

September 2010 Newsletter from Building Diagnostics

Welcome to the September newsletter. In this issue I have a FIT and recommend some reading on biomass. There is real information in the energy tips section as well, a radical departure from recent practice.

I was a bit taken aback by the reaction to math class last month. I thought that most people would snooze through with no reaction. But the responses were pretty strong in both directions, some love, some hate. What was really interesting is that there has been a strong sign up this month. I assume that either the geek crowd is spreading the word or there are people who need more electrons in their in boxes to recycle.

I was also informed that in the tradition of USA based chauvinism, the units I used are only valid in this country. If you are really interested please feel free to check the relevant information on [Wikipedia](#) or Google away.

A further announcement before we continue. I got the following email forwarded from at least three people. I agree that it is important so I am including the original email:

From: Jim Rubens [<mailto:jimrubens@aol.com>] **Sent:** Monday, September 13, 2010 8:08 PM **To:** JimRubens@aol.com **Subject:** Urgent Action Alert: Protect EPA Climate Authority

Dear Clean Energy Supporter,

Given dim prospects in the Senate, the battle to act on climate change has shifted to the Environmental Protection Agency. The EPA is required by the Clean Air Act under current law to protect the public from global warming emissions, based on its [scientific finding](#) that they are harmful to public health and welfare. The public health finding has been litigated and found valid up through the US Supreme Court.

The EPA is about to begin the process of setting limits on global warming pollution from the largest sources, such as coal-fired power plants, oil refineries, and cement plants.

[Opponents of climate action](#) will attempt to block or delay the EPA via an amendment to a must-pass appropriations bill. Over 190 House members have co-sponsored or voted for measures to restrict or delay EPA. In June, 47 Senators voted for a similar measure.

This Thursday, September 16th, the Senate Appropriations Committee will vote on an amendment to the Senate Interior, Environment and Related Agencies Appropriations Bill that would prevent the EPA from spending any money on researching or regulating greenhouse gas emissions. This would effectively stop all federal action on global warming. Senator Gregg represents a key vote in this committee.

All hands are needed right now to stop this latest attack:

1. For everyone: **phone Senator Gregg's office at 202-224-3324** asking him to oppose any attack on the Clean Air Act and the EPA. Please do this today.

2. If you are a scientist, engineer, health professional, or economist with or working towards an advanced degree: **sign on to this statement** urging Senators Gregg and Shaheen to oppose any Senate action that would prevent the EPA from fulfilling its mandate.

Please pass this email on to any of your peers who might be eligible to sign – and follow up with them personally. The sign on deadline is September 23.

The statement will be delivered to Senators Gregg and Shaheen in late September. It will also be distributed to the media, and may be used in newspaper ads. Efforts to handcuff the EPA may resurface this winter and spring, at which time we may reissue this statement.

Sincerely,
Jim Rubens
Union of Concerned Scientists
(603) 359-3300

This Month's Topics: #1: Feed in Tariffs.

Feed in tariffs are a hot topic in the renewable energy world. They seem to be replacing, or supplementing, rebates as the tool of choice to encourage the growth of solar and wind electric generation. Unfortunately they are also reminding me of a nearly dead cat.

About twenty years ago I had a customer who decided to adopt a stray cat that was hanging around her house. The cat had spent a long time as a stray and had the feisty attitude that had kept her alive. She also had a really bad infestation of fleas.

The new cat owner (a very holistic type, btw) went to the natural pet supply store and came home with a spray bottle of natural flea killer. The bottle had application recommendations and said the problem would be cleared up in 2 or 3 weeks as I recall.

Unfortunately (for the cat) my customer did not want to wait two weeks so she saturated the poor cat's fur several times a day. I stopped by one day and the cat was having difficulty walking, and drooling. The pyrethrins used in the flea killer are natural but they are a neurotoxin. Used at proper doses they are very safe for animals, overdo it and the result can be very bad.

It is the same with feed in tariffs (FITS), too much of a good thing can be detrimental.

What is a FIT? Simply, it is an agreement between an electric utility and the owner of the renewable generation to purchase the output of the system for a guaranteed price for a certain amount of time. Actually there is no official definition in federal regulations, a January 2010 report from NREL saw the need for a definitions and suggested this:

a publicly available, legal document, promulgated by a state utility regulatory commission or through legislation, which obligates an electric distribution utility to purchase electricity from an eligible renewable energy seller at specified prices (set sufficiently high to attract to the state the types and quantities of renewable energy desired by the state) for a specified duration; and which, conversely, entitles the seller to sell to the

utility, at those prices for that duration, without the seller needing to obtain additional regulatory permission.

So this is a mechanism that can be used to create a favorable financial situation for individuals and businesses that invest in renewable energy projects. It is a guarantee of an above market price for a period of years. The exact amounts are determined by the utilities or more likely their local regulatory board, usually after legislative action.

As with rebates or other incentives this can be a powerful tool to encourage the growth of renewable energy. Unfortunately, in my opinion, the implementation is failing a very basic test. Does it create the greatest amount of generated kilowatt hours for the money? I think the answer is no.

Let me briefly go over some basics. We purchase electricity in kilowatt hours, utilities typically purchase units of megawatt hours. I'm going to assume that you understand watts vs watt hours. It isn't that difficult, although often when discussing usage the hours get omitted which leads to confusion. A kilowatt hour is one thousand watt hours, a megawatt hour is one million watt hours, or one thousand kilowatt hours. For the sake of this exercise I am going to state everything in kilowatt hours.

So what's wrong with FITs? The short answer is that they are paying too much for the kilowatt hours they are purchasing. I understand that for a FIT to be meaningful it must value the renewable power at a higher rate than fossil fuel generation. It is an accepted method of market manipulation to pay more to encourage a desired outcome. Yes, I said manipulation, but it isn't a bad word. Every transaction in a market is a manipulation of that market, unless it is rigorously controlled via regulation. No purchase or sale is free from the influence of our human wants and desires, so the concept of a purely rational market is, again in my opinion, irrational.

But even within that irrationality there needs to be some contact with reality. The NREL definition above says that the prices will be set "...sufficiently high to attract to the state the types and quantities of renewable energy desired by the state." What it doesn't say is that setting the price too high will dilute the value of the dollars spent on the FIT, reducing the potential purchasing power and long term benefits.

The concept of the FIT as currently seen originated in Europe, I have seen credit given to Germany most often but occasionally other nations are named as originator. In one sense it has been a rousing success. Germany is the largest producer of solar electricity in the world (Note: Statistics can be hard to pin down on this and some production claims are questioned, but that is not my point here.) But to get to that point they have created FITs that pay several times the market rate for renewables (the formulas are complex and the multiplier varies considerably).

Other countries have seen the results in Germany and have decided to clone the approach. France created a system modified from the German model, Britain enacted a system in 2008 that takes full effect this year. And in this country FITs have been implemented in New Jersey and parts of Florida among other places.

One other little detail about FITs as opposed to net metering, under most models you get paid the full tariff rate whether you export any energy or not. It is a pure production model,

you make the KWh, you get paid even if you use them all yourself.

Even that last part is fine by me, avoided cost is avoided cost. The market problem with FITs is that they are snapped up as soon as they are available. In Gainesville Florida the local utility announced a FIT paying 32 cents per KWh on March 1st 2009. They were fully subscribed for the year within three weeks. In Sacramento CA the local utility (SMUD!) put out rates that averaged from about 10 cents to 12 cents annualized (actual rate is time of day, peak summer hours earn almost 34 cents). Those too were gone in days.

Any student of market forces will tell you that when people are rushing to sell something into a market it is because prices are high. An orderly market at a reasonable price should have some hesitation, some tire kicking if you will, before the market is sold out.

One possibility was a case of pent up demand. I'm sure that accounts for a major chunk of the results. But ultimately it was a poor market choice on the part of the program designers. If they had a certain amount to spend (they did) then they should have done a better job analyzing the market before they set the prices. If there were that many willing sellers then perhaps the price could have been 25% lower. That would have leveraged 33% more installed capacity. If you could sell out at 50% lower you could double the capacity.

Let's get back to the pricing. Most FITs are priced above retail cost per KWh. That in itself is reasonable. The price relative to wholesale or retail is irrelevant. What does matter is the size of the pot of money that is set aside in the first place. Also of critical importance is the size of the pot in relation to the overall size of the utility involved.

The money to pay for the FITs is raised from the rate payers. The math is relatively simple, utilities have a rough idea of what their annual sales will be, so if they increase the price of a kilowatt hour 1 cent they can be fairly confident in how much it will raise for the FIT.

So a utility sells one million KWh per year with a one cent adder. That's \$10,000.00 if I did the math properly. So now they are going to buy renewable KWh via the FIT. In Florida they could buy 31,250 KWh, Californians are able to buy 83,333. And it would seem that they both overpaid.

What is the right price? No one knows because we haven't really done the proper market tests. Would Florida be able to sell out their FITs at 12 cents? Probably not, but we can be fairly certain that they could have done it for less than 32 cents. California may end up paying more over time. My guess is that the availability of 12 cent renewable power is going to be limited. But in either case they owe it to the ratepayers to determine what the actual price is so that when they come back to them next year for another penny increase the ratepayers don't feel cheated.

I know I will be hearing from some of you that FITs are in response to a heavily subsidized fossil fuel market. I absolutely agree. There is almost nothing about fossil fuel (or electric) markets that a real free market person could love. We subsidize and move costs to other places so we have no idea what energy really costs us.

But that doesn't tell me that we can justify not paying any attention to the market place. We need to create a smooth transition to renewables. We need to do it as quickly as possible. I think FITs are a superior tool to rebates in that regard. But just as with any tool, it needs to function efficiently.

Oh, the cat? She was just fine in a couple of days. Fortunately the pyrethrins flush themselves out of the body quickly. She was able to tolerate a low dose so everything worked out with just a little common sense.

Topic #2: Biomass in the fuel supply

I was going to make this my primary topic this month, but in late August I got my copy of Northern Woodlands magazine. Their feature article was...biomass! They wrote a great article and for a brief moment I considered the copy and paste option but that didn't seem right.

The article was thorough and well balanced. The only points I might emphasize more are the issues of extracting the maximum energy from the biomass. I think it points to cogeneration as the best use of the limited resource. Schiller no, Concord Steam yes (a qualified yes). Second would be direct use as heat in homes and small businesses. I am also a bit nervous about the idea of this bandwagon getting overloaded. We do not, as a species, have a good track record of controlling ourselves when it comes to our natural resources. I wasn't around for the over cutting of the White Mountains last time and I don't want it reenacted, thank you very much.

So here is the link to the article. If you don't read this magazine you should. You will learn things no matter what level of expertise you have on our forest resources. The topics are wide ranging and are largely written for a general audience. Go ahead, subscribe.

<http://northernwoodlands.org/articles/article/the-burning-question-is-biomass-right-for-the-northeast/>

Topic #2A: More biomass

Near and dear to my heart, I ran across an article recently (I can't find the link, sorry) about Scotch whiskey and the brewing residues. It seems that the residues make a very potent biofuel, about 30% more energy than ethanol. So have an extra glass of that fine Scotch, but even if you run your car on it, you shouldn't drive.

Energy tips:

No appliance annoys me like clothes dryers. They are not a necessity, they are marginal in design and execution and they can burn your house down. At least the Chinese have decided that they are a bad idea. Good for them.

OK, so we still have millions of these things in use every day so what will keep them running as efficiently as possible?

It all boils down to two basics, short and clean. Short, that's the exhaust pipe. The length matters because every foot of pipe increases the resistance to air flow. Elbows are worse, each elbow equals 3 – 5 feet of straight pipe. Longer, twistier pipe leads to lower airflow through the dryer. That leads to slower drying and potentially overheating of the clothes. Overheating leads to fabric shrinkage and reduces fabric life.

Installation instructions usually are a bit vague on maximum length but 25 feet seems to be the consensus. Personally I think that's nuts, but there are a lot of loooong dryer vents out

there. The pipe should (read MUST) be metal and be as smooth internally as possible. No plastic flex, metal flex only where absolutely necessary. Do NOT join sections of pipe with screws. Even the shortest projection will catch lint and quickly plug the pipe. Use tape designed for ducts, not duct tape, to join the sections.

Clean, this is the tough one. I mean keeping the ducts free from lint which will reduce the diameter of the pipe and reduce airflow. All dryer have lint traps. Filter is better good word because none of them are particularly effective lint barriers. I guess they clean the lint before allowing it to go clog the exhaust vent. For years there have been two basic dryer chassis design. One has the lint trap at the bottom of the door opening, the other has the trap accessed from the top of the cabinet at the right rear.

The door location is slightly more effective, but can still pass a lot of lint. The top mount design has a couple of weak points that allows slightly more lint to pass around the edges of the filter.

Both designs are compromises in terms of airflow and effective lint trapping. A finer mesh would stop more lint but would greatly restrict overall airflow. Most of the lint that ends up in the ducts passes through the trap itself. If you take a chunk of the built up lint in a dryer vent and rub it between your fingers you will see that it is actually very fine particles.

As the lint trap clogs during the drying process the fine particles are actually trapped by the accumulated larger particles. Unfortunately by then the airflow is greatly restricted and the air is forcing its way around the edges of the filter. This is particularly bad on the top filter design.

For best operation the lint trap must be kept clean. This is the major choke point in the system. The trap should be washed periodically, especially if you use dryer sheets for fabric softening. The sheets cause a film build up on the mesh, reducing its size. Remember, never push the start button until the filter has been cleaned.

Despite the fact that you clean the lint trap you still need to clean the ducts on a regular basis. How often will depend on use, but at least once a year. The best way is to disassemble the pipe from the back of the dryer and where it goes through the wall. Frankly, because of the poorly conceived way dryers are designed this is a real pain and most people won't do it. Get a dryer brush that fits your duct system, most likely 4 inches, and clean it from the outside. Tape the exterior flap open and start cleaning at the end. Do a short length and withdraw the brush and clean it. Run the dryer on the air setting for a couple of minutes and repeat. When you have cleaned as much as you can reach (if it doesn't reach the dryer you need to disassemble the pipe) start the dryer on the air setting and carefully run the brush in again. You may get more lint, so don't put your face near the outlet.

An interesting fact, clothes will dry just fine on an outside line year round. It take longer in the winter but it will work. When it's cold try doing a couple of loads of wash at a time, dry what you need in the next two days in the dryer, the rest can go on the line. Jeans and heavy things may need a little indoor drying time to completely finish them. We bring a couple of pieces in at a time an hang them near the radiators, works like a charm.

So, keep the dryer properly vented and clean the lint trap **frequently**. Then go to the hardware store and buy a clothesline. Line dried clothes smell better and last longer and you get to go out more often. We have a winner.

Blatantly Commercial Content:

I do have to justify the time spent on this effort, so I am charging myself an exorbitant fee to sponsor this newsletter. I get one ad per newsletter and free coffee refills in the kitchen.

Business update: I continue to do a mix of residential and commercial energy consulting work; I'm looking for more of both. Please visit my website, <http://www.buildingdiagnosticsnh.com/> for information on my capabilities and background.

I'm still always on the lookout for a good stinker of a building. Actually when someone calls and says "My building smells bad" I really get interested. So whether a bad smell or just too much energy use, give me a call.

Closing thoughts:

As mentioned above, I need feedback for this little venture to succeed. I would like to include notices for events that relate to energy, the environment and community building, so if you have any announcements please send them in to newsletters@buildingdiagnosticsnh.com. I also welcome rebuttals and amplifications for anything I write.

Please forward this to anyone who you think would like it, if you don't like it use the email address above to unsubscribe.

Thank you, I'll see you next month.