Sarah Clack:

Idea of this webinar is to look at the different storage options and how we might be able to utilise them on farm from thermal storage to batteries and also kinetic storage. So today, we've got Ellie here from Pitt & Sherry. She's a professional chemical engineer with 12 years of experience in consulting and delivering projects in relation to renewable energy, energy efficiency, and emission reductions. Her specialist areas of expertise are solar systems and battery sizing, heat recovery system optimization, gas and steam turbine feasibility assessments and greenhouse gas emissions accounting. So Ellie's passionate about energy productivity, reducing costs while improving the outputs from your energy inputs. So yeah, I'll pass over to Ellie now to present to us.

Ellie Shirdel:

Hello everyone. Thank you, Sarah, for your introduction. As Sarah mentioned, I'm Ellie from Pitt & Sherry. Today I will talk about the energy storage option in the Agri business.

Ellie Shirdel:

Before I start, before talking about the energy storage, I'd just like to briefly introduce our company and our team. Pitt & Sherry is the engineering and environmental consultancy company that has been established in 1963. Right now, we have more than 300 staff across seven offices in the east coast and in the Tasmania. We are offering different services across different industry, like transportation, civil, utility manufacturing and energy sector. Our energy team is a combination of different engineer that enable us to understand the different aspect of energy in a different area, I mean like a different section and sector and find the best solution that actually suits our client.

Ellie Shirdel:

Our main services are the development of net zero strategy, energy management plan, energy auditing and productivity analysis, heat recovery and heat pump system analysis, renewable energy and storage option, and last by not least hydrogen feasibility and emerging field. We have a great experience in the agriculture sector that includes energy auditing of more than 250 farms in the Victoria and New South Wales. We also have a project of energy auditing several abattoirs across the country. The farm that we audited are in the different type of farm, like a dairy, cattle and sheep farming, dry cropping, horticulture and winery.

Ellie Shirdel:

They were in a different size, and each of them had a unique condition that we have to look at in detail and find what suits them to improve their efficiency. Some of a more common solution for this farm to reduce in their energy consumption first and then increase their energy efficiency are upgrading their old equipment that were in the low efficiency and their maintenance was costly, installation of VSD for their pumps and their different type of model that can increase their efficiency and reduce their energy consumption by 30%, operating of the light, installation of the thermal battery and the heat recovery system, and finally installation of renewable energy.

Ellie Shirdel:

Today, I will talk about the energy profile and why it is important, how it would be generated and what you can understand from it and then briefly talk about some energy storage option. I will show you some example in a different location for the different farm. Finally, what would be the next step for you? The main benefits of having renewable or the energy storage on your farm is that it gives you this opportunity to control your energy demand and cost. Also it can give you the social license to operate in the world that are looking for the decarbonization and expand your marketing from the local market to the national or international market. As right now, there is a huge market for the customer, are looking for the product that are in net zero emission, that are produced as a net zero emission or they have a lower emission intensity.

Ellie Shirdel:

Okay. Now let's talk about the energy profile. For energy profile, technically it's a form of graph that we generate based on your energy data that show us very important information. It will gives us the information how and when you are using the electricity, what is your main source of the energy and how it can be aligned with the different opportunity to reduce your energy consumption, and is it technically useful for you or not.

Ellie Shirdel:

As each farm based on the equipment that they have and how they are using their equipment, they can have a totally different form of energy profile. Here, you can see that there are just three example of an energy profile. This one is for the dairy farm. As you can see, there is like a three peak for the dairy farm that are related to the milking time and also operation of the hot water generation. But for the egg producer, the energy profile can be totally different as they need to control the temperature of the shed for the chicken during the day, especially in the midday at the summertime. Also the site might have a seasonal load, especially for the irrigation system as you are using your irrigation system normally during the summertime from November, December to March to April.

Ellie Shirdel:

Understanding of your energy profile actually help you to know that what would be the best solution for you. This is just the example that I want to explain, what would be the impact of the solar on this farm. The orange line is the typical energy consumption load in a dairy farm. As you can see, and I mentioned, there are two main peak that are related to the milking and afternoon milking. Then we have a third peak that is related to the hot water generation. The blue line shows the amount of generation from the solar PV. As you can see, there is a minimum correlation between the solar generation and onsite energy consumption.

Ellie Shirdel:

In order to get the maximum benefit of your solar system, it's better to have the maximum overlapping between the energy consumption and the solar generation. The area between these two red line shows that actually there is a minimum consumption onsite while we have a maximum amount of generation on the site. So it prove that actually the amount of generation at the site can't be used on the site at the same time. So it shows that the necessity of energy storage on the farm that can be either thermal storage or the electrical storage. So in that case, when we store the amount of energy that has been generated by solar in this time, that can be from 9:00 AM to 1:00 PM, the load can be discharged from the battery later at the time or even early morning for the next day.

Ellie Shirdel:

Another factor that would be useful to understand your energy consumption is that you know what is the difference between the demand and energy and how it would understand you to size properly your renewable option or your battery system. If you imagine that you have a tank on your site, it would be the total amount of energy that you are consuming on site. This tank would have an inlet and outlet. The outlet is the accumulation of all the power that you required on site. It comes from all electrical load that you have on site, can be refrigeration, heater, fan, pump, everything that you have or all the electrical tools that you are using on your other site.

Ellie Shirdel:

What would fill this tank would be the connection that you have from the grid or the battery that you have on site or you are willing to install it on site. There should be a rational proportion between the inlet and outlet. It means that when you have more load or require more load on site, you are connecting like a larger outlet to this tank. So there should be a balance between inlet and outlet.

Ellie Shirdel:

So you need to have a larger connection either from the battery or the from the grid. If your battery has been designed initially for a certain size, so you need to have like a larger connection from the grid. At the end of the day, the amount of the energy that you are consuming is the amount of demand times amount of the period or the time period that you are running each equipment. So for the two different farms, they can have the same amount of energy consumption while they have a different amount of demand. You can run a two kilowatt pump for five hours and consume 10 kilowatt hour energy, but you can have a refrigeration system that has a 10 kilowatt demand and run it just for one hour. Why it is important? Because you are actually paying for both factor.

Ellie Shirdel:

You are paying for the size of your connection and then for the size of the tank. Actually you are building or you are consuming the amount of energy. When you are sizing the battery or renewable, it's important to know that what is the relation between the size of inlet and outlet. If you have any kind of change on your site, you might need to optimize your system that has been installed before. But before investing any money for the renewable or energy storage, there are some factors that you should consider. First, review the performance of the farm and find the deficiency or that is happening on your site as it can reduce your site energy consumption by 30% by just a simple action. This action can be insulation of the tank or cool room or the doors of the cool room, ceiling around the cool room, lighting upgrade, a load shifting. That is important for your irrigation system from instead of working at daytime, it might be able work at nighttime. It can reduce the evaporation. Also it can save a huge amount of money if you have a two type of tariff.

Ellie Shirdel:

Installation of the VSD on the electrical motor, like your irrigation system. I mean, if they are electrical pump or even some other pump like in the dairy, it would be super useful and also prevent water penetration and evaporation. If you have a pond on your farm, it is really, again, helpful as I had a farm that 50% of the water that they were saving or pumping from the water source to their pond has been penetrated or evaporated. So technically they were just paying 50% of the money for something that didn't do anything for them. Finally try to find the leaks through your water network, your fuel tanks and also find some hidden load that are running all the time and you are not aware of them. As they might be a little small, but when accumulate them across a year, it can save you 10 to 15% of your energy consumption.

Ellie Shirdel:

Now, let's move to the energy storage option. Currently, there are quite different type of energy storage around. Some of them are more developed, and they are well known now between the people. But some of them are still under development, and they are not available in smaller scale in the market. I'm not saying that it's not possible to install them, but they might not be financially feasible in the smaller scale. Some of the energy storage option are thermal storage, electrical storage, emerging fuel like a hydrogen ammonia or biomass, and also the pump hydro. Today, we'll just focus on the thermal storage and electrical storage. For the thermal storage, it is necessary that you have the heating demand on the site. Otherwise this form of storage might not be useful for you.

Ellie Shirdel:

You can get the maximum benefits of thermal storage when you have both heating and cooling demand, like you have a refrigeration and also you are producing the hot water on your site. It can be for the dairy or the fruit producer as they have a cool room, and they need to create the hot water for the washing and sterilization. For the electrical storage, it's the most common type of the energy storage that all of us are using it in our daily life. But if we are tending to use it in a larger scale, you should be aware that you can use it if you are mainly using electricity. Like you have a cool room, and it's running all the time. Please be mindful that if you have a seasonal load, battery storage might not be the best option for you as it's running just half a year and for the rest of year, it's not working.

Ellie Shirdel:

Thermal storage is a technology that actually can store a waste amount, the wasted heat that are available in your site. That can work as a heat source. It can be the excess amount of generation that would be generated from solar on site or it comes from your refrigeration system. As you know, refrigeration system will take the heat from the area or the cool room, and then reject it to the environment in the condenser. This rejected heat can be captured and produce the hot water or preheat the water for the hot water generation. So directly reduce your fuel or electricity consumption as you might have an electrical heater for the hot water or you might have a fuel burner. I mean, LPG or diesel burner to produce the hot water.

Ellie Shirdel:

Normally, you can have a stratifier tank that can store the whole cold weather and hot weather in one tank or you might need a separate tank for the cold fluid and hot fluid. There can be different arrangement, but they would do the same. The thermal storage working by itself in the closed loop, it get the heat from the heat source and deliver it with the hot water that currently is generating on the site. But for the electrical storage, the story is a little bit different from the thermal storage. All the electrical storage are in some form of chemical energy that can be stored inside of the battery. So it's a reversible chemical reaction that happened inside of the battery. When we charge it, it goes in one way. When we discharge it, it goes to the other way. Chemical battery or electrical battery storage are really good, and they gives you more flexibility as you can connect it to the different type of equipment.

Ellie Shirdel:

Also you can use it to control your peak demand. As I mentioned earlier, you are paying for the demand and also for the amount of energy. So by the battery, you can control some of the demand if you are paying for the demand. But when you think that you need the battery storage, there are some key criteria that you need to think about it, and you need to answer them. First, what kind of technology would suit you? When you think about the energy storage, don't think that you should always invest a lot to get the chemical battery or lithium-ion battery. There are some other type of the battery that might be useful. Or if you have a thermal demand, the thermal storage might be the best solution for you.

Ellie Shirdel:

What is your energy profile of the farm, and how and when you are using electricity. Is it useful for you to have the battery of storage or is it something that a supplier just trying to sell you? What is your main purpose of having the energy of storage? Are you trying to reduce your demand or you are trying to reduce your energy consumption as they can be programmed differently?

Ellie Shirdel:

Actually their technology is different. So when you are purchasing and paying for this battery, it is important to consider that and not pay for something that you are not using it. What is your available energy sources to charge this battery or do you have the solar already on site? And your onsite solar, is it producing enough energy that can be stored in the battery? Do you have a refrigeration system that the waste can be stored at a thermal storage or do you have some other kind of energy that can be monitored and then be assessed that are they good to be stored or not?

Ellie Shirdel:

Finally, what is your financial parameter? What is your expectation for the payback of this new technology? Are you expecting three years payback or 10 years payback? As they can be different based on your operation, based on the charging and discharging of the battery. Lastly, the optimization of the battery is really important. That should be done based on the operation of your farm and how and when, again, you are using the energy.

Ellie Shirdel:

Lastly, when you decide that the batteries are really good for you or you might get the consultation from someone or some expert that they say that they assess your site, and they give you their advice that it actually is useful. Actually it bring very key benefits for your operation. It can match renewable energy supply with the business demand, as I show you for dairy farms. It can store at the midday and be used later. It can provide quality and a stable energy supply. It means that if you have a frequent power outage on your site, by having the battery, you can stabilize the energy that you have on site. Also you can control the cost for your energy. You might have a two-type of tariff. You might pay in two type of tariff, like a peak and off peak tariff. So your battery can be charged at the off peak time and then be discharged at the peak time. So you can save some energy, some money in that section.

Ellie Shirdel:

Some example of the energy storage is installation of lithium-ion battery for an egg farm. The implementation of lithium-ion battery has actually key benefits that they have. They are a low barrier to entry, and they are well-known technology. A lot of company and industry are already invested in that area. You can find them in a different site. Even based on your budget, you can install it gradually and increase the capacity of the system. They are high energy. They are high energy density, and they have a simple integration as they can easily be added to your existing system and start operating. But this type of battery has some limitation. They can lose the charge if you are not regularly discharged them after charging, and also you can't use deep cycle them.

Ellie Shirdel:

What does it mean? It means that when you charge them to a hundred percent, you can't discharge them to 0% and do it again and again. It would actually reduce the capacity or reduce the life span of the battery. Also by nature, the lithium-ion battery would have a capacity degradation over their lifetime. For example, when you buy the hundred kilowatt hour lithium-ion battery at the beginning, after five years or after 10 years, there would be some degradation in their capacity that to comes to 90%. At the end, it can come to 70% or even lower at the end of their lifetime.

Ellie Shirdel:

One alternative for lithium-ion battery is the flow battery. Flow battery or different type of chemical battery that they can save electrical energy in themselves. Flow batteries technically have two tank that are filled with special fluid that some of them are like vanadium. When they run through a problem, they can charge. They can be charged or discharge electricity.

Ellie Shirdel:

Their main benefit is that they can be regularly deep cycle. So you can charge them to 100% and discharge them to 0%. They have a limited degradation over the life span of the battery because there isn't any direct chemical reaction between them. So the amount of loss in this type of battery would be lower. They are ideal for long time discharging. They can be suitable for the eight or even more discharge time. They are durable and heavy. So you don't need to be worried about them. Fluid can be recycled and recharged. But they have a main disadvantage, that is that they need higher upfront cost when we compare them with the lithium-ion battery.

Ellie Shirdel:

When you go to the market, you can find the different size of them, like the lithium-ion battery that's right now available on the market, and also you need to contact some specialists to come design it for you. If you are not buying it the market size, and it should be installed by an expert. But the lithium-ion, almost every electrician is qualified to work with it.

Ellie Shirdel:

This is another example of thermal storage for a dairy farm. For this dairy farm, the thermal storage has been installed in the cooling system. This thermal storage is connected to both the second stage heat exchanger that would cool down the milk and also to the refrigeration system. The rejected heat from the refrigeration and also from the milk would be captured by this system and would be stored in the thermal tank. This tank has a circulation loop with the heater that can generate enough hot water. In a case that there isn't enough load, the heater would draw like a normal condition to increase the temperature of the water to the required level, and there for the cleaning or sterilisation.

Ellie Shirdel:

The main benefit of thermal storage is that they are known technology. So you don't need to have like a specialist to run it on site. They have a relatively simple integration. They may use existing equipment. You might have some extra tank or retire tank on site. You can refurbish them and repurpose them and install them at a storage tank. Also, when we compare them with the chemical battery, they need the lower investment. But they have their own limitation. First of all, you need to have the thermal demand on site because you can’t generate, for example, the electricity from your thermal storage. Another thing is that normally they can store it for the long time. There should be a small period of time between charging this tank and discharging if you don't want to lose the amount of heat that actually you store.

Ellie Shirdel:

What is for you for the next step? First of all, try to understand your energy profile. That is really, really important. In order to do that, you might need to ask some specialists to help you to get the information from your electricity meter or your fuel bills that they can make the graphs for you and then explain it to you. Ensure that you understand where is the best stage of energy on your site. Do you have any deficiency that happening and rectify them before, again, investing in renewable and for the energy storage. Finally, when you decide that this is the best option for you, to install the energy storage, try to find out what would be the best technology for you.

Ellie Shirdel:

Lastly, engage the technology supplier to understand the cost integration requirement and complete the financial analysis for you, for your farm. Also you can reach us if you like to get more information. Thank you for your attention. I am here if you have any question.

Sarah Clack:

Thank you for that, Ellie. I did switch off your camera part way through that just because it was getting a bit glitchy there. So if you do have any questions for Ellie, please pop them into the chat. We will, yep, address them in a little bit. But right now, I had the pleasure earlier this week of catching up with Fred Jonkers, who is a dairy farmer over in Gippsland at Yinnar. We pre-recorded with him. He's also online today as well to answer questions. But we prerecorded just because he does have some internet issues that he's aware of. Just a bit more about Fred, so he has installed a battery and solar system on his farm.

On screen:

An overview of the business

Fred Jonkers:

The son and his partner are the milkers. They milk 310 cows in our district. We have a 20 rapid exit dairy, 20 aside. Yeah. We are spring cows.

On screen:

What energy technologies have been implemented on farm?

Fred Jonkers:

The 22 kilowatt battery system and 64 panels on the roof to charge the 22 kilowatt battery system.

Fred Jonkers:

We restricted them, how big we can go because of AusNet. They said, "You're only allow to go 7.5 kilowatts per phase," which restricts us to what size we can have because we're running two phase, not three phase. Or we can export, I think it's about 22 kilowatt battery system.

On screen:

What lead you to install the solar and battery system?

Fred Jonkers:

The main process was the price of our electricity bill, and we didn't have our backup system when the power went out. So we yeah, talked to Lindsay Anderson about what size system we needed to make the system work when there was no power.

On screen:

What did you consider when installing the solar and battery system?

Fred Jonkers:

The system that was going to work as well as saving money, but would work when the power went out. So we had to get a size to make that we could milk the cows. Cows, it's probably three hours of energy, but we can't cool the milk because that just takes too much energy.

On screen:

When the power goes out, do you arrange hot milk pick up through your factory?

Fred Jonkers:

We did when the power went out, put the system to the test. They had to come down because we couldn't get it started. We had to tweak that the cooler pump wasn't actually connected to the solar. So the first load actually went too hot, and we had to dump it. After that, it was okay.

On screen:

What have been the benefits from the solar and battery system?

Fred Jonkers:

More times when you can milk because the way the system charges. Yeah, that's probably the main one, just so we know the batteries are going to be fully enough charged so we can save energy. When the power went out for seven days, we actually did milk the cows. So that was a big benefit.

On screen:

What is the impact of the energy savings on your monthly electricity bill?

Fred Jonkers:

It used to be 24 to 2,500, and now it's gone down to 1600.

On screen:

What did you consider when selecting your solar and battery provider?

Fred Jonkers:

Well, just the main thing, you can get back up. You just got to make sure that the people who are doing a system have got backup because I don't understand anything about it because that much computerized stuff in that box as they did. So yeah. I can always get hold of them too.

On screen:

Do you have any advice for those looking to install a solar and battery system?

Fred Jonkers:

The right advice that you've got the system that's big enough to handle your shed because if it can't handle your shed, it's no good when the power goes out. You're probably still using too much outsource electricity.

On screen:

Are there any hurdles you had with your solar and battery system?

Fred Jonkers:

Another thing we had a bit of problem is our systems because the people that installed it monitor the system. So we had a bit of trouble with the internet because it had to come from the house to the system. Yeah, we had a bit of trouble with that because they could not read it. They had to come out twice to get someone fixing out the internet side of it.

On screen:

Does the remote monitoring allow your solar and battery system provider to pick up on issues with the system?

Fred Jonkers:

Good. Because it even picked up the vacuum pump motor, was actually a bit faulty. It was actually when it started up, it was actually spike and heaps of power. So they told us, and we worked it out. That's when the vacuum pump started. That's where the spike was coming in the system. So that was good. So yeah, we got the motor repaired. Yeah, she's all good now.

Fred Jonkers:

Advise people when they get a system done, to make sure that it's got the internet connected to, so the people who supply the system can tell you how it's all going.

Fred Jonkers:

Yeah, I can ring up now. I can say, "Oh, how's the system going?" He can actually give me a printout on how it's all, the energy and everything's working out. Yeah, so that's good.

On screen:

Are there any other energy changes you are looking to make on farm?

Fred Jonkers:

We're looking at a VSD vacuum pump system, which is trying to save energy and also so we can get a solar system on our water pump system down at the river because that's another big cost.

Sarah Clack:

Awesome. So that was from my catch up with Fred earlier this week, on Monday. So there has been one question come through so far. This is directed at Ellie.

Ellie Shirdel:

Yes.

Sarah Clack:

It is, "Which battery has the longest life cycle. And how long is that? You also mentioned about cost implications on the flow batteries. How much is a unit currently? And do you envisage price decreases as the technology is widely used with time?" So which battery has the longest life cycle and how long is that?

Ellie Shirdel:

Actually right now, the battery comes in 10 years as I know. It normally comes in a 10 years life span. But I can't advise any brand as it's not professional. I'm sorry about it. But there are right now great brand on the market. They are offering 10 to 12 years life span. So I hope that I answered the first question. What's the next?

Sarah Clack:

So the second one is you also mentioned about cost implications on the flow batteries.

Ellie Shirdel:

Yes.

Sarah Clack:

How much is a current is a unit currently? Do you envisage that the price will decrease as the technology is widely used with time?

Ellie Shirdel:

Yes, it would. Right now, I don't have any price in my mind. But I think that they are at least 50% more expensive than lithium-ion. But as you can see for the lithium-ion energy price, that it dropped by almost 50% from five years ago to until now. I expect that for the flow battery, it would drop in the same train. So by increasing the demand in the markets for the flow battery, I think that it would be cheaper at least by 50%.

Sarah Clack:

Fantastic. Thanks for that. Ellie. So we've had another question coming for Ellie and also for Fred. What are the warranty periods on the commercial scale batteries?

Ellie Shirdel:

Is it okay if I answer?

Sarah Clack:

Yep. It's fine. Yep. You go, Ellie.

Ellie Shirdel:

The normal is again like a lifespan of the battery is for 10 years. But recently, I've even seen that they guarantee for 20 years. But it can, again, depend how much you are investing in that area. If you are paying for a more advanced technology that has a higher efficiency and more lifespan, you have to pay more. So you can get longer guarantee time that can go up to 20 years. But normally, if you are looking in the market, look for that at least 10 years guarantee.

Sarah Clack:

Fantastic. So with those ones that have got warranties for 20 years, even though they're a bit more expensive, over the lifetime of the battery, would they end up being potentially slightly cheaper?

Ellie Shirdel:

Yes. Yes. You mean the LCOD, the cost of the battery per amount? I think that yes, but the initial investment, I mean the upfront cost for this battery is really high. I think they are normally twice the price of the normal lithium-ion.

Sarah Clack:

Yeah. So that's that capital cost will potentially.

Ellie Shirdel:

Yes.

Sarah Clack:

Outweigh the long term gains potentially depending on the business and what they're able to do. Fred, if you are able to speak, what is the warranty you got on your battery system?

Fred Jonkers:

Yeah, 10 years. But in that 10 years, they do lose the amount of capacity they can hold. So that's what you got to expect.

Sarah Clack:

Yep. Are yours lithium-ion batteries?

Fred Jonkers:

Good question. I'd say so.

Sarah Clack:

Yeah. Yeah. No, that's all good. Thank you for that, Fred. So there are some other alternative examples of energy storage such as flywheel storage systems. Are there any others out there that you've seen applied in an agricultural setting?

Fred Jonkers:

Yeah. I've got to say that there is a couple of different systems. There's one that they use. It's like a big flywheel. That's another system they're trying, and it just keeps spinning.

Sarah Clack:

Yep.

Fred Jonkers:

Yeah, that's another one I've heard about. There's actually one system working somewhere in Australia.

Sarah Clack:

Awesome. Fantastic. Ellie, what have you seen around the traps in your adventures around different farms?

Ellie Shirdel:

I haven't seen any installed flywheel in the farms that I was working with them. But definitely it can be an option as flywheel is storing the electricity in a form of the kinetic energy and return it back. It's like a generator that you are fitting it, and it stored the electricity in a form of kinetic, and then it return it back to your system. But as I read about it, there is some kind of efficiency that you should consider that what is, again, your excess amount of energy resources that you want to save in the flywheel as the efficiency of the system would drop if the rotation in the system is not in their highest speed. So all in all, I'm saying that you should consider how much excess energy you have on site and when it's happening.

Sarah Clack:

Fantastic. Thank you for that. We have had another one come through. What about battery recycling management at the end of lifespan? Would you have any information on that, Ellie?

Ellie Shirdel:

Not really, but for the fluid battery, there are some center that they are actually selling you the fluid battery. They will take back the fluid that is in the fluid battery, but for the lithium-ion battery, I know that there are some company. Again, they will take it back, and they might even replace it with some option. They might have some option for replacement of your battery like in a cheaper price. But if you are looking for a specific center, I don't have any name on my mind right now.

Sarah Clack:

Yeah. Thank you for that, Ellie.

Ellie Shirdel:

Sorry. I have a two question that came directly to me. Noel ask that I just check how speedy, not generating any power at all. Do you took overcast day in Gippsland, what do you advise in this situation?

Ellie Shirdel:

This is unfortunately part of having the PV system. If you are having solar PV on your roof, and you have a cloudy day or rainy day for several day, they are going to generate the minimum amount of electricity as there would be less amount of radiation, direct radiation from the sun.

Ellie Shirdel:

The advice is that if you want to be off grid or you want to be more independent from the grid, you should install the chemical battery or even the thermal if you are using the hot water generation on site. So you can save the generation from the days that actually have excess generation and then use it for some other days that are cloudy. But you should consider that how often does it happen. As if you are not using your battery frequently, it might get discharged by itself.

Sarah Clack:

Yep. Awesome. Fantastic. Thanks for that, Ellie. I've got a question for Fred. So during the video that we recorded on Monday, you mentioned how when you had a seven-day power outage, that you were able to milk the cows through that time. So you obviously had the benefits of being able to milk. What are the other benefits to your business from being able to milk there?

Fred Jonkers:

Oh, we could milk the cows, would've been virtually choppers because some of the mastitis would've been through the roof, probably the main thing. Just probably that the factory would pick up warm milk, I suppose that was another benefit, I suppose. We're not that far from Leongatha, so it's not far for a tanker to come and pick up our hot milk.

Sarah Clack:

Yeah. So is that something you are looking to potentially do in the future, but might that be an option in the future to expand your battery storage, so that you are able to cool milk when you do have those power outages?

Fred Jonkers:

Yeah. We've just got to mainly look at the figures on how much that'll cost. Like would it be just cheaper to put another generator, a generator system. Yeah. It'd be good. But yeah, it does take a lot of energy that's cooling that milk in.

Sarah Clack:

Yeah. Fantastic. That might be another option maybe looking at potentially thermal storage there like Ellie was speaking about before, to potentially assist with that milk cooling. Yeah, and heating up hot water.

Fred Jonkers:

Yeah. Probably the way we could do it a bit cheap is probably go the Glycol Cooling System because you can cool that before. Oh, if you had a seven-day outage, you'd be in trouble. But if you only had a one day outage, you could cool your Glycol cool enough that it would cool your milk. Solar system cool that days before your bail went out.

Sarah Clack:

Yeah. Fantastic. There's been another question come through for you, Fred. Have you had any technical issues with the battery to date?

Fred Jonkers:

None. None with the batteries. Just the internet mainly.

Sarah Clack:

All right. So there's a question about where have you seen the best utilization of solar that's minimized the need for batteries?

Ellie Shirdel:

Yes. Yes. There are like when you have a cold storage, that they normally have a constant load during the air. You have maximum benefits of using the solar generation onsite. In that case, you can have more than 80% self consumption on site. In average, it can reduce 30 to 40% of site total energy consumption.

Sarah Clack:

Thank you for that, Ellie. There's a further question on that last question there, Ellie. That was, have you got any irrigation examples?

Ellie Shirdel:

Yes. But for the irrigation system, it is really critical. The irrigation system normally is running during the summer that is from November, December to March, April. So you should know that. What is your irrigation pumps that if you want to connect it directly to the solar and it's running during the day, you can get the maximum benefits of solar? For the irrigation system, for example, if you are running five kilo or let's say 10 kilowatts pump, you need almost 20 kilowatt solar to be installed to give you 10 kilowatts load for your pump running. During the summertime, it is really good and the best time to overlap the operation with the solar generation.

Sarah Clack:

Fantastic. Thanks for that, Ellie. Yeah. We have seen some fantastic solar systems go on for some irrigation systems up here in Northern Victoria as well. Yeah. They've even put it on tilting frames so that they can actually maximise the time that they can utilise that solar to irrigate during those summer months.

Ellie Shirdel:

You are right. Yes.

Sarah Clack:

Yeah. All righty. Thank you to Fred for recording with me on Monday so we're able to get some visual in there. Also thank you for joining us on here today. It's been fantastic to be able to ask you some questions. Also thank you for Ellie for sharing the technical knowledge around batteries and thermal storage and other forms of storage with us today.