Fastest Way To Prepare

MODULE 3

POWER FOR HEAT AND LIGHT

Hello and welcome to this module. We are going to cover power for heating and lighting and specifically we are going to talk about scalable systems that are both affordable to put into place right now and high enough quality to use if your planning goes out to 6, 12 or 24 months. We are also going to talk about solutions you can start using right now so that you can get benefit from them before you are in a survival situation.

What we want to try and avoid is buying things that 10, 20, 30 years from now, if no disaster has happened, we don't want to have stuff that just sat around for the last 10, 20, 30 years. We want to get stuff that we can use both now and after a disaster. I'm going to share a simple trick with you that will let you turn your extra beans and rice into useable electricity to run all of your electronics and I think you'll like this. So let's get right into it.

We are a power hungry society; we use power for everything; for cooking, for refrigeration, for heating and air conditioning, for communication, lighting and entertainment, security and more. Almost everything that we use involves energy in some way or another. When the grid goes down you've got two options; number one is you use less because it's been forced upon you, or because your emergency energy supply is only so big or you make more. And ideally we would be able to make enough to take of everything that we do normally just living off of the grid, but it's not really that practical, off grid power costs a lot. I can't begin to convey how much money it costs to go completely off grid, especially if you are in an urban area. If you are out in the country then you've got a little more flexibility and you can make things happen that you just can't do in the city. But even in the country it's pretty darn expensive to go off-grid especially purely off-grid with solar and wind.

So your main options are going to be to generate power with a conventional generator either gas, diesel or other fuel. Use solar or wind power or use human power. And solar is great and I love it, really love it. My family has been using solar to one extent or another since it's either the late 70s or early 80s, so I'm a big-big fan of solar. It's great, but it's something you can't put into place in the next couple of days. It's also pretty darn

expensive; I'm going to give you a big warning on that "cheap solar systems" in just a minute.

Human powered generation is a different problem. It's not that expensive to buy but it takes a lot of man hours per week to generate enough power to actually be useable, to run what we would consider vital appliances.

Now gas generators on the other hand and basically what I mean by gas generators; one that uses gasoline, natural gas, propane, diesel, etc. Gas generators can be bought today or tomorrow and used immediately. Its what people go to the store and buy when a hurricane is a day out and they want to make sure that they've got power because its not rocket science - you just get it and you use it.

Now with generators you've got a couple of big-big considerations and on one end of the spectrum you want a generator that's going to run everything that you use on a normal day to day basis. On the other end of the spectrum you've got a generator that's going to be respectful of how much money you have to spend, respectful of how strong you are and how able you are to move it and fuel considerations.

A whole house generator takes basically an 8- 20 kW generator, costs several thousand dollars and there are problems with fuel. In urban areas you just can't store enough fuel to run it for very long. So just by where you live, it kind of limits you to a smaller generator and a smaller fuel supply. There are a couple of ways around that which we will get it into and it's not a problem out in the country, but they are still pretty pricy for a bigger generator.

Then we've got medium size generators that are 3-8 kW generators and I like those it's like the pictured here on the right. But they aren't easy for smaller people or older people or if you've got to move and stick it into a vehicle that's got limited space. Also one big drawback to the whole house generators and the medium size generators is that there just aren't as many times when you can use them before a disaster. It's not something that you can stick in the trunk of a car or in a mini-van or an SUV and use on a weekend because it's just not that portable.

Some people do go ahead and use them, but they are fairly loud, they go through gas at a pretty good rate and they are really kind of overkill for camping. And there's another class and its obvious by the bias that I'm putting into this presentation is the way that we've decided to go and it's a class of 2 kW generators and they weight roughly 50 pounds, they sift gas and they cost under $1000.

Now if you are a little fuzzy on what the kilowatts are; basically all of your appliances are going to use a certain amount of power and they are going to be rated in kilowatts. I will give you an example: Refrigerators, it really depends on the efficiency, they run from 200 watts to 300 watts up to 1000-2000 watts depending on whether they are frost free, the most efficient LGs on the market or an older refrigerator. So you could run a few of those on a 2 kW generator. Basically what you are going to need to do is figure out what appliances or items you want to run at a given time and size your generator accordingly.

You are probably not going to be able to run your air conditioner on a 2 kW generator. I'll show you how to do that in just a minute. But this is going to be mostly for smaller things for charging batteries, for refrigeration, for maybe running a fan. But the big thing is going to be for charging batteries and then running things off the batteries.

What I recommend and what we have gone with is the Yamaha EF 2000 IS inverter generator. As you can see in the illustration, it has a handle on the top and the reason it has got a handle on the top is because it is light enough to carry with one hand and that makes it pretty darn great. It's just a very-very good little generator and we've had good success with it and I'll get into some details on it.

Once you start looking at generators if you do any research online you are going to see the big argument is red versus blue, red being Honda and blue being Yamaha. This is a debate that will go on as long as Yamaha and Honda are in existence. Yamaha is normally more expensive than Honda, that may change over time but right now Yamaha is more expensive than Honda.

I believe that it's a higher quality product, but it may or may not be people have had great experiences with Honda people have had great experiences with Yamaha. My line of thinking is I'm going to be using a generator some, but when I really-really need it I don't want to screw around. I want to make sure that I've got a generator that works and I don't want to be penny wise and pound foolish and end up with a cheap generator that doesn't work in an emergency.

Like I said, they are both high quality. The Yamaha comes with more goodies, it's got wrenches a spark plug wrench and it's also got a charging cable so you can directly charge 12 volt batteries which is quite handy. Both can be run parallel and double the output, and what that means is you can take two of the Yamaha 2000s or two of the Honda 2000s and with a special cable hook them together and then have, its actually 3800 watts of power and with that you can run an air conditioner. So you have the flexibility of having small portable generators, and enough power to handle some bigger stuff. In reality though, in an emergency situation it just doesn't make sense to run your air conditioner very much at all. If you do decide to go that route you are better off finding a small window unit that somebody has discarded and run that instead of a whole house air conditioner.

As I said before, when you use the parallel chord you get redundancy which is awesome. Instead of having one 4000 watt generator to go bad you've got two 2000 watt generators and if one goes bad you've got the other. If you need parts from one you can salvage them off of the other. You have twice as many things that can go wrong, but if something does go wrong you've got a complete generator back up. Makes it easier to carry by having two smaller generators and you can spread them out. If you are travelling in two cars you can put one in each car, if you have two places you can put one in each house. If you and your neighbor are preparing together each of you can buy one and hook them together when need be. And the other thing is that you control the fuel use. This is a big deal since the smaller generators, like I said, just sip fuel and the big ones go through a decent amount-you control how fast you go through fuel. When you have small fuel requirements you only need to use one generator, when you have big fuel requirements you can use two generators.

A third option, this is a newcomer to the market but so far everything that I've seen has been good about the Champions. I shouldn't say everything most of everything has been good about the Champions. A few cool things, they are stackable, they are significantly less expensive and almost half as expensive as the Yamaha generators and less expensive than the Honda generators.

You can run them in parallel like you can with the Yamaha's and the Honda's. One of the biggest problems is that there is a limited network or no dealer network which means no parts are available for it. With Yamaha and Honda, in almost any city or town, not necessarily town but any moderate size city to large city in the US there are places where you can get parts for the Yamaha and the Honda generators.

Now here is another reason that I suggest going with either the red or the blue or the Honda or the Yamaha and that is tri-fuel adapters. These things are really slick. What they do is they allow you to run propane, natural gas, or regular gasoline in your generator and that gives you just tremendous flexibility and it gets around the problem of not being able to store gasoline in urban houses.

There are a few other advantages, one is that the exhaust smells better that's just a function of natural gas and propane and it's compared to gasoline. Another thing is it significantly increases the longevity of the generator; it can't gum up the carburetor. These things are great. In addition to being able to safely and legally store more fuel for your generator, you don't have to pour hot fuel or don't have to pour fuel into a hot generator. That's one problem that when these go empty, when your tank goes empty, you take off the lid and pour fuel into a generator and it may spill down and hit hot parts of the exhaust.

Now on the Honda there is a lid with a hose in it that allows you to take fuel from another container. I've seen the aftermarket versions of this for the Yamaha as well I haven't tested them though, so I don't know if they actually work. But with this conversion kit you can store a lot of propane and the propane doesn't go bad. It's safer and easier and you don't have that problem with pouring fuel into a hot generator.

Two places where you can get them, I've got them listed here, Propane-Generators.com and GeneratorSales.com.

When you are using a generator you've got to remember carbon monoxide and I don't want to sound like a broken record on this but the fact is there are 400 deaths and 20,000 hospitalizations a year due to carbon monoxide poisoning. A huge-huge percentage of these happen after natural disasters when the electricity goes out. Unfortunately there's another component to this; 75% of the youths who are hospitalized after a disaster due to carbon monoxide poisoning, the reason that they had the generator plugged in is because they were playing a game console. Where the statistic comes from is a hospital in Houston after a hurricane, I forget which one it was, but 75% of the kids that were admitted who were under 18. The reason the generator was going on was because they were playing video games.

The reason that they got carbon monoxide poisoning was because they tried using the generator in a garage that was attached to the house and the carbon monoxide seeped in

and they didn't have a carbon monoxide detector so they got carbon monoxide poisoning. Carbon monoxide will kill you before it kills the generator. I hate to admit this but I used to think that if I was using a generator or running the car in a garage that it would turn off, the engine would run out of air before I did. The fact is the brain works different than an engine. An engine can run way after carbon monoxide levels get to lethal levels. So you just need to be really careful with it. And what I suggest is using a plug in carbon monoxide detector plugged into the generator and a second AA carbon monoxide detector in your house where you are and that's even if you've got the generator running outside and you are running a chord into the house.

Again the reason is it's a cost benefit analysis here. The cost of being wrong way-way outweighs… there is no benefit to being right, being right is you go on as normal. There is no benefit to being right.

Now QUICK primer on solar, like I said, I love solar and we've been using it for a long time to one extent or another. But there are four basic types of solar panels and two that I really want to cover are mono-crystalline and poly-crystalline and I've got pictures of the two of those off to the right. Mono-crystalline is what's on the top and as you can see it's uniform and consistent. Poly-crystalline down at the bottom looks irregular and has almost a snowflake pattern. The reason for this is the mono-crystalline ones everything lines up the same way and it reflects light the same way. The poly-crystalline one is basically scrap mono-crystalline cells that are put together to make a poly-crystalline cell. The mono-crystalline cell will put out more electricity in a smaller space, in a smaller panel but it'll be more expensive. Normally the cheaper panels that you see are going to be poly-crystalline of one design or another.

You've also got amorphous and Thin film cells and those are the flexible solar panels that you see. Those again actually become more expensive per watt but they are flexible and much-much larger for the same output. So again it's a cost benefit of whether you want to go with the cheapest solution to have a panel or the cheapest solution per watt. The cheapest solution per watt is normally the mono-crystalline.

If you need a compact package the cheapest solution per watt, if you've got lots of space, is going to be the poly-crystalline. If you need flexibility and you need it to fit in a back pack you are going to want to go with amorphous. On this note, there are 60 watt solar generators that are being sold by several manufacturers and they are sold paired up with what's called a modified sine wave inverter and they do technically work. But let's just go nuts and say you've got the high end LG refrigerator that uses 300 watts of power and you've got a 60 watt solar panel. What that means is that you are going to need to run

your and this is a gross simplification, you are going to need to collect five hours of full sun in order to run your refrigerator for a single hour. Now if you've got a more traditional 1200 watt frostless refrigerator, what that means is you are going to have to get 20 hours of sunlight for each hour that you run your refrigerator.

So you may actually be able to run it when the electricity first goes out and you plug in into the backup power bank or the backup battery bank. But once that battery bank goes down you are not going to be able to charge it fast enough. You are not going to be able to add electricity to it as fast as you are talking it out. So they are good systems as long as you know their limitations.

In addition, most of these… but most notably the Duracell back up kits and Xantrex back up kits have what's called a modified sine wave inverter and electronics run on a pure sine wave. And modified sine waves can cause them to burn out faster or not work as well, or not turn on at all. So if you like your electronics and you like them to last, you may want to make sure that you are using a pure sine wave inverter and not a modified sine wave inverter.

Now personally we are slowly moving to solar electricity and its not cheap, it not easy and its not fast but I like it so much that it's the way that we are moving and its going to be a combination of solar and wind. But as long as we are in a town we aren't going to do wind its just going to be solar.

Now I told you I would tell you a trick for how to turn beans into electricity and this is a very-very simple trick. You may or may not have heard it before; you may not have known how to implement it even if you did know. Basically what you do is you trade food for time pedaling a human powered generator, either a hand crank or a foot pedal crank generator. Basically when someone comes to the door and they are asking for food, you can say to them "Absolutely. All you have to do is pedal this crank generate so many watts and I'll give you so much food. You can eat to your heart's content as long as you pedal."

And here is an example. I want to back up a second. Some people would call that cruel, some people would call that completely free enterprise, it's an idea that you can take or leave. But after a disaster you've got charity and you've got people who need to pull their weight, and if people can't pull their weight that's where charity comes in. If people can pull their weight I think that they should. That's just my opinion on it if you've got a different one that's fine.

What I've got pictured here is actually the Duracell kit one of them that I was talking about having the modified sine wave power that comes out of it. This is a 300 watt bicycle generator from pedalpowergenerator.com. They give you complete plans of how to make a generator yourself using whatever components you want or you can buy the whole pre-made kit from them. This is great because once you've got the generator you can hook a bicycle up to it, you can hook a hydro-unit up to it if you happen to live near a stream, you can hook a hand crank up to it, you can hook a treadmill up to it, and you can hook anything that you want up to it.

Next we are going to talk about adding flexibility with batteries. One of the things that we do or that's in our plan when we are going through a day or two or three or however long without power is, we use a generator during the day when its loud outside to run appliances that we need to run and also to charge batteries. At night when it gets quiet out and we want to sleep we turn off the generator we bring it inside and we use our batteries.

That way we have solid operation, we still have electricity but we don't have a real loud signature that says "Hey we've got a generator come steal our generator or come look for things that you may want". Without batteries you either use power or you loose it. If you've got a solar ray that's putting out 1000 watts and you are only using 300 of it you loose the other 700. If you have batteries in your set up then you can capture that electricity, you can capture that power and use it when the sun is not out.

There are several different kinds of batteries, there's lithium polymer which is what's in an iPhone and some Smartphone's have very-very small batteries. There is also Air-Soft

equipment if you use Air-Soft for firearms training. There are also lithium ion batteries that are also in cell phones and AGM. It is going to look like a regular car battery but it has some different features so that it doesn't spill if it gets broken and it has some great longevity properties. These are great-great choices, but they are very expensive and they may keep you from doing something as quickly as you would like to.

Personally we wanted to get stuff in place and specifically we wanted to get stuff in place before a particular blizzard. So we went with T-105 type 6-volt batteries. And over the years we've gotten a few different kinds, we've gotten batteries by Interstate, by Deka and by Alliance and they are all the same T-105 type which are about the same size as a car battery but they are 6-volt batteries that are made to run appliances rather than start cars.

This is an important point, you've got car batteries and you've got deep cycle batteries. Car batteries are made to put off a large amount of power to start the car and then get immediately charge back up. Deep cycle batteries are made to get drained down halfway 60- 70 percent of their capacity and then charge back up, over and over and over again. If you use a car battery in a deep cycle application your car battery will die very quickly, within days or weeks. If you use a deep cell or a deep cycle battery in an automotive application as long as you've got enough amps it'll work fine. Normally it is not going to work because it's going to take several batteries to generate the amperage that you need to start a car, so all this to say, if you've got an extra car battery laying around that's not what you want to use for powering appliances.

The batteries that we've gotten are all 200aH batteries and they cost between $100 and $150 a piece. You can find them at local stores, local battery places and local golf cart supply places. A lot of times these are called golf cart batteries because that's where they are used most often. They are also used in RVs and those are really the two main things,

they aren't used in household applications that much; there's a different class of batteries for permanent residential use.

Charging the batteries becomes the next issue and the reason for this is they've got to be maintained whether you use them or not. This is especially true if you are in a hot climate. Once you get over 75 degrees the life of the battery drops off significantly. So you really want to maintain them and make sure that they keep a good charge, keep the fluid levels up so that when you do need them and when you do need to rely on them they are going to be available for you. Personally I charge and check water levels in our batteries once a month.

One thing that I didn't say on having the three types of batteries, you never want to mix batteries from different brands or that have been bought at different times. It ends up basically killing them. The batteries either have to be the same or you don't use them together. What we had was pairs of batteries that we would cycle through between using and charging. It is admittedly not the most efficient way to do it but when we were tip toeing into solar, not just solar but backup power, it was the way that we could afford to do it and the way that we could make it happen. So that's what we did, and at some point in the future we will go ahead and buy a big bank of batteries, 6, 8, 10, 12 batteries at one time that just wasn't in the cards when we started buying batteries.

For charging the batteries if the battery levels are low we us a combination 6 and 12 volt Schumacher plug in charger and this is again admittedly not the best choice for charging deep cycle batteries but it does work. We really need to upgrade to a dedicated charger and maintainer. They are not incredibly expensive. But just when we did it we went with one that we could use both for charging our 6-volt batteries once a month and for charging and jump-starting vehicles if we needed to.

One big benefit of the Yamaha inverter generators is that they charge batteries directly and there is a cord that comes with them with jumper cables and you just stick it on the battery and let the generator go and charge it up. You do need to keep track of the voltage but it will charge it in good time.

Controllers are another option and they are what you use when you are using solar, wind or human power that's generating a DC current and you use that to charge batteries. That gets into a whole other thing. The pedal power generator site has a very-very good controller on it that will take a wide range of voltages and charge 6 and 12 volt batteries, actually 6-volt batteries in series or 12-volt batteries.

Next is inverters; inverters are really-really awesome and it's important to know a couple of things about the inverters. This one here in the illustration, is a relatively cheap one that you can get at Radio Shack. It has both a cigarette adaptor and alligator clips to

connect directly to a battery or a battery bank. One thing that you need to keep in mind with these is that they are most efficient when they are running at 60-70 percent of the rated capacity. So if you get a 300 watt inverter you really want to be running it somewhere between 180 and 210 watts. If you use it more than that, if you are using a higher load than that, it's going to drain your battery faster. If you use less than that it's just not going to be efficient because it takes a certain amount of power, because of that you really don't want to use it if you are using less than half of the recommended load. You can for a short time especially if you are in your car and you are driving and it's getting powered by the alternator, but if you are running it off of the battery, you kind of want to figure out another solution than running off of the inverter.

Again, pure sine wave inverters are very good, the modified sine wave inverters you may or may not have trouble with them. Most inverters are a modified sine wave. This one right here, the inter-cell one, we have two of these. They have a modified sine wave inverter in them; we use them for computers, we use them for charging our phones but we have had some trouble with them. They've also worked great but it's just hit or miss and this is something that you want to figure out before you've got a problem and if they don't work for your particular appliances get a pure sine wave inverter.

As far as the efficiency that you want to look for none of them are 100 percent efficient. They all waste power, they waste power in the form of heat and they waste power with the fan that they all have to have to dissipate heat. 80-90 percent is what you'll normally find in stores and 90-98 percent efficient is easy to find. In fact a lot of solar rebate programs are based on having an inverter that's 90-98 percent efficient and if you don't have one that is 90-98 percent you won't get a rebate. So you can look for them or not, it's definitely not a deal killer to get an 80-90 percent efficient inverter if it's what you can get and put into place right now. There's good enough and there's perfect and if you can do perfect that's awesome, if you can do good enough do it. That way if a disaster happens you've got a workable plan in place; it may not be perfect but its better than having it all floating around in your head and saying 'I wish I would have'.

Something else to keep in mind is running load versus peak load. Most inverters have two ratings on them and they advertise their peak load and that's going to be in this case a 300 watt or I'm sorry this one is a 350 watt. This is an interesting point, there are two different models of this and there used to be 350 watts and they replaced them with a 300 watt version at the same price and this is just a subtle form of inflation, I'll go back to the 300 watt example. The most power that it can handle at one time is 300 watts and if you are starting an appliance it takes more power to start it than it does to run it. So the running load is what it can handle for minutes or hours at a time and the peak load is what it can handle for a few seconds while an appliance is starting up. So again you want to size your inverter for what you are running.

A garage door opener is an example of this. Going back to blizzards again, when my lovely petite wife was driving around with a new born and a toddler I didn't really care that she could open the door if she needed to in a power outage. I didn't want her to, I

didn't want her to have to, if she needed to that was fine she could do it. Part of being a loving, doting husband was I wanted to make it so she wouldn't have to even if the electricity was out.

So what I did was I hooked up an inverter in a battery bank that was constantly charged to our garage door opener and that way when the electricity went out during blizzards or whatever reason they went out, she hit her garage door opener and the door would open. A garage door opener takes a lot more than 300 watts and this inverter did not work for that and we had to get a bigger inverter that was dedicated to the garage door opener. But which kind of brings up the thing with multiple inverters versus a single inverter.

Inverters are something that once you get in to backup power you are probably going to end up with a few different inverters. Its kind of like a knife, there are good general knives but sometimes you want a specialty knife. We use small inverters for small handheld devices, keeping phones charged, radios charged, etc, while we are driving. We use big inverters to run appliances.

We run the blower on our air conditioner, I'm sorry not on our air conditioner but on our furnace, because one of the things that happens in a power outage in the winter is you may have gas to your house but unless you've got power to run your thermostat and your blower all that gas doesn't do you any good. So we have a backup plan in place to take care of that.

Now here are some ways to use less power, again I talked about before how you've got two options in the whole emergency power game and one is to make more power and the other is to use less power. It's much-much easier to use less power than to find ways to generate more, because fuel isn't always easy to come by. If you are in a high wind area and you can have a windmill that's great as long as you've got wind same thing with sun. As long as it's sunny and you've got a correctly sized system that's great. If you've got both it kind of means that you've been able to buy your way out of the problem which there's nothing wrong with that its just not an option that's available for everyone either because of finances or because of where they are at.

So here are some ways to use less power. One is to use candles, lanterns, and LED lights for lighting. Personally we have candles and lanterns but they aren't something that we use a whole lot and fire is the simple reason. We do use them in the kitchen where we've got tile floor, we don't use them in the living room and bedrooms where we have carpet and fabric. So this is something that you are going to have to make a choice on. If you do use candles and lanterns of course you make sure to have extra fire extinguishers available to use on them. LED lights, we absolutely love LED lights, after Christmas I go around to the different stores and I buy up the Christmas tree LED lights and they might be $1 to 3$ for a 50 foot string of lights that were $10 to $20 three days before. Great, great way to pick up LED lights on the cheap. Headlamps and lanterns, LED lanterns, are a great option and a great alternative to incandescent lighting or a typical volt. We like using incandescent lighting just because of the quality of the light but when it comes to

power consumption you just can't beat LEDs. They are significantly more expensive but the power saving is incredible. In our house we don't have LED lights in our appliances right now or in our fixtures. All of our LED lights are headlamps, camping lanterns, other things that have multiple uses. In our RV though we've changed a lot of the interior lights to LED lights and what we do is we have one switch set up and its all LED and some of the other set up so that they are incandescent. So in the kitchen and living room area we can turn on just the LED lights and be fine or we can turn on the LED and incandescent if we have a better power supply and have a lot of light.

Refrigerators are another thing that uses a lot of power. There is no real way to tell how long your refrigerator is going to last after the power goes out. It's going to depend on how well it's insulated, how full it is. The more full it is the longer it will last. I talk about this in the surviving place course, one of the things that you want to do is fill up any empty spaces that you can in the refrigerator and your freezer with water bottles or water jugs. So that when the power does go out you have go that, it's called thermal mass, and it will keep the refrigerator and the freezer cold much-much longer.

The other thing is you want to limit access to your refrigerator and your freezer, and if you can help it you only want to open it once or twice a day. Ideally you don't want to open it at all. But at some point you are going to want to get food out of it so when you do just get it in and out as quickly as possible. One trick on this if you are in a situation where you have a camera and it works, a digital camera, one of the first times that you open your refrigerator take a picture of it and then from then on when you get ready to get into the refrigerator stop a minute and take a look at that picture that you took so that you know where you need to reach so that you can minimize your time in the refrigerator as much as possible.

Another thing you can do is if you know that there is a big space in your refrigerator after the power goes out, take a trash bag and blow it up and tie it shut and try and make it so it's just the size of the space and then when you open the door stuff the trash bag in. What that will do is keep the air from transferring when you open the door the next time. Another thing that you can do is consider using a propane refrigerator freezer like what you find in RV's. If you have got an RV and it's parked next to your house it's pretty simple you just move stuff from your house out there and start running off propane.

The down side of these is they are pretty pricy when you compare them to a conventional refrigerator, and I'll tell you a trick on how to get them cheaper in just a minute. Also one of the things you might want to consider is if you are using a generator to power refrigeration, instead consider using a deep freeze and a cooler instead of using a fridge. So basically what you would do is run the deep freeze a few hours a day and freeze water in it and then take that ice and put it into a cooler. Preferably a very high quality cooler like the Yeti Coolers I have talked about before. Its YETI coolers and with the Yeti cooler, just a little bit of ice will last for several days.

The next thing: Cook with the smallest possible appliance that you can. Even if you have got a way to power a full sized gas oven try and use a smaller camp oven or a Dutch oven. Basically try and figure out how you can use the least amount of fuel as possible. If you have a choice of using your full grill or using a little camp stove, use the camp stove. Even if you have the ability to use debris in your area, then use that and save your refined fuel for when you absolutely need it.

One thing with air conditioners after a power outage they are pretty much you are not going to want them. You are not going to be using them. You can use them but the amount of fuel that you need to power a generator to run an air conditioner is going to be cost prohibitive, again you can use the strategy I talked about which is finding a high efficiency window unit and running that in one room, but for the most part you are going to want to figure out other ways to stay cool.

One of those is by adjusting clothing and in the summer obviously you want to wear fewer clothes, in the winter obviously you want to wear more clothes and the goal in a emergency or survival situation is to conserve fuel and regardless of whether you want to conserve fuel during normal times, during an emergency everyone needs to conserve. If you don't it just means you are going to run out faster and you are going to have another problem that you have to deal with.

One of the best things that you can do to conserve power in an emergency it to create micro environments and a winter example is the easiest one. If its zero degrees out and your power is out, instead of heating the entire house just heat one room and instead of heating one room setup a tent in a room or set up what we call with our boys a fort with couch cushions and blankets and sheets. Try to make it a small of an area as possible and if you make a small area you can heat it with just your body heat and natural body functions. If it gets a little bit bigger then you can use other types of heat. If you are in what I would call a normal suburban house with a oversized living room and a fireplace and lots of open passage ways to other parts of the house, try and close them off with sheets or blankets or tarps or Visqueen, so that your fireplace can actually heat the room that you are in. Now again you have a carbon monoxide issue here and make sure that you are running a carbon monoxide detector, but just try and make the area as small as possible. If you do decide to go with the room air conditioner, pick a small room. Pick the smallest room that you can use with the air conditioner so that you don't have to run it very long and you can get cool and get some benefit from it.

Another thing is solar cookers. They save a tremendous amount of fuel just by harnessing the sun's energy. On the left is an example of one that I talk about in the Advanced Urban Water Purification book and also in the Lamplighter Report Newsletter, and this is a Fresnel lens and it's a lens salvaged from a projection TV. Well basically it's a magnifying glass and if you can imagine a magnifying glass that you cut into slices and then you hollow out the middle so that all you've got is the edges and then you compact all the edges together so that instead of the magnifying glass being shaped like a lens it's flat. What this does is it focuses the sun's energy and it focuses it quite well. This will heat, it will start a piece of timber or lumber on fire in five to ten seconds in the focal point of it, and it will heat this little black container well over 160 degrees in, I believe, ten minutes. So you can pasteurize water which makes it drinkable and you pasteurize water by getting it to 158 degrees and that kills bacteria, viruses, and protozoa and you can use that for cooking as well. If you let it sit longer you can boil with it but you don't even need to do that.

Another option pictured in the middle is to take an old satellite dish and this is just, I believe, it's a dish network satellite dish and what I did was I took some Mylar tape that I got off of Amazon and coated it and pointed it towards the sun and again it heats the container up to a 158 degrees to where the water is pasteurized relatively quickly. I believe this was 15 to 20 minutes and it was well below 20 degrees when I did this experiment.

Here is another option on the right; this is a sun oven or a solar oven from SunOven.com the down side of this is, the last couple were very cheap to implement, the Fresnel lens you can get those on big trash pickup days when people have TVs out on the curb or you can buy them off of Amazon for 100 bucks framed and ready to go. The satellite dishes you can get for free, buy off of Craigslist or Freecycle, but these are 300 bucks and they do work very well - as you can see they are cooking bread in there. You can make one at home on your own out of cardboard and aluminum foil using the exact same design parameters. What you want to do is basically collect as much sunlight as you can and focus it on a small cooking area.

Another thing you can do for power is keep just small batteries on hand. We keep at least 50 AA and AAA disposables on hand at any given time and we just pick them up when they go on sale at Costco. We don't get them at sporting goods stores anymore because

what we found is the AA batteries that are sold in sporting good stores normally have a lot less capacity than the normal batteries and it may look like you are getting a heck of a deal and in reality you are not. You are getting about a third of the capacity for maybe half the price. Another option that you have got is nickel–metal hydride rechargeable batteries and these can be good or they can be junk; you want to make sure that you avoid buying them unless you see a milliamp hour rating on them. Three good brands are Sanyo and they go by Eneloop, AmazonBasic is great and GP is great; a lot of other ones are hit and miss. Now especially on these, the Eneloop ones there are Eneloops that have a 800 milliamp hour capacity and there are Eneloops that have 2000 milliamp hour capacity and they are not apples to apples. You buy the 2000 milliamp hour ones and you've got two and a half times more power than with the 800 milliamp hour ones. So you really want to make sure that you look for and find the milliamp hour rating before you buy these nickel–metal hydride rechargeable batteries.

For disposables something that we are switching over to with a lot of our electronics is lithium batteries and all I can say is they are incredible. In GPS units they last two to three times longer when the temperature is what I would call normal. In cold weather they last even longer compared to alkaline batteries. They are lighter and they have a 15 year shelf life. They are more expensive per battery, but they aren't more expensive when you consider energy density and how many batteries you need to carry with you to run appliances for the same amount of time. There are lithium rechargeable batteries that you can get but they cost about $10 a piece and I just don't see the value in them right now. For some applications they may work for stuff that you're going to go out today, this week, this weekend and put into place, I would not worry about lithium rechargeable batteries.

Two parting tricks I want to share with you one is how to get cheap uninterruptable power supply systems or UPS systems otherwise known as battery backups, and I especially look for ones that have automatic voltage regulation. What automatic voltage regulation does is it smooth's out rough electricity. So if you have problems from the utility company, problems on your block, problems with your transformer etc, the automatic voltage regulation or AVR will smooth it out so it doesn't damage electronics and so that your electronics last longer.

Well all these systems, the batteries die at some point and when they do its very-very easy to open them up and replace the batteries and it's so easy all you have to do once you open it up and look at the battery is type in the model number in Amazon and order the battery or go to Radio Shack and buy the battery and it's just a fraction of the cost of going out and buying a new UPS system.

One of the interesting things is these get thrown away very-very often and you can see them on the curb on big trash days, you can see them on the curb on hazardous material days and you can see entire battery backup units at battery recharging stations or battery recharging drop off locations where you drop off batteries instead of throwing them away and there they are free. So you just pick up the system, open it up, take out the batteries

and order new ones. The new ones and the ones that came with the battery will normally have the same connections if not all you do is snip off the ones that came with the unit and put them on to the new one either a crimp them on, twist and tape, solder, however you want to connect them, but you can get a very-very high end power supply for very a low price.

Next thing is if you have got the space consider buying a used RV and the reason is, all of a sudden you've got water storage, a generator, propane tanks, accommodation propane and 120 volt refrigerator, an air conditioner, deep cycle batteries and a battery charge controller for cheap. I looked right before I recorded this and in our area right now there are four RVs that have all of these items in them, from $500 to $1,800, so for less than the cost of a refrigerator or less than the cost of the generator or less than the cost of the air conditioner, you can get all of them and granted now, I'll be the first to say RVs take work. And all of these systems in these dirt cheap RVs are probably going to need help, but they may not. If you go out and you look at them and the reason that they are giving away the RV is because the engine doesn't work and all you want to do it tow it and take all the stuff out of the inside or use all the stuff from the inside, then you are good to go.

For self-propelled RVs you can have engine problems, you have transmission problems, you can have all sorts of things that make the RV not worth very much, but all of the things that are valuable from a self-reliant perspective are still good in there. You can all of a sudden have redundancy with what you have got in your house, again for next to nothing. So if you have got space to park it and if that's something that's interests you I want to encourage you to look at it, look at the trailers, look at the self-propelled RVs and if that's a fit for you it could be a very good fit. We have gone this route and so we have a back up to everything in our house, everything that we have done. It happens to be a trailer that we can take wherever we want to go. We can also leave it by the house and have backups for all the systems that are in our house.

So that's it for this module and look forward to seeing you on the next one.

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