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Understand your bushfire risk

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Chair

Our next presenter is Ian Bennetts

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First I want to acknowledge that Justin Leonard made a significant contribution to this approach during its early development. The second thing is that this approach is not tied to any regulatory system, it is basically a voluntary approach that people can use to find out how to better their circumstances.

What are the objectives of this star rating approach? First of all to allow property owners to better assess the potential risk of property loss due to bushfire. Identify the key mechanisms of loss, primarily from ember attack. That's what I principally want to talk about tonight, and provide guidance on risk mitigation through practical targeted recommendations.

As an overview, the approach is what I call a notional probabilistic approach. In effect the model estimates, using an engineering model, what is the notional probability of loss in a particular situation. We're not saying for a moment this is highly accurate but it's an estimate that enables you to compare one situation with another. It's an important way of saying “Is it likely that you would lose your house or is it not likely?” And obviously houses with a low probability of loss will get a high star rating and conversely those with a high probability of loss would have a low rating.

The model assumes the property owner is not present and this makes a big difference.

It considers losses due to bushfire radiation or flame contact, direct ember attack, and what I will explain shortly by the term indirect ember attack. I'll cover those aspects presently. It's principally concerned with protection of property, it's not concerned with life safety. The model is basically looking at whether my house is likely to survive given a bushfire. We assume in the model that the property is subjected to a severe level of ember attack without going into detail as to what we mean by that. The probability of loss is adjusted depending on the fire line intensity, bark hazard and distance from the bush. The model depends on obtaining inputs of the sort Justin was just explaining. And of course, the model also requires many house and property details as you can probably imagine as we go through this.

I'm going to focus in this presentation on aspects of direct and indirect ember attack. Now what is direct ember attack? We define this as house loss due to direct ember attack would be due to embers directly entering house cavities or landing on surfaces or very close to the house or its attachments where components are combustible or vulnerable to heating.

In the model we have identified what we consider to be 22 independent mechanisms and they’re characterized with respect to various pathways. You might think of one pathway as being the roof. In relation to the roof, we've identified four mechanisms. Another pathway that embers could enter or affect the structure is through the walls. There are six mechanisms. Or it could be via attack of the windows and frames. And there's four there. Or the doors and frames and so forth. We go through to subfloor, evaporative coolers, gas supply, ventilation pathways, and skylights.

I'm just going to talk about roofs and walls briefly. Because it's quite a complex. We don't have time to go through everything. Let's think about direct entry into the roof space, and here I'm looking at Mechanism 2. The options are if you've got a tiled roof you can see gaps between the tiles so you can get some smaller embers coming through there. If you've got materials stored in the roof that

can have an effect. Also, you can see with a steel roof you could have gaps along the ridge through which embers could enter.

And many houses have eave vents as well. So, this is important, if these are not screened or they're not dealt with they can lead to the entry of embers into the roof space. Mechanism 3 is debris in gutters and valleys and I've just put a couple pictures here that we've taken during surveys and I probably don't need to say too much more. Obviously the likelihood of loss depends on the level of debris and that in turn will depend on whether you've got adjacent or overhanging trees. And also the likelihood of loss depends on gutter and roof construction details and so forth.

Mechanism 4 is attached structures. This is an unusual one referring to pergolas and carports that might be physically attached or very very close to the house. But you could imagine if you had fuel at the base of those verticals. If you did have significant fuel (in this case there isn't) the fire could climb, depending on the type of material the vertical posts are made of, could climb to the roof, and depending on the roof construction and the sheeting, could actually spread across to the house. And of course, the other thing that's important is where it's attached. Obviously if it's attached above the roofline it's not an issue to the same extent as if it's linked to the house and below the eave.

Let's look at wall mechanisms, Mechanism 5. This is one we're probably all familiar with, direct entry into a wall cavity. The factors we consider here are the gap sizes, areas, and the length of gaps. The interior wall construction is obviously very important because once embers get into those gaps it depends on what's inside the walls as to what actually happens.

Cladding directly adjacent to debris or mulch. This is not a good picture either because of the brick wall. It's not really an issue here but you can imagine if that was a combustible wall and you had significant combustible material at the base a fire that could develop through ember attack could actually affect that wall. And the sort of things we consider are the length and the type of cladding and the level of mulch or debris at the bottom of the wall.

Another couple of mechanisms are similar. Ember build up on horizontal fixtures. So, for example electric fuse boxes would be an example of that sort of fixture and there are others, embers landing on ledges above windows. When I walk around the neighbourhood I actually see metal construction that contains blinds. And above this construction, which is quite a wide ledge you also have combustible infills above the window. And I'll show some examples of that. So, things that become important are the width of the ledge the type and length of cladding. Now here's an example. These constructions at the very end of the house are actually almost a horizontal ledge. I suspect it's not an issue in this case but if it could attract some debris. What you've got there is effectively combustible cladding and an almost horizontal surface on which the embers can collect and ignite any fuel that happens to be there. So we look at that as well. Second storey is probably not an issue if there's a decent slope on the roof, in this case there is but in principle it's something that has to be looked at.

So, in this case we've got we've got combustible cladding I think on the top storey. By the way it's very common now for people to use EPS (expanded polystyrene), lightly rendered on the top storey, so the junction between the roof and the top storey could be an issue if the slope is low.

One of the main things that we look at, and we think is a significant mechanism, is the interface of a combustible wall with a combustible deck. The factors we consider are the wall cladding type, deck construction, how is the deck supported, do we have combustible verticals, are they CCA treated pine, are the bearers treated pine or are they something different, what is the decking made out of, the height of the deck above the ground, and whether the deck’s actually closed or not.

The presence of overhanging trees can be important because that will just create debris. Surrounded dead corners where debris can actually get locked in is an issue. This is actually my deck I have to admit the level above the ground is low and what I realized was that when you blow the leaves off the gravel path they generally speaking go under the deck. If you look under the deck there's quite a lot of fuel that's starting to develop there and then of course you've got some vegetation directly adjacent to it. This is actually a merbau deck but the supports are class one timbers, the horizontal bearers are actually treated pine. There are a whole range of issues

associated with decks and the answer could be well we just enclose them all. But one of the things that we have to think about is that if you close it in you've probably got to ventilate it properly, because there are other concerns such as termites, and it's not a good practice to just close things in, especially in country areas.

We've talked about direct ember attack. Now I'm going to talk about what I call indirect attack. This is where an object which is outside the house has been affected by embers. It could be anything but let's talk about being started by embers and as a result, that object burns. Now the diagram shows a house. It could be the house next door, it shows a bush on the right-hand side and if that ignites. One of the things that we're concerned about is that once these objects ignite, and this is something Kevin touched on, you can get significant levels of radiation and that depends on the spacing and on the size of the radiator, and the nature of the material. If, say you had annealed glass windows which is fairly standard and you had significant level of radiation from an adjacent object that's burning you could break the glass and once that breaks the embers can actually come straight in.

I've just gone around the neighbourhood and taken a few pictures. Here's an example of a caravan which if it did ignite would produce a very significant fire. We have to be very careful to leave boats, caravans, cars, in certain locations during the bushfire.

Wood piles, plastic bins, kayaks, canoes and outdoor furniture, all of these things we generally know about. This is a shot I took of a house with quite a significant bush at the back of it. The guy parks his open speedboat right near the front door and it's very close to the window. The photo on the right is not actually that boat, it's just showing that boats can burn very well because they're made of polyester, and they've got soft furnishings. You can imagine embers dropping straight in the top and starting a fire and the radiation from that fire being quite significant will last for quite a while.

These are probably trees that we shouldn't be planting. We should be careful about what plants we plant around the house, and this is something Kevin touched on as well. Be careful about low level plants of the wrong sort near windows, native grasses or unmanaged grasses, bushes and shrubs we might describe as being having a higher flammability. The model actually allows this to be taken into account. Other things we look at are retaining walls. This slide shows a retaining wall adjacent to timber cladding but also adjacent to an LPG tank. I think it's spacing is sufficient for it not to be an issue in this case but you could imagine if that was closer it could present an issue.

Timber fences and plastic water tanks can be issues. Some recent examples where we've been applying the model are interesting. Here not only have we got a timber fence, which I think is a treated pine timber fence, running along next to the house and there's windows on that side. We've got one at right angles as well and we've got a whole row of pencil pines behind.

Then we have the house next door. This can be a difficult thing to deal with because in suburbia houses tend to be quite close to each other. So, we've got to think the house next door can present a problem.

If the house next door was very resilient in terms of bushfire resistance so we needn't worry too much. But if it's a poor example and it catches fire even if your house is well designed if you haven't considered this hazard that's going to be a problem. Same thing goes for detached garages and it's possible that we may have to protect our garages against ember attack to the same level as we might consider for example protecting our houses. If the garage is too close and it catches fire and most people's garages that I've seen have got a lot of fuel in them then it could impact the house. The model takes that into account.

To summarize the star rating approach. It's a model that enables the notional probability of loss for a house to be determined. It identifies the key contributors to the probability of loss, identifies potential mitigation measures to achieve the most cost-effective reduction in loss and the star rating is a function of estimated probability of loss. Jeff Emmerton who is taking part in this webinar is in charge of developing the models which are going to be in the form of an app for a home user. Also there will be an expert version of the model as well and Jeff might be able to give some more details on that.