Welcome to the small farm sustainability podcast, a production of the small farms program at Iowa State University Extension and Outreach. This is episode eight, where I meet with Greg Brennaman and Tom Miller, at the Iowa small farms conference. Greg is an agricultural engineer for Iowa State University Extension and Outreach. And Tom is a field specialist for Iowa State University Extension and Outreach. We will discuss renewable energy and talk about some of its applications on a small farm. I'm Laura Class, assistant of the small farms program, and we hope you enjoy the show. So can you tell us a little bit about how you guys became interested in renewable energy and its application on a small farm?

I'll let you go first.

Actually, we've done this for quite a few years kind of starting with wind conference, gosh, that's probably been 10 or 12 years ago, and we had a meeting in Washington County. And I think the first thing we'd planned on Around 70 people showing up and we ended up with 125 people. And it's kind of evolved through the years as solar has become more cost effective, that we've had a lot of interest. And we've probably done five or six meetings through the years on alternative energies that that have a practical influence on on society here in Iowa.

Yeah. And I would say that just interest from our clients has kind of spurred our interest in, what is going on? And what are the possibilities and in order the realities.
Laura Class 01:25
Okay, you guys talk a little bit here at the conference in your session about that use renewable energy on your own farms. Can you tell us a little bit about that?

Greg Brenneman 01:33
Well, we use it and I'll diverge here a little bit. But yeah, I use renewable energy by cutting wood and burning wood and at our home, okay. But Tom really is one that has the solar installation, where he's generating nearly all of his electricity on his own farm.

Tom Miller 01:53
And it had started out that, one of the meetings we did here about three years ago, was on solar energy. And historically or over 12 years ago, solar energy really was expensive to install, it cost about $10-11 per kilowatt to, to install it, and or per watt?

Greg Brenneman 02:16
Per watt. $10-12,000 per kilowatt.

Tom Miller 02:19
Yes! .. per watt to install it, and we did a meeting in Washington and with the federal tax incentives, State of Iowa tax incentives, as well as a program that was being offered at the time at our utility became really affordable to do it, and the price of solar has dropped from that $10-11 per watt down to from $3-4 per watt.

Laura Class 02:48
So just looking at some basics here some starting points, if a small farm or acreage owner is wanting to fully transition or partial transition to renewable energy, what are some things they need to consider? I mean, there's insurance options and inspections to go through what are some of the first things you should do?

Greg Brenneman 03:07
I think, in my mind, probably a couple of things, consider the resource that you have in terms of if you're thinking when it's probably more difficult to evaluate really, what is every genuine wind speed at your location. For solar, it's probably the information we have from local weather stations is very reliable. And we can probably predict pretty well what the the solar resource is. But you may need to look then at is, are there any citing issues, those sorts of things? But then
you do need to look at what is the cost of the installation going to be? What is the interconnection agreement with the utility company that is providing power. And right now I'm just thinking of looking at electrical production. That's extremely important to know what the agreements are as far as either banking or sale of excess electricity back to the utility. And that can make or break whether an alternative energy system is going to pay for itself.

Tom Miller 04:24
And I add in, one of the nice things, and I'm not promoting solar over wind, but one of the really nice things for me about solar, I can size it exactly to my needs. So I look back over the previous two years light bill and kind of figured out how many kilowatts I was using per month. And I could base it off of a system that really fit our electrical usage. And not that you can't do that with wind generation but it gets a little more you kind of have a little wider trough there I would say.

Greg Brennmann 04:55
Yes, with wind you kind of pick a wind turbine and it may be Five KW or 10 KW or with solar, Tom could scale it, just how many panels he bought, and he could make it 21 or 22 or 18, whatever fit for him. So that's that certainly is a difference between the wind and solar. I guess one of the other differences I see between wind and solar is with the wind turbans that is mounted up in the air, you know, 50, 60, 100 feet, and to work on that is not something that you can just go out and do. You may have to either take the wind turbine down or have somebody specially trained to, to go up there, where with the solar it still takes specialized training for the electricians, but it's usually in a location that it's more accessible to work on. And I think that's one of the things that we see is probably lower maintenance, and easier to get somebody to work on a solar installation as compared to a wind installation.

Laura Class 06:05
I know you said in the session, it's always making energy as long as the sun is shining. So that's speaking solar, can that energy be stored? Can it be sold back to electrical companies? What are some options there?

Greg Brennmann 06:17
Well, in terms of storage, probably one way I think was storing is with batteries. But battery storage is somewhat cumbersome and can be fairly expensive. Most of the installations we see are interconnected to the utility grid. And so excess electricity is put back on the grid, and essentially, either stored, so to speak with utility company, depending on the your utility, in some cases, it's sold back. And if it's sold back, oftentimes that's at a much lower rate than what you're buying electricity for. Some will allow you to essentially net meter or run the meter backwards when you're producing excess and then bring it back off utility. And that's probably the best from an economic standpoint, the best situation. And at least, in looking at Tom's data, it appears that probably two thirds or more of the electricity he produced was put back on the grid. And then he used it back off at a later time.
Okay.

Yeah, and that is very true, because our electrical usage tends to be in the fall with grain dryers, wintertime with electric heat in the house, and when our big production time, of course, is June, July, or for May through September, is really when we produce a lot of electricity through the solar panels.

And that's just a, agreement that needs to be made with everyone's personal?

Those interconnection agreements are dependent on the utility that you're with whether you're with Alliant or with Mid America or with an REC. The the Alliant, Mid America are regulated by the state in terms of how they can, or what agreements they need to make with the customers. RECs can have different agreements, depending on each cooperative.

Okay, So a lot of times small farmers are interested in being self sustainable and doing things themselves or their options for renewable energy that can be installed by the farmer themselves, or is that something that a specialist should generally come and do?

Probably, you know, like passive solar, and Greg talked about in our session we had in there, you know, just light coming through a window in the wintertime warms the house. And there's quite a bit of passive solar. And we didn't cover that at all today, but those would be options.

The other option, I think of for renewable energy is bio energy. Whether that's a bio energy crop, a grass type crop, but we've used a renewable energy source for hundreds of years. And that's storing sunlight in wood products, burning of wood. And so, you know, that's a renewable energy source and certainly one that can be looked at for heating, probably not electrical production that I've seen too much, but usually it's for heating or for some sort of heat source. It was interesting today and listening to Jesse Randall talk about maple syrup
production. Most of the energy that goes into evaporating the maple sap to make maple syrup is wood energy, he said that most things are fueled with wood because they have the wood resource and it's quite a bit cheaper than using electricity or LP or something like that for those situations?

Laura Class 10:03
So there are definitely a lot more renewable options than just wind and solar and the basic things people tend to think of?

Tom Miller 10:08
Yes.

Greg Brennaman 10:09
Yes, certainly. And, probably those are two that come to mind the quickest from an electrical standpoint. But from an overall energy standpoint, there are certainly other renewable sources that we can use.

Laura Class 10:25
Do you guys have anything else you'd like to add? I know I didn't get to catch all of your sessions, but are there things you'd like to touch on?

Greg Brennaman 10:29
Yeah, I guess, one of the things that, as I've looked at this information for the last several weeks here and kind of thought through, okay, what are the important points of it? And I think, a couple of things. One is just what is the cost to install either solar or wind power, it's probably in that $2,500 to $4,000 per kilowatt of generating capacity for either one, that depends somewhat on size and scale, those sorts of things. Out of either one, it looks like per kilowatt of generating capacity, you'll generate in the neighborhood of 1400 to 1800 kilowatt hours of electricity a year, which would say $150 to maybe $200 worth of electricity. So just on kind of that face value, you'll add some pretty long payback. The thing that does make it more attractive and with much greater payback are some of the federal tax credits and state tax credits that can greatly reduce the cost of the installation assuming you have the tax liability. The other one is for businesses, whether it's a small farm or another type of business, they have the opportunity to depreciate or even expense out some of that equipment on just their on their overall taxes and reduce their tax liability. So the big thing that's making it more economical are the tax incentives to install those.
Thanks, Greg and Tom. This podcast will be up on our website www.extension.iastate.edu/small arms, along with our acreage living newsletter. Thanks for listening