that it doesn’t bother the so-called “environmentalists” is just one of many ways in which their blatant hypocrisy is demonstrated along with their true goal of control of people, not protecting the planet, as claimed.

For the record, I personally believe that it’s the leaders of the environmental/green movement that are the hypocrites and control freaks, and, that most of those “activists” are mainly “useful idiots” who have never researched nor thought about all of the issues in-depth. The latter is the category I used to be part of.
One more “for the record” involves the use of the term “consensus”.
Consensus is not science and science is not consensus.

The claim of consensus among atmospheric scientists is a blatant lie since there are hundreds of published peer reviewed articles and studies refuting every single aspect of so-called man-made global climate change, but, that's not the central topic of this presentation.

Consumable energy includes all of the petroleum products, wood, and coal.

All of these supplies are interruptible. The one possible exception would be if you have a 10 or more acre wood lot of your own and a hand saw for harvesting the wood. But even that can be interruptible via illness or injury.

Yes, even personal firewood collection is an interruptible source.

Consumable Energy

- Gas, Propane, kerosene, and other fossil fuels
- Wood
- Seasoned
- Fireplace vs stove
- Clean chimney yearly
- Coal
- Supply is interruptible

Firewood Permit

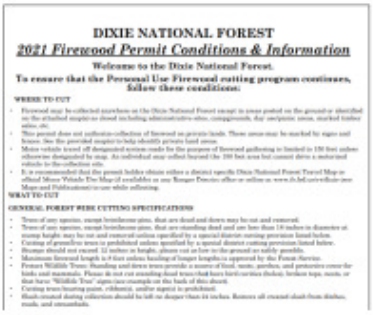
- Required for gathering firewood on public lands, both National Forest and BLM
- Check with your local Ranger District for maps of what areas you can collect from as well as the permit itself.

Most of us do not live with our back property line touching a national forest boundary. That means we need a supply of fuel for our vehicle, as well as a firewood collection permit from the federal government, fuel for the chain saw, and sufficient health and strength to accomplish the task, at a minimum. Any or all of those resources may be compromised with little or no warning.

National Forest and BLM areas open for firewood gathering change yearly.
Also, some areas will give permits that are good for a calendar year while others give permits that are only good for 30 days. Sure, some people gather wood without a permit, but to me, the potential cost of a fine, not to mention the cost to my integrity, is not worth it.

Here's partial information on firewood permits in Dixie National Forest. You'll need to go to www.fs.usda.gov and search for your nearby national forest, or check with your nearest BLM office to find out the specifics for your area. In Dixie NF, the charge for a permit is $5/cord of wood with a maximum of 12 cords per family per year, and the permit is good for the entire calendar year.

Firewood Permits Required Most Areas



DIXIE NATIONAL FOREST

2021 Firewood Permit Conditions & Information

Welcome to the Dixie National Forest.

To ensure that the Personal Use Firewood cutting program continues, follow these conditions:

WHERE TO CUT

WHAT TO CUT

GENERAL FOREST WIDE CUTTING SPECIFICATIONS

Firewood is generally used in either a fireplace or a wood stove when used for indoor heating and/or cooking.

You'll get the best results, with the least amount of flammable creosote build-up in your chimney/flue if you use wood that is room temperature, thoroughly dry, and well seasoned – at least 6 months since it was cut.

A wood stove will usually give you far better "bang for your buck" in terms of heat generation and cooking ability than a fireplace.

If you are concerned about acid rain to the east of you as a result of your use of firewood, then you will definitely want to get a wood burning stove rather than a fireplace because once the stove gets

going good, there's no smoke, even outside – at least from ours. If ours is burning well, I can even add a new dry, room temperature log without having it send smoke up the chimney. The fireplace, on the other hand, is always smoky.

Another of our "tuition" instances was paying a sizable chunk of money to have a nice fireplace with a fan to force hot air from around it into the room. It's pretty, and it lends a nice ambiance, but it puts out very little heat, as in not even warming the room it's in.

We've now put in a small, freestanding, wood stove that does a far better job of heating multiple rooms, with 3 logs and about 1 ½ hours of burn time, than the fireplace ever did with many logs and many hours of burn time – plus it has a flat top that I can use my cast iron skillets on for cooking if I need to.

We've had our wood stove operational for just over a month, but, in that time (2nd half of Jan. & 1st half of Feb.) our furnace has not come on a single time. I therefore estimate that, based on our expenses with installing it and getting wood versus the historical cost of propane and electricity to run the furnace, our wood stove will have paid for itself in 8-10 months of use, perhaps less given our current net metering situation and power sell-back to the electric company from our solar panels. Since our heating season is about 10 months, that means it will have paid for itself in less than a single season of use.

Your individual circumstances and results may be better or worse depending on how much you normally spend for utilities and how much you spend for your wood stove, installation, and wood, but for us, the savings appear to be substantial.

Coal burns hotter than wood thus requiring a more expensive appliance for burning it than wood, and is more difficult to come by, but, depending upon your circumstances, it might be a viable option. Also note that coal stoves tend to be heavier than wood stoves, but **even a large wood stove with oven and multiple burners can weigh enough to damage a standard concrete home foundation that has not been specifically reinforced to bear the extra weight, as one of my friends learned the hard way** several years after her stove was installed when she faced major repairs to her foundation and house as a result of the stove's weight.

If you are burning anything to heat your home or cook with, you'll need to be sure to clean your chimney every spring. One of the most embarrassing stories I've ever heard comes from a neighbor who used to be a fireman. His first day on the job, first call of the day, was for a chimney fire – at HIS house. Chimney fires are very dangerous and have the potential to smolder for hours, then burst into flames in the middle of the night when everyone is sleeping.

Assess Your Situation

- How do you currently cook?
- How do you currently light your home?
- How do you currently heat your home?
- How do you currently get clean water?
- How do you currently get hot water?
- What other ways do you use energy in and around your home?

Now that you have some information about a variety of energy sources, it's time to assess your situation to determine how you can get from where you are to where you want to be. Remember, there isn't a one-size-fits-all answer for any of these questions, or for YOUR final goal, much less the path YOU need to take to reach it.

Some questions to consider:
How do you currently cook? What steps can you take to diversify and/or increase your independence for cooking?

How do you currently light your home and what can you do to diversify and increase your independence?

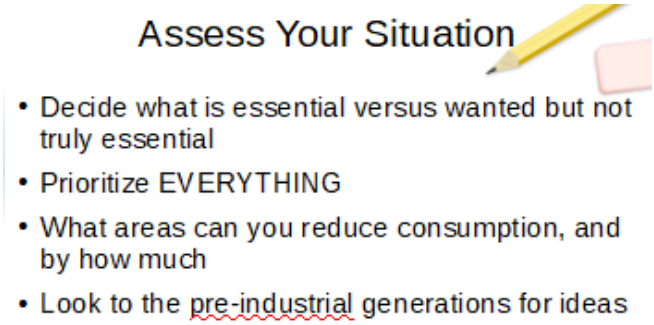
How do you currently heat your home in the winter and cool it in the summer?
What can you do to diversify and reduce your need for energy in this area?
Would a solar chimney be advantageous for summer cooling?
We didn't talk about that because there is such a short window in the summer when it would be an advantage for us, that cooling is really at the bottom of our priorities, but your situation may be different.

How do you currently get clean, potable water?
Are you on city water that can disappear if the power goes out long-term?
Are you on a well that requires electricity to run a pump? If so, do you have a solar adapter for it, or a hand pump?

How do you currently get hot water? Again, how can you diversify?

What other ways do you use energy around your home? Keep track of everything you do for a few days and see where you and your family may want or need to diversify and plan for alternatives.

Once you've done a thorough energy survey of your home and what you use, consider which things are essential versus which things are wants, that you could do without, or significantly reduce, if you had to.



Prioritize everything, considering what is essential for life and what could be considered a luxury. Again, everyone will have their own lists here.

If you require refrigeration for medication, then learn how to use a solar oven to make ice, or, build a good root cellar with at least 3 feet of earth over it, which in most places, will keep it at about 40° F., the same as an electric frig.
If you have a stream or spring on your property, could you make good use of a spring house for cooling and preserving food and other necessities?
What other non-electric methods of refrigeration are there? Could you utilize any of them?
Are you in an area where an old fashioned ice house would be a good thing to have?

Read up on things the pioneers and other pre-industrial generations did to do the tasks you currently use consumable energy for and see which ones you can implement.

Remember, every source of energy has both pros and cons, limitations and advantages.

Nothing is infallible.

Whatever you are dependent upon some form of energy for, have back-up plans and sources.
Yes, I did use the plural there because when it comes to being prepared,

2 is 1
&
1 is None

Whatever your life depends on, by definition, you have a lifetime supply of it RIGHT NOW.

Questions & Answers

Q. Where did we buy our solar system?

We bought from Solar One, also known as One Solar but do NOT recommend them.

In spite of being told at least 4 or 5 times that the ONLY reason we were getting solar was so we would have an uninterruptible power supply, they "got" us with the question – repeated several times – "Well, wouldn't it be nice to be able to sell your excess power back to the electric company?"
As soon as we said yes, they put us down for a system that shuts down when the electricity is off. We could have made the changes necessary to sell excess power for a fraction of what making the changes to have uninterruptible power are going to cost us. And this is only 1 of several egregious problems we encountered with them.

Q. Will an EMP knock out your solar panels?

The panels themselves will not likely be destroyed by an EMP, however, the inverters probably will.

One of the participants suggested so-called EMP-proof inverters.

I have a son that works with sensitive electronics for the military, so I asked him about this as a potential option.
His response can be condensed to:

1. testing for EMP resistance is difficult, expensive, and largely theoretical, therefore unreliable
2. even the military keeps multiple back-up parts for essential electronics even though they are supposedly hardened EMP specifically BECAUSE they do not have sufficient real-life proof of EMP resistance, in addition to potential failure for other reasons such as age or other damage
3. purported EMP-proof parts are many times more expensive than normal replacement parts
4. you can often purchase 5-10X as many replacement parts as a single unproven-in-real-life EMP-proof part will cost
5. best estimates are that IF an EMP is the result of an enemy attack rather than a natural phenomenon, there will be multiple such attacks several days or weeks apart in order to disable as many "prepared" people/organizations as possible (the same could be said for a natural EMP being potentially followed by an enemy attack)
6. if you spend the mega-bucks for an EMP-proof part, and it fails with an EMP, what recourse will you have? None, because an EMP will likely destroy most of what we currently know as "society". Never forget, 2 is 1 and 1 is NONE!

And when it comes to essential electronics and EMP, you might want to consider that 3 or 4 is 1 and 2 is none.

That was MY son's advice to ME. For yourself, take it or leave it, knowing that the consequences of your choice will not affect me in the least, but may have significant impact on your life and the lives of your family members. For myself, I have chosen to attempt to store some spare parts in a make-shift, but hopeful, Faraday cage.

Q. What do I think of kerosene?

I have used kerosene space heaters such as this in several settings over the years and found them to be fairly effective. So much so that I actually now own 3 as emergency heat sources.

CAUTION: As with any open flame source, you have to be very careful to make sure you have adequate ventilation in order to avoid potential carbon monoxide poisoning, and, they do get quite hot, presenting the potential for burns or ignition of nearby flammable objects such as curtains, upholstery, or clothing foolishly placed on top of or close to it to dry. Keep all flammable objects at least 3 feet away!!!!!!

Know the symptoms of carbon monoxide poisoning – headache, nausea, malaise – and be ready to move to fresh air.

My first experience with these heaters was as the sole source of heat, combined with a couple of box fans to move air, for an approximately 800 sq ft house near Rexburg, ID. I found that one heater, centrally located, did a pretty fair job of keeping most of the house tolerable – while also wearing warm clothing. The specific room it was located in was toasty. My laundry room, near the outer edges of the heater's capacity to warm, stayed warm enough for me to grow tomatoes even through the winter so that should tell you it wasn't terribly cold even at the outer edges of heat production and movement.

My second experience I had with them was in an old pioneer-era home in Pleasant Grove. Again, it worked well, especially when combined with a couple of box fans.

My third experience was in a very cold basement apartment in the Salt Lake valley that was roughly 600 sq. ft. and a single heater was all I needed.

My fourth experience was in trying to provide a source of heat for my husband's 600 sq. ft. shop with only a little insulation in a metal building with a very high ceiling (the ceiling peak is about 14 feet up) where a single heater proved totally inadequate and he was unwilling to try adding another.

My fifth experience was in using one to provide some supplemental heat for part of our house this winter. Eric doesn't like the smell of kerosene, which you do get some odor from it – primarily on filling, ignition, and extinguishing, so we didn't use it very much, but, it did warm the area well.

To sum, kerosene heaters can be effective temporary heat, but you have to respect the potential for flammability of other items nearby as well as the potential for carbon monoxide formation if the ventilation is not adequate.

Since kerosene is a petroleum product, highly flammable, I would not choose to depend on it as a long-term heating solution because it won't be available if the grid goes down long-term. For short (a few hours) power outages, it works well though.

Q. What about kerosene lamps?

I have no experience with kerosene lamps/lanterns, but the same cautions would obviously apply.

In other words, keep them at least 3 feet away from all flammable objects, including curtains, upholstery, clothing, blankets, etc. and make sure you have adequate ventilation.

Q. What about cooking indoors with a camp stove in an emergency?

Bad idea!

All of the camp stoves are designed and intended for use outdoors. As such, they can be a significant health risk from both toxic fumes coming from the fuel source in addition to the potential for carbon

monoxide. Both of those risks increase as the size of the flame source increases. In other words, the larger the camp stove, the higher the risk. Even with a small one, you will need to have excellent ventilation.

Q. How much wood do you need to heat a house with a wood stove?

One participant attempted to answer this question by stating that a good rule of thumb is that you will need a pile of wood the same size as the house in order to heat it for the winter with a wood stove.

Let's examine this question in a little more detail.
Consider that there are actually many factors involved in determining the answer to the question, for example:

- the age and insulation status of the home being heated is a significant factor
- how warm the family living in the home decides/tries to keep it is a significant factor, as in, it doesn't take a nuclear physicist to figure out that it will take significantly more wood to try to keep a house at 75 degrees in the winter than at 65 degrees
- the amount of wind the house is subject to on a "normal" or "average" day can significantly affect the amount of heat lost regardless of insulation
- architectural elements such as the height of ceilings, depth of attic space, number and size of windows & doors – especially sliding glass doors – can have a significant effect on heat loss and thus the amount of wood needed
- what is the BTU output of the particular wood(s) you are burning?
- How many months is the average heating season where you live?
- What is the average daytime winter temperature?
- What is the average nighttime winter temperature/
- And maybe more….

Different types of wood have very different characteristics in terms of being able to heat a home. The BTU expected output for different types of wood commonly available in the intermountain west ranges from a low of 13 to a high of 32.9 – more than double the heat output of the lowest types, which means you would need half as much of the higher BTU woods as you would need of the lower BTU woods.

Now for a basic and indisputable fact:
A cord of wood is defined as filling an area 4 feet by 8 feet by 4 feet

Most people choose to stack wood in a 4' x 8' footprint, then go up 4' to obtain a cord. This translates to 32 sq. ft. of floor/ground space for a cord of wood, or 128 cubic feet if you include the height of 4'.

Where I live, surrounded by Dixie National Forest, they figure the average family can adequately heat their home for the year with 10-12 cords of wood, even factoring in our average 10-11 month heating season and the low BTU output of most of the available woods in DNF.

In terms of temperatures, Manti shows as USDA zone 6a with winter lows of about -10° F. while my area is zone 5a with winter lows of -20° F with average last frost the end of June and average first frost mid-August.

Doing some simple math, 10 cords of wood is equal to 320 square feet when stacked 4 feet high. If you go with the higher estimate of 12 cords, that would equal 384 square feet stacked 4 feet high.

In my own admittedly limited experience of just over a month now of using a small wood stove to heat my house, we have used about ½ a cord of wood for the last half of January and the first half of

February and have been keeping the house in the upper 60's most of the time during the day. In fact, it's warmer with the wood stove than it was with the propane furnace and electricity (because I kept the thermostat at 63 in the day and 59 at night). Obviously, the temperature drops if I'm outside or away for an extended period (several hours) and overnight, but it's pretty easy to bring it back up. So, my limited experience says that 10-12 cords of wood should be adequate, and that is certainly not anywhere near the size of my house, especially considering that that 320-384 square feet is only stacked 4' high.

Here are the specific details on heat from various types of wood that can be found in Utah from Utah State University:

Species	Weight (lbs./ Cord) Green	Weight (lbs./ Cord) Dry	Heat per Cord (Million BTUs)	% of Green Ash (see note below)	Ease of Splitting	Smoke	Sparks	Coals	Fragrance	Overall Quality
Alder		2540	17.5		Easy		Moderate	Good	Slight	
Apple	4850	3888	27	135	Medium	Low	Few	Good	Excellent	Excellent
Ash, Green	4184	2880	20	100	Easy	Low	Few	Good	Slight	Excellent
Ash, White	3952	3472	24.2	121	Medium	Low	Few	Good	Slight	Excellent
Aspen, Quaking		2160	18.2		Easy		Few	Good	Slight	
Basswood (Linden)	4404	1984	13.8	69	Easy	Medium	Few	Poor	Good	Fair
Beech		3760	27.5		Difficult		Few	Excellent	Good	
Birch	4312	2992	20.8	104	Medium	Medium	Few	Good	Slight	Fair
Boxelder	3589	2632	18.3	92	Difficult	Medium	Few	Poor	Slight	Fair
Buckeye, Horsechestnut	4210	1984	13.8	69	Medium	Low	Few	Poor	Slight	Fair
Catalpa	4560	2360	16.4	82	Difficult	Medium	Few	Good	Bad	Fair
Cherry	3696	2928	20.4	102	Easy	Low	Few	Excellent	Excellent	Good
Chestnut			18						Good	Good
Coffeetree, Kentucky	3872	3112	21.6	108	Medium	Low	Few	Good	Good	Good
Cottonwood	4640	2272	15.8	79	Easy	Medium	Few	Good	Slight	Fair
Dogwood		4230	High		Difficult		Few	Fair		
Douglas-fir	3319	2970	20.7	103	Easy	High	Few	Fair	Slight	Good
Elm, American	4456	2872	20	100	Difficult	Medium	Few	Excellent	Good	Fair
Elm, Siberian	3800	3020	20.9	105	Difficult	Medium	Few	Good	Fair	Fair
Fir, White	3585	2104	14.6	73	Easy	Medium	Few	Poor	Slight	Fair
Hackberry	3984	3048	21.2	106	Easy	Low	Few	Good	Slight	Good
Hemlock		2700	19.3		Easy		Many	Poor	Good	
Honeylocust	4640	3832	26.7	133	Easy	Low	Few	Excellent	Slight	Excellent
Juniper, Rocky Mountain	3535	3150	21.8	109	Medium	Medium	Many	Poor	Excellent	Fair
Larch (Tamarack)		3330	21.8		Easy-med		Many	fair	Slight	Fair
Locust, Black	4616	4016	27.9	140	Difficult	Low	Few	Excellent	Slight	Excellent
Maple, Other	4685	3680	25.5	128	Easy	Low	Few	Excellent	Good	Excellent
Maple, Silver	3904	2752	19	95	Medium	Low	Few	Excellent	Good	Fair
Mulberry	4712	3712	25.8	129	Easy	Medium	Many	Excellent	Good	Excellent
Oak, Bur	4960	3768	26.2	131	Easy	Low	Few	Excellent	Good	Excellent
Oak, Gambel			30.7							
Oak, Red	4888	3528	24.6	123	Medium	Low	Few	Excellent	Good	Excellent
Oak, White	5573	4200	29.1	146	Medium	Low	Few	Excellent	Good	Excellent
Osage-orange	5120	4728	32.9	165	Easy	Low	Many	Excellent	Excellent	Excellent
Pine, Lodgepole		2610	21.1		Easy		Many	Fair	Good	Fair
Pine, Ponderosa	3600	2336	16.2	81	Easy	Medium	Many	Fair	Good	Fair
Pine, White		2250	15.9		Easy		Moderate	poor	Good	
Pinyon		3000	27.1		Easy		Many			
Poplar		2080	Low		Easy		Many	Fair	Bitter	
Redcedar, Eastern		2060	13		Easy	Low	Many	Poor	Slight	Fair
Redcedar, Western	2950	2632	18.2	91	Medium	Medium	Many	Poor	Excellent	Fair
Spruce	2800	2240	15.5	78	Easy	Medium	Many	Poor	Slight	Fair
Spruce, Engelmann		2070	15	78	Easy		Few	Poor	Slight	
Sycamore	5096	2808	19.5	98	Difficult	Medium	Few	Good	Slight	Good
Walnut, Black	4584	3192	22.2	111	Easy	Low	Few	Good	Good	Excellent
Willow	4320	2540	17.6	88	Easy	Low	Few	Poor	Slight	Poor

Here is the link to the USU website for additional information and explanation of some of the column headings: https://forestry.usu.edu/forest-products/wood-heating

I encourage everyone to check out the information and learn more for yourself rather than taking my word for it, or anyone else's.

Finally – an observation related to solar cooking

We are in a very exposed area with a lot of wind. The wind has actually been a serious problem for me with attempting to use my solar ovens. Yes, I do have several of them, two commercial designs including a Sun Oven and a light weight, more portable one from another manufacturer, as well as a couple of homemade ones of different designs and materials.

I have recently discovered (figured out) that by putting any of my solar ovens inside the walipini (see my presentation on food independence) the wind is no longer a factor, plus, the walipini is so much warmer than outdoors that my solar ovens all achieve much higher winter cooking temperatures and better, faster results. Very nice bonus!