Kelly Wickham:

This series has come out of the Agriculture and Energy Investment Plan, and during that plan, we rolled out a series of energy assessments across agriculture. Over 500 audits were completed, and almost 30% of those audits were actually completed in the horticulture sector. So what we've found through that segment was that the greatest potential for energy savings, dollar-wise and potentially even emissions-wise, was in horticulture, up to 40% plus. So great opportunities for savings in horticulture for energy, but we're really talking about sustainable energy, so both solar PV and energy efficiency measures. The three presenters will all discuss those sort of measures in this webinar, and without further ado, I'd like to throw over to Rowan Little, who's the general manager at Montague Orchards who have been operating since 1947, I believe. So yeah, over to you, Rowan.

Rowan Little:

Thanks, Kelly. Thanks for the opportunity to talk today. I'm going to be talking today exclusively about a big production redevelopment, so not in the orchard, but in the packhouse, that Montague undertook. We commenced in 2019, so we'll go to the slide and I'll just give you a brief overview, and then talk about the energy efficiency specifically.

Rowan Little:

So I guess what I'm going to talk about today is two main goals that we had when we developed our new packing facility. The first one was, we wanted to add some electricity generation, so obviously that came through a solar panel installation, and I'll talk a little bit about that. But then the other big driver was also reduced energy use, and there were three components that we undertook for that, and they were both in the design of the building, the technology, we employed, and then the real focus of it all was waste reduction. So I'll talk about all of those things in light of what was installed.

Rowan Little:

Just to give you a brief overview, this is a project. The overall site development was 53,200 square meters, and you can see this is an aerial shot of the whole precinct. And it actually took us... It's four years and nine months was the total construction time. That's from planning to finished construction. So obviously construction didn't take all of that time, it was about 14 months and about 70,000 hours of construction, but the outcome has been a significant increase in both capacity for apple production to 100,000 bins and then stone fruit to 32,000 bins per annum. So that was the outcome.

Rowan Little:

So if we look specifically then at what we did in terms of energy efficiency, there are a number of measures. The first one was electricity generation, and you can see from the top... I guess one of the things with a project of this scale is always, how much have you got to spend on all of these measures to begin with? So where we started with electricity generation in stage one was one installation of 294 panels, which produces about 100 kilowatts per hour. So that's by no means enough to power the whole site, but it is enough for us to see what savings we could make. And there's certainly opportunity to... I mean, you can see from the roof, we've got a lot of roof space to do that. So our long term goal in terms of electricity generation is actually to power the whole site, probably with the exclusion of the cool rooms, using generated power. So that was a big move, and one that's already starting to bear fruit for us.

Rowan Little:

In terms of the next measure, which was savings, there was a number of different areas that we employed in terms of energy savings. The most significant investment that we made was in an automatic storage and retrieval system. For those of you who are in fresh produce, you may be familiar with this, or you may not, so I'll try and explain how a automatic storage and retrieval system works. Basically in a conventional cool room, we use a whole range of cool rooms with racking, or just straight bin stacks for... So this is fruit that we harvest from the orchard, and we're wanting to pack through the packing facility. And so that traditionally has gone into a standard cool room which is packed in columns, and then forklifts come and remove the bins when they need to get packed.

Rowan Little:

So given the number of bins that we were going to process through this facility 52 weeks of the year, when we came to look at this particular component of the production facility, we decided to invest in this automatic storage and retrieval system. So the capacity of this particular investment is 3,000 bins, with each bin having 360 kilos. And those were, you can see from the photo there, they're all on a racking system that allows us to call every one of those 3,000 bins at any time out of the building. So the total building height's about 21 meters, and within the room it operates dark and it has no aisles, and therefore it's 60% smaller than a traditional cold storage facility that would house that number of bins.

Rowan Little:

So the obvious legacy of that was the much higher capital costs, so a significant investment, both particularly in terms of the cranes which you can see there, so we have two cranes, two aisles with two cranes. However, when we looked over the 20 year return in terms of the reduced area of refrigerated air that we needed for the 3,000 bins, plus the reduced labour and the reduced bin movements, it stacked up both economically, but also in terms of power saving for refrigeration, and savings in terms of that labour movements and the reduction in bin movements. So it's been a significant investment in terms of energy, but also obviously in terms of efficiency and flexibility for the business.

Rowan Little:

So the next item that we worked on was... For those of you who are familiar with apple production, one of the big challenges is if you want to wax fruit in particular. Typically most places around the world, if you want to wax fruit, or you want to dry fruit, you generally have to have a... We've been using a gas powered heat unit, where we burn gas in order to heat an environment, and then we force the warm air onto the apples to dry them, so that they can go into the box. So one of the things we thought about with this packhouse was that's actually introducing a heat source, external, so using a lot of gas each year, we have to do a lot of venting of that gas. So we were looking at ways in which we could reduce or eliminate the need to have these gas burners in our packhouse.

Rowan Little:

And what we identified with this was, we were creating a lot of heat using our refrigeration, and so what we decided to do was to use the heat used from our refrigeration to warm water, and then we piped water to heat the air in the drying tunnels, and that enabled us to dry the apples, and it eliminated completely the need for LPG gas or natural gas, and were also venting so burning of the gas and the removal of the waste from that. So it's come at a significant saving, both in terms of what we're doing but also environmentally, in terms of that waste, and also we're really encouraged by the use that we can make of this byproduct of another activity altogether, which is obviously refrigeration.

Rowan Little:

So I believe there that... I mean, there's heaps of other little activities that we did do, in terms of the packhouse, mostly in relation to design, and that was just the layout, and in particular the use of lights and power reduction in lights, but those three measures were the principle ones that we did. So in the interests of time, I think that's it for me for now.

Kelly Wickham:

And a really large distribution center that's going to change the game for distribution of products throughout Australia, and potentially the world. Just by way of previous example, I was talking about the Agriculture and Energy Investment Plan. We've also find through the program that over $50,000 can be saved per business in horticulture per annum. So that's what the size of the prize is, just on an annual basis for savings, just from the almost 250 audits we've done in the sector. So without further ado, and on that note, we'll get some questions to Rowan after Dasha and Jason are through, but for now we're going to throw to Jason Shields, the orchard manager at Plunkett Orchards. Over to you, Jason.

Jason Shields:

Thanks, Kelly. And yeah, thanks for the opportunity to be able to speak today. If we go back to when we first started looking at going to orchard mechanization and platform harvesting, our initial thoughts were around having to struggle to get labour, and we thought we'd get quality gains, and a lot of this stuff that was all unknown, it was all unproven. So we were focused on, this is what we think the outcomes, but as a manager to be able to justify it, I couldn't really prove any of those outcomes, because I'd never used any of the machines or anything like that. So to justify the expense, I went down a different approach to try to justify the cost. And there was three main facets that we worked with to do that.

Jason Shields:

Previously, before we got the platform harvesters, we were using the Hydralada cherry picker system. So we've now purchased three Revo platforms, which carry basically four people on them picking tops and two people picking bottoms or pruning or thinning. Previously though we were using up to 12 Hydralada's cherry pickers. So just in that one instance, we basically took 12 machines and we replaced it with three. So just as a really easy thing, I knew then that was I was going to be nine machines better off in fuel. So just in that change alone, without any other savings, I was going to be saving about $200 a day in fuel, which equated to about $60,000 for the season. So that was a pretty big saving.

Jason Shields:

Then the other assumption that we were making was that we were going to be more efficient with these machines, but without, I couldn't prove that until we got the machines. Once we had the machines and we were moving them, we found that with our harvest we were about 20% more efficient. So potentially those three machines have replaced 14 cherry pickers, so we don't have 14 cherry pickers, now we don't have any, anymore. So literally it was even 20% better in that saving we first initially thought about. So that itself made us think that this was probably a worthwhile experiment to have a go at.

Jason Shields:

Then the second factor that we took into it... So everyone when it comes to harvesting fruit, everyone knows how much they pay, or they should know how much they pay to pick a bin but what they generally don't factor is the oncosts associated with picking that bin. So just itself, when we are harvesting and we used to have the 12 machines or 14 machines, and then we would have another crew of people picking bottoms, we were spending up to about $15 to $25 associated oncosts. And of that, it was up to $5 a bin just in fuel. So that was a fairly significant amount of money, that if you told someone that you're just spending $5 in fuel a bin, they would find that hard to believe. And that’s because we were using the Hydraladas, and then because of that we were moving all the bins with tractors.

Jason Shields:

So instead of having, with these machines now, we have six people in one row, we would have one person in every row. So three machines is 18 people, so we would have 18 rows full of people. The rows are basically 200 meters long, most of the time, so to move a bin we could be traveling up to 200 meters for every single bin move, where now we've moved it all into... We had six people, so six people in a row, so literally a bin movement is about every 10 or 15 meters, as well as the machines actually move the bins down the row. So just in that itself, we worked out that we were at about $4 to $5 a bin in fuel, or energy, and we reduced that number down to about $1, a $1.50. But you've got to think, whenever you have someone that's burning fuel, that is an operator. We also saved that operators hours time. So we went from a $15 to a $25 associated oncost, getting the bins back to the shed, down to probably more like a $4 to an $8 cost. So that was a huge saving just in itself.

Jason Shields:

I've got a little video that we'll just play, that just shows the efficiencies now. That's just playing up there in the corner. So as you can see, we've got six people there running on the platform, rather than having six individual people down the rows that we would have had supervise. Now as the video will just scroll out you'll see that now all of a sudden, rather than our tractor drivers having to move around over 18 rows, which would be up to 200 meters of distance between the things, all of a sudden in that picture we've got 30 people all within 15 meters of each other. And then, as they go down the row, all of those bins are all down the row. So rather than a tractor driver having to drive up and down one row to pick another bin in the middle, now they just back literally straight down one row, as you can see here, and there's just five rows full of fruit rather than 20 or 30 rows with one bin in every row. So the tractor is just literally backing down.

Jason Shields:

So we saved a lot…. So everything was in efficiencies. Although we also saved a lot in energy efficiencies, it's also that energy is contributed to a person on the tractor. A lot of our earlier stuff that we were more thinking about was the labour and all this, so instead of having to have four tractor drivers that can drive a tractor, we only need to have one. Rather than have 12 people that can operate a cherry picker, the people that used to operate the tractors now drive the harvesters. So we took all of our good people, and used them better, and now they're part of the picking process rather than all this oncost that we had before. So I would say that most people are probably spending 50% of their harvesting costs on oncosts, and they just don't even realise it. And a fair contributor to that is energy.

Jason Shields:

So that's all around the harvest part, but the other benefit of these machines or this process for us was that we can use them basically 350 days of the year, because we also use them, not just for harvesting, you take the harvesting machines off, so all year we're saving that $200 a day in fuel savings, because we've taken 12 cherry pickers away and we've replaced them with three platforms.

Jason Shields:

As I said before though, other things that we did pick up that we were hoping, we picked up efficiencies in harvest of about 20%. So when you actually think about that, that is a lot better than what we're saying, because now we now picking 20% more bins for that same amount. So the savings have really focused in. And then when we go into thinning, depending on how big the job is, we're up to 20% to 50% efficiencies. So when you look back to a class one kilo of fruit, the quality's better, the fruit that we're picking, so everything... If you're looking to the energy per class one fruit that we deliver at the end, we are a long way in front of where we were before. So we're really, really excited about what has happened and the process we've put forward.

Jason Shields:

Just some other things that we've been doing, that people…more focused on the costs of things. For us, we were trying to come up with efficient systems, growing systems. So a classic example is the spraying. We've gone and set up our farms now, we're using hydraulic spray pumps rather than PTO spray pumps, so we can run at a lot lower revs, and using about six litres of fuel a minute rather than 10 to 12.

Jason Shields:

Then the other things that we're doing that... Most people just look at the cost of chemicals. A lot of chemicals aren't rainfast but they're cheap. So it might be $20 a hectare for the chemical, and so they use that because they see that as cheaper, rather than a rainfast chemical that might be worth $30 or $40. But for us, we don't look at it that way, we look at it more as, if it costs us about $35 a hectare to spray, and $15 of that or so is fuel, so if we could put on a chemical that is going to be rainfast and last longer, we're going to save labour and we're going to save fuel doing it, which is actually more expensive than what the chemical is, but because it's not a direct cost, it's an oncost, and people don't think that way and they don't factor that in when they're actually looking at the chemical and saying, "This is cheap." Or any other thing, when they're working out their actual costs, they don't actually factor in a lot of the oncosts. And fuel is a big cost and it's only going to go up, it's not going to come down.

Jason Shields:

So that's just a brief summary of what we've done, and the exciting things that we think that we're trying to change for the future to be more efficient. Thank you.

Kelly Wickham:

Thanks, Jason. That was brilliant, and right on the money as well. So if you could just hold your questions until the end of this first half hour of proceedings, and we'll have a bit of a discussion at the end, that would be great. Well done, Jason. And I just wanted to introduce Dasha. Just before I do, we had a short before we came on, and Dasha mentioned something about the fact that the seasons are actually growing longer. My conclusion right away was that this is due to climate change, and it's actually a whole lot more interesting than that. But in the meantime, let me throw you over to Dasha Sherif from I.M. Sweet Australia, talk about their renewable energy initiatives plus. Thanks, Dasha.

Dasha Sherif:

Thanks, Kelly. Thank you. Yeah, we're from Shepparton, Victoria, third generation orchardist, growing mainly stone fruit. Our season begins in November, and the harvest continues until end of March, April. We decided to go down the path of trying to save some money with our electricity bill, which other than the labour is probably one of our largest expenses we've got on the property. And diving into it for a few years, we came across the local distributor in Goulburn Valley, and we've decided we ended up putting in a 200 kilowatt solar system. And to break it down, basically two to three years ago we were spending close to $100,000 a year on electricity, and we've since now had it installed, and it's pretty much been cut in half. So it's been more than efficient.

Dasha Sherif:

We started the process off about 18 months ago, so we put 430 watt panels on our roof. The panels, as you can see, some are on tilts and some are flats. The one on the tilts are facing the east, which generally doesn't get as much sunlight compared to the west on the way our shed's designed or laid out. So there's 465 panels on that roof, we chose the roof because obviously to minimize space on the ground. So we went down that path. The inverters we used were Huawei inverters, and going back to those, the tilts, the brackets, it's on a 15 degree angle, and we worked out we could pretty much get an extra 5 to 8% production for any solar panels that were on a tilt.

Dasha Sherif:

The panels we used were LONGi, so they're a tier one product. So they've got a 20 year warranty for the panels, and a 10 year warranty for the inverters. We've sat down with Horizon Solar, who ended up doing our new installation, and they said to me, factoring everything in, that it's realistically a four to a five year payback. And it's been installed now for just over 12 months, and we're on track of that, if not better. At present, this time of the year, spring and summer, when the days are longer, and especially if it's not cloudy, we have generated up to 1.6, 1.7 megawatts on our 200 kilowatt system, which is unbelievable. And obviously during winter, when the days are shorter, and with more cloudier, rainier days, obviously that's a lot less. But on average, it works out that our 200 kilowatt system generates roughly 800 kilowatts all year round. So for us, that's massive. And Shepparton is known for more sunny days than Queensland, so that was another thing that... why we decided to go for solar.

Dasha Sherif:

We've also in our packhouse included rapid roller doors on our cool rooms. Basically our cool rooms are kept at 1 degree, so when the fruit comes in from the field, our fruit can be 35, 40 degrees in temperature, so we're trying to cool that down as rapid as possible and as quick as possible. So by these doors being automatic, every time we drive in, they automatically go up and down as soon as we come out, so it means that the door and that room that's set at 1 degree is not letting all that cold air out into a packing shed that's 25, 28 degrees during summer. So that's been another saving.

Dasha Sherif:

Also all our plant room for the cool rooms all with variable speed drives and what have you, just for the initial starting up and slowing down of compressors and motors, et cetera. So that's pretty much, I think... Oh, sorry. And probably the next thing that I would probably looking at would be is if we can batteries, solar batteries, where what we can generate during the day, if we can put into batteries and use the batteries at night for... Our cool rooms run 24/7. So during the day this is all good, we're taking a massive curve off our electricity usage during the day. But at night, obviously the solar system doesn't generate, so we're still using power off the network. So definitely batteries would be the next thing for me to look at in future.

Kelly Wickham:

That's brilliant, Dasha. Thanks for that. I think battery prices are slipping year in and year out, so that might be pretty appealing in the next couple of years. And given that your four to five year payback may become something like three to four, you squeeze the battery in, and it's going to be a really good story. We've got a few installations across ag, which is quite exciting. And thanks again.

Kelly Wickham:

So we'll open up to discussion, if we could get you back on, Sarah and the guys, and open this up for a bit of a panel chat. Love to hear from folks that have participated by listening in today, would love to hear you participate by asking a question, or sending it through the chat form, raising your hand or otherwise as Sarah has suggested. So first up, what have we got?

Sarah Clack:

Awesome. I'll just get all of their presenters to just turn their cameras back on there, so we can see everybody as we're having our discussion. So, we have had our first question here is from Richelle Zealley from APAL. And hers is, with net zero carbon targets making headlines are there any businesses looking at implementing programs to demonstrate their energy efficiency practices? So Rowan or Jason, is there anything there?

Rowan Little:

I guess communication is going to be really important. When you start out, I think you've got two questions that you have to resolve with all of this. I think the higher cost becomes and the more carbon becomes a question, anything that you can do is... If savings are going to be generated economically, you're going to save money ultimately. So I think the whole question of PR and marketing and communications is an important one, and certainly we'll be talking about that, but I think at a foundational level, why do you do something? You do something primarily because it's good for your business at a number of levels. And certainly the decisions that we made came at an economic cost, but we think we get a financial return. So there is certainly a what's good for the planet question, but I think a lot of the solutions that we've got about is, it's really a pragmatic decision that's been made based upon an economic return.

Rowan Little:

I think the challenge is going to be with consumers, is do they see that? And I do absolutely believe the horticulture industry needs to get on the front foot and talk about our credentials in terms of carbon, because it's going to be a... Otherwise there's going to be expectations that consumers place on our industry which may be unwarranted.

Kelly Wickham:

Jason and Dasha, do you want to add to that in way, shape, or form before we go onto the next one?

Jason Shields:

I think Rowan's summed it up pretty well. I think a lot of the things that you've got to think about is, if we all think that we're going to be doing what we're doing now in 20 years' time, we're all kidding ourselves. So if we're not looking to move forward... And Rowan's exactly right. We're not doing it now because we're potentially forced, we're doing it because we think that there is an economic benefit from it. And generally the efficiencies that we gain across anything end up being an efficiency, with energy or with whatever, because you start to produce more fruit, or better quality fruit, better packouts, so like that energy per class one kilo of fruit that we deliver is better. And that's what we all have to be aiming at, because then that means we can grow a class one fruit but cheaper, to be able to sell it, to be able to stay profitable as a business. Or else none of us are going to be here, whether it needs to be net zero or not.

Sarah Clack:

All right. So next question that's come through is, what are the next steps in the orchard for each of the businesses? Are they already using solar irrigation systems?

Dasha Sherif:

Yeah, at one of our sites we have solar on our irrigation pump shed and at the front of the farm. So again, what electricity as we're running, it's using into that, and then obviously when it's not running, it's exporting back into the grid. It's a lot smaller, it's only a 38 kilowatt site, but yeah, we're trying to save anywhere possible, really.

Kelly Wickham:

And do you have a what's next kind of thing, Dasha, in terms of any other measures you're looking... Oh batteries

Dasha Sherif:

For me it's definitely, especially with the 200 kilowatt, that's... If the cost of batteries slowly comes down, that's the next thing definitely that we're looking at installing.

Kelly Wickham:

Cool. And what about you guys, Jason?

Jason Shields:

One thing with the farms, that I'd probably say that everyone would probably love to be doing that, but most of the farms that we have now are already built around a system that that wasn't available. So I would be assuming that, as we move forward as farmers, and we make new farms or develop new farms, we actually leave various sites where we might have the solar blocks, to be able to generate enough power to run irrigation systems and that. Most on most of the farm sites now, I imagine that unless we actually go and build sheds to put solar panels on top, our sheds that we have for irrigation pumps and stuff like that aren't really big enough to be deriving a massive power saving. I know we've talked ourselves, about building in the farm some internal bin storage sheds that we could put power on top of, to try and maybe potentially run irrigation pumps and so forth off. But packhouse is a little bit different, because a packhouse is a really big facility that is using a lot of power, so you can put up a big solar panel there.

Rowan Little:

Yeah. I totally agree with... It's really difficult to retrofit stuff, is all that I would say, and that's going to be one of the challenges with your orchards in particular, in relation to irrigation. And that was one of the big reasons when we came to our production facility, that we did build a new production facility. Because we looked at trying to... what efficiencies or whatever could we get out of the old one, and you just couldn't. You couldn't generate the things that you... The savings and whatever, both in terms of design, layout, and the environmental or energy savings. So that is a massive consideration, and I think until you can resolve that question of how you retrofit things, it's really difficult to implement stuff, because you've already got a sunk cost, so that saving is not as significant.

Sarah Clack:

So what sorts of planning does a business considering energy savings technologies need to do prior to embarking on their projects? Or another way to look at this is, what planning did you guys do before you embarked on your projects?

Rowan Little:

I touched on this in my thing. I think we started planning for our build, which we finished in March of this year, in 2015. So we did five years of planning. And a lot of that was compliance planning, so planning in relation to... Our building's in a green wedge, so that had all sorts of limitations. But then it was also... You've really got an opportunity once to lay it all out, and if you've got the time on your hands, the more planning you can do, the more implementations you can look at. And I guess this seminar's primarily on energy efficiency, but I think the other thing that we were really concerned about was just waste at every level. So whether that be people walking unnecessarily, whether that be how we remove product from the process, or... We did a big piece in our planning in relation to water management, because that was the other thing. How do you recycle water, reuse water? Because all of these resources are incredibly expensive.

Rowan Little:

So I don't think you need to take four years. There was a lot of stuff that got in the way there. But I would certainly say that, if you're wanting to go down this path, then the more time you can spend planning and looking at the options, the better the returns will be.

Sarah Clack:

Thanks, Rowan. Jason or Dasha?

Jason Shields:

Yeah, I just...

Dasha Sherif:

I think Rowan touched on it then, that you're always trying to be as efficient as possible with everything you do, whether it's in the packhouse or in the field, it's just part of business. It's the same sort of thing, like I said, whether it's OH&S with your workers and water savings, you're trying to be as streamlined as possible. Expenses are always going to go up, so it's just trying to cut your costs down and grow at the same time.

Sarah Clack:

Dasha, did you have an energy audit done prior to figure out the size of the solar system that you were putting in?

Dasha Sherif:

Yeah, we had an audit done earlier on. Yeah. That was about three years ago. And it actually worked out well, because we were looking to expand our packing shed, and it worked out well that we needed that extra room to fit on the extra panels. And then that report came back and the main thing they'd come back with was that our electricity usage was our main expense, and that a solar panel would be best suited to us. And the second thing was upgrade from a Freon plant to ammonia, which is something we're looking at doing as well.

Sarah Clack:

Yep. Fantastic. And Jason?

Jason Shields:

Yeah, I'd just say, out in the orchard side of things, because from when you plan to plant a tree to when you actually have that tree into production can be... From when you're ordering the rootstocks to picking your first crop could be five to eight years. You always just have to be planning, and I just think you always have to just be looking forward, and not about what you're doing now, and what will be more efficient, and what potentially robots might be able to pick or platforms might be able to be able you could pick up any efficiency, and not just go, "But I've got this sized row, or this system, I don't want to change." You're eventually going to have to change, so you just have to draw a line in the sand and plan to move forward, and don't just rely on what you've always done in the past.

Sarah Clack:

Fantastic. Thanks for that, guys. Rowan touched on it before around wastage, and there's been a question come through here around whether any of you guys have been looking at utilizing prunings or other wastage for pyrolysis or bioenergy in any way. So for generation, like using those prunings and waste to generate electricity, or any other products such as wood vinegars, etc.

Dasha Sherif:

I think the prunings... Just touching on the prunings, the prunings we mulch back into the soil. So it forms a compost in the winter, and then in the spring and summer, we slash our grass and we throw all that mulch on the treeline, right where the trees are, to keep moisture in the treeline rows. There's probably one thing, we throw a lot of fruit that... With apples and pears, there seems to be a lot of juice, but especially with plums and probably apricots, a lot of it that's not good enough ends up in the dairy farms out this way. So that's one thing, a few discussions we've had with some people to maybe utilize that in future. But it's a slow process, but that's another thing, looking at in the future.

Jason Shields:

I would back up Dasha's one. I think if we went and took all about prunings and all about grass out I think we'd create another problem that we would be burning more energy to make fertilizers and everything, and driving trucks to bring in compost, where we are just trying to rejuvenate our soils naturally by trying to put back as much as what we... Not just take everything away. Because we're already taking the fruit away every year, we're just taking nutrients and everything. If we started taking away all the wood as well, I think we would deplete our soils pretty rapidly.

Rowan Little:

Yeah. I agree at an orchard level. I think where there's potential for waste byproducts is certainly at a packhouse level, because you've already spent the money and you've got it to the packhouse. So we're actually three quarters of the way through a project with RMIT University, where they've been coming and getting a lot of our commingled waste, and they're looking at various products that we might be able to make out of it, because that's certainly... You've got the waste, you've spent the money, and at the moment you just have to take it away. So what are the other things that we could use for that, is a bit of a project that we've got underway.

Rowan Little:

And I think particularly in stone fruit, where there's no juice market, that's a critical pathway that we have to find, because it's crazy just turning what is basically just food that has got some sort of minor cosmetic defects... Basically it all goes to waste. So that's a big part of our program moving forward.

Kelly Wickham:

Why is there no juice market, Rowan?

Rowan Little:

The biggest problem with stone fruit is it doesn't really juice up, it sort of goes to this pulpy consistency. So apples and pears are magnificent for creating juice, and we have very little waste of apples and pears. But stone fruit, by the time you've got to take the stone out, and then the amount of juice you actually get, expressible juice, once you strain it all, is so limited that it's not really a juice option.

Sarah Clack:

Fantastic, thanks for those insights. That's great, and it's great to hear that you guys are utilizing those products and giving it back, and hopefully building soil carbon and returning those nutrients to the ground there.

Sarah Clack:

My questions have just moved on me. We've got a question here. How can you be confident you're selecting the right battery or solar PV system? There's so many providers and installers out there. Where do you start?

Dasha Sherif:

I think what I did, you just get quotes from three or four different companies. A lot of the solar panels... Obviously you make sure there are... And you do a bit of research as well yourself, make sure that they're tier one product, which a lot of them are. The solar panels are getting larger and larger. A couple of years ago, a 250 or 240 kilowatt was a big panel, and I think now there's 500 watt panels. So they're just getting larger and larger as technology progresses. So just a bit of research, and I can't complain with who I ended up going with. Price was one thing, but just the product and the brand, after doing a lot of research. LONGi's a well known brand, and the more I delved into it, it was the one in the end that probably had less and less bad reviews on it, I guess. So just do a bit of your own groundwork, I guess.

Kelly Wickham:

What warranties or guarantees did you get with that, Dash, as well?

Dasha Sherif:

Sorry?

Kelly Wickham:

Did you get any warranties or a guaranteed period?

Dasha Sherif:

Yeah, yeah. Like I said in my intro, there are 20 years on the panel, and 10 years on the inverters.

Kelly Wickham:

Oh, yeah. Excellent.

Dasha Sherif:

Yeah.

Kelly Wickham:

Beautiful.

Sarah Clack:

Rowan, was there any process that you guys went through with selecting solar panels, making sure you get the right provider?

Rowan Little:

Given it was such a big part, we basically just outsourced that. And that's the other option you can look at. We outsourced the whole tendering process to a project manager, and they went and... I agree with Dasha you have to, you can't just take whatever quote, you've got to go and survey the market, and we just figured that we weren't experts in solar panels, so we just got someone in to do that, and then they put it together. So it all depends on how much time and energy you want to put into it, but solar panels, there's so many suppliers and it's a bit of a minefield, so that was the decision that we made.

Sarah Clack:

Fantastic. Thanks for those insights. There's been another question around electricity. Have any of you guys looked into the potential of electrified vehicles in the orchard, potentially being powered by solar that's generated on farm?

Dasha Sherif:

We're just purchasing as we speak two electric forklifts, so yeah, that'll be charged during daylight hours, so the packhouse will run with electric forklifts. That's as far as I guess for electric vehicles.

Rowan Little:

We haven't looked at that. I think that's the next horizon, is going to be about orchard... It's going to be about all vehicles though, not just orchard tractors and whatever, it's the electrification of that particular piece, is going to be the next thing. But at this point, we haven't invested in anything.

Jason Shields:

And I think at this point there still probably isn't too much stuff out there, that I know of anyway, that's out there on the market. So I think as they get vehicles and cars become more electric and more and more of a thing then all of a sudden tractors will follow, and as they get batteries better, everything else will just follow. But generally, I think cars and trucks, they use more, so that's where they'll put all their money first, and then as they get them right, then we'll see that continue on.

Sarah Clack:

Fantastic. Thanks for that, guys. And so there's another question here. There's been some talk about labour efficiencies and reduction in labour. Do you think there's been a change in the types of skills needed by your workforce? Or do you just use labour more efficiently?

Rowan Little:

This is definitely one that I'm passionate about. I think the type of workers that we need in horticulture are changing rapidly. I look at the level of technology that we've now got across the whole business, and a standard hort degree... Not to belittle the need to know how to prune stuff and all of that sort of stuff, but you really need to have quite a rounded... We're going to need to look for a whole new set of skills in the packhouse and whatever. The level of technology you have on your grading equipment, and the level of integration that you're doing at a software level, it's pretty exciting from a horticultural point of view just to think, with the bright...

Rowan Little:

It's not like if you go onto the farm now you're going to end up doing base labouring work. There's some really exciting stuff that you can do, and I just think we've probably got to promote that way more, as an industry, that actually horticulture's changed. There's a whole lot of exciting stuff you can do in terms of robotics, in terms of energy efficiency, in terms of a whole range of software applications. And there's a lot of blue sky opportunities there. And I don't think the workforce that we have today will be the same in even five years. We're rapidly changing the level of skills that you need.

Rowan Little:

I think the ultimate challenge is, what does the labour force look like? What's the make-up, between skilled and unskilled? And that's a really interesting question. The whole big one is, will we ever get to mechanized picking? Obviously there's lots of robotic options around now that people are trying to develop with robotic picking, but at the moment that's still all done by unskilled labour. But when we say unskilled, they still have to know what to pick. So to me, that's an area that's still a little bit for nirvana, but it's the last vestige in, this is someone who... Basically I just need to get a whole lot of bodies in to pick fruit.

Jason Shields:

I'd go into that with the way that with the way we are potentially changing and moving into platforms or some other form of system and the Future Orchards did a webinar two or three months ago, it was just before harvest, and what they actually said was right, that we all complained that we can't get workers, but we have a system where they need to be able to carry a 20 kilo bag and climb up and down a ladder, and if we look at the Australian demographic now, there's probably around maybe 10% of the people that are actually capable of efficiently and effectively being able to do that. So we just complain that we don't have the workers, but we're not actively going out and...

Jason Shields:

So if we say with the platforms the potential is we just open up to... We take it to a demographic that probably 60 to 70% of the actual workforce can do. So we're opening up to a different labour pool for our general labour staff, where we just need numbers. But then we have more numbers to choose from, rather having the need of bigger, stronger, and not being sexist but we have more than 50% of the people that work on our farm are females now, because they're generally faster, more agile, than what most of the men are.

Dasha Sherif:

Yeah, definitely. Especially with the packing shed, that's where automation's really taken over. So a lot more people with laptops and on computers, looking at cameras on the fruit rather than people. So it's definitely changing, and it's going to continue.

Kelly Wickham:

Can you guys reflect on the time that you've been operating in your relative businesses, how much the price of electricity has gone up in that period? I'm curious.

Dasha Sherif:

I think for us, our business has grown a lot the last five, six years, but I can remember a period there it was every January, it just seemed to be going up five, six cents every January. And that was about three years ago I said this is just crazy. It was stupid, and it was unsustainable. So that's what really made me look at solar, because like I said, it's just unsustainable. And it's going to keep going up and up.

Kelly Wickham:

Rowan and Jason, do you recall what it's been like in the time you've been in your relative businesses, what the kilowatt-hour tariff was back in the days to today? Has it doubled or tripled?

Rowan Little:

Yeah, I couldn't tell you. All you can say is, anecdotally it's gone up a lot. Obviously that's the driver for a lot of the measures that you're taking, so you just keep looking at that... It's the same with the gas. We were spending a lot of money on gas for a pretty tiny little amount of value. So electricity, it'll just keep going up, so anything you can do to save or to generate your own is going to give you a return.

Kelly Wickham:

I only mentioned that because, when I came to Australia 25 years ago, they had the second cheapest electricity prices in the world. And now I think we're somewhere in the top 10. But yeah, that's going to have a big impact on the business, so people who once weren't looking at it are now looking at it and focused on it. Excellent.

Sarah Clack:

Awesome. Thank you for that, guys. So we're almost at 1:00 now, so I would just like to say a very big thank you to Dasha, Jason, and Rowan for their time today, time in preparing and also their time today in actually presenting. It's been fantastic, and it's been fantastic to get such different technologies and businesses along to share their insights into their energy journeys.