

To whom it may concern,

**RE: Werribee Open Range Zoo (Zoos Victoria) nomination for Interpretation Australia Award for Excellence 2019**

It gives great pleasure to submit the Solar Forest Project for your consideration as a part of the Interpretation Australia Award for Excellence 2019.

We believe the attached submission and supplementary information demonstrate that the Solar Forest is a great example of excellence and best practice in interpretation.

As a Zoo Based Conservation Organisation, Zoos Victoria including Werribee Open Range Zoo (WORZ) was the first zoo in the world to be certified Carbon Neutral and reached this status in 2013.

Zoos Victoria develops powerful experiences that connect visitors to wildlife, improve their understanding of the threats to wildlife and provide tools to take simple conservation actions. This Connect – Understand – Act framework underpins all we do. We are always looking for innovative ways to engage visitors in conservation and to showcase best practice in Community Conservation Actions.

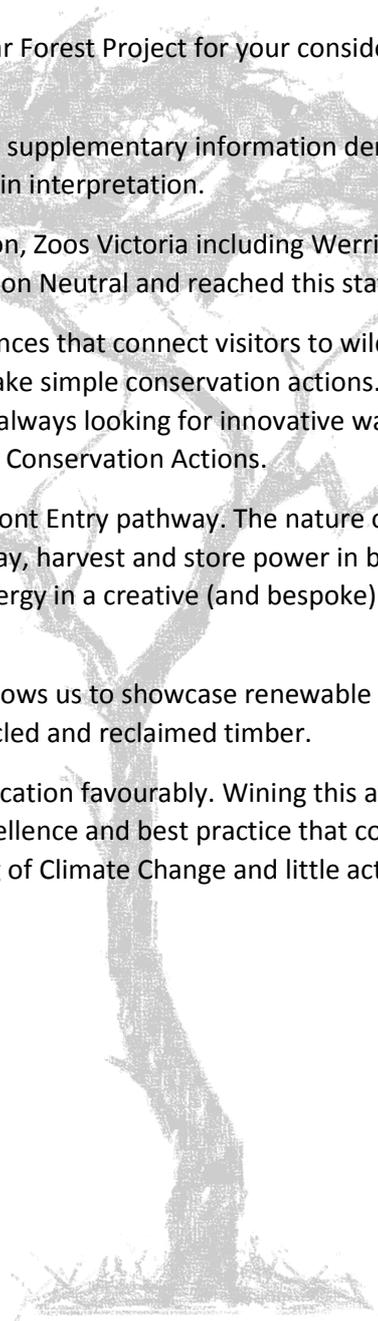
In 2018 the Solar Forest was added to Front Entry pathway. The nature of the install to light the pathway at night, provide shade for queueing visitors by day, harvest and store power in batteries for other uses such as charging an electric buggy and showcase solar energy in a creative (and bespoke) manner. Solar panels don't have to be boring.

The location and impact of the panels allows us to showcase renewable energy in an organic way drawing upon its sculptured structure made from recycled and reclaimed timber.

We hope that you will consider the application favourably. Wining this award would be a great acknowledgement of the innovative use of interpretive excellence and best practice that continues to have a positive impact on sustainability, our visitors understanding of Climate Change and little actions that can have a great impact on our planet's future.

Warm regards,

The Solar Forest Team  
Werribee Open Range Zoo  
Zoos Victoria



# Interpretation Australia Awards for Excellence 2019

## Sustainabiltrees Solar Forest, conversation for conservation

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Autonomous Energy - Concept designs (WORZ Solar Forest by Day)

### **Question 1. What is your project?** *Project description including purpose, location, mission, aims and objectives*

#### **Our Purpose & Mission**

As part of Zoos Victoria's achievement of being the first carbon neutral zoo in the world, we're constantly looking for ways to reduce our energy footprint. While this is imperative, our true commitment is to our visitors, how do we take them on the journey of sustainability with us? How do we inspire them to join us and take action? How do we make them the centre of our experience?

Introducing... Sustainabili-trees!

The WORZ experience is an African experience, our animals, our stories and our conservation stories are all about creating strong engagement and immersing our visitors. Continuing this theme through every element of our experience means carefully considered design. Drawing inspiration from the African Thorn Tree (*Acacia tortillis*) with its wide canopy spread out above the hungry reach of giraffes and other grazing herbivores of the savannah; we created a Solar Forest made up of 8 "Sustainabiltrees".

The successes of our solar program is immense; we currently generate 20% of our electricity from our solar panels. So while it's important to constantly be increasing this amount, our real responsibility here is to engage our visitors in this story and to start inspiring others to assess their energy footprint and go solar.

At Werribee Open Range Zoo as part of our sustainability program, we have been increasing our reliance on solar energy across our site since 2014. We currently generate 20% of our electrical needs from the sun through our 200kw grid connected system. The Solar Forest is a powerful opportunity to promote and showcase Zoos Victoria's commitment to sustainability whilst inspiring others. This project is a demonstration project of an off grid 20kW bifacial solar PV with battery storage technology.

#### **Aims**

We're in a really unique position, having already utilised every flat surface in the zoo to house solar panels (with the exception of the back of the hippo!), we needed to get creative to expand our solar network.

The forest was designed to provide shelter along a concrete pathway from both intense sun and from rain. Their installation was to create a positive visitor-focused experience on entry while improving the space that was there previously.

On a more technical note, the Carbon Dioxide (CO<sub>2</sub>) avoided by our Solar Forest is the equivalent to the CO<sub>2</sub> fixed by a forest of 521 trees. This means each tree is the equivalent of 65 real trees on a CO<sub>2</sub> avoidance/sink basis.

### **Location**

We looked at several possible locations, seeking to balance both the practical requirements of the trees but more importantly where our story would create the biggest spark among our visitors. Just like our commitment to sustainability being at the heart of everything we do, we wanted the Sustainability trees to be front and centre, bold, yet beautiful and completely unmissable. We wanted to create the conservation conversation, and placing them where they would not be missed, ensured this would happen.

The outcome being to move this solar harvesting shelter to the front entry for great visitor access and visibility and for it to become a spokes piece to showcase the sustainability achievements of the organisation.

The Solar Forest is located at the Front Entry pathway. The changed nature of the install from “solar harvesting - weather canopy” to; providing light for pathways at night on exit after evening events, provide shade for queuing visitors by day, capture enough power to charge equipment such as electric buggies and vehicles and showcase solar energy in a creative and engaging way. We wanted to take this from practical, to practically impossible to miss.

### **Question 2. How does it demonstrate excellence and best practice in heritage interpretation?**

#### **Research, concept planning and methodology:**

Research and concept planning honed in on what we do best at Werribee Zoo – creating a fun and engaging visitor experience whilst staying true to our brand and authentic African look and feel.

The research and planning process for this project was a collaborative one, involving both internal and external stakeholders.

Members of the following internal teams included; Operations, Horticulture, Sustainability, Projects and Visitor Experience. Whilst external team included; Autonomous Energy NSW, TimberZoo, Local Power supply company, Kennedy Electrical and Cavern Sound Studio.

#### **Audience – profile, expectations and issues**

Our Audience profile is multi-faceted, ranging from the glance and go type of person appreciative of the dappled shade as they queue to enter the zoo; to the more environmentally conscious, inquisitive visitor.

This space is designed for visitors to explore and take command of their own journey. As an entry space, the flow of the area is imperative. We wanted to create a sense of intrigue and curiosity, while not bombarding our visitors at the entry. The free-flowing design enables visitors to move throughout the space at their own pace, engaging and exploring on their terms. We often see visitors re-engage with this space on their way out.

The entry is also somewhere we felt visitors would not stop and read slabs of signage, but hang on, the trees have important stories to tell!!!

Thinking outside of the standard approach of ‘slap up another sign’ we decided to give the trees a voice, literally.

#### **Key messages, themes and storylines**

We sought inspiration from the African landscape and borrowed the aesthetic of the African Acacia and Boabab trees; as well as echoing the lines of timber framed safari tents and artist easels. We wanted to evoke the romantic notion of going on a safari in time of the “African Queen”.

In order to achieve this - reclaimed and recycled materials had to be utilised as much as possible.

Solar Forest messages, themes and stories are delivered to our visitors in a number of ways;

- If trees could talk – What would they say? Lots! I’m sure. Three animal nest boxes are used to house audio equipment and speakers. Each nest box alludes to the plight of 3 of Zoos Victoria priority 27 endangered species and animals which are undertreat due to habitat loss and climate change. The Stuttering Tree Frog, Orange Bellied Parrot and Lead beater’s Possum.  
Voice audio emitted from the nest boxes, shares stores of Zoos Victoria’s sustainability achievements. From Carbon Neutrality and composting all organic waste on site to solar energy harvested and removal of all single use plastics.
- Aesthetically, the use of recycled timber is obvious – it speaks through its uneven discoloration, previous fixing holes and marine worm damage from years in its previous life as a pier.
- Star Domes, by night reflect the up-light of the LEDs and spill it to the ground lighting the footpath for the visitor. By day they cast shadows, including the star cut-outs, onto the ground below. Each of the 8 trees has a different Southern Hemisphere star constellation which is important to cultures across Africa as well as Australia. These constellations include but are not limited to Orion’s Belt, Cassiopeia, The Southern Cross (Crux) and Sirius (Canis Major) to name a few.
- Visitor Welfare - Shade by day and lighting by night were key factors in the design and construction of this project and messages may also be garnered by our visitors subliminally as they make use of these.



### **Communication – techniques and channels / choice of interpretive media**

Our choice of interpretive media was intentional; rather than putting up another sign that wasn’t going to be read we chose to use voice over and sculptural elements to provoke thought. We wanted the sculptural feel to make a strong visual statement, one that would create the conservation conversation.

### **Design - problems solved, appropriateness to setting, aesthetic appeal, cohesive relationship with marketing**

Each Solar Tree features a wide canopy of solar panels supported above a timber tree structure. Straight lines contrast the curves of the plantings in the surrounding backdrop, reminiscent of human interaction in a natural African landscape.

Natural materials provide an organic feel to the structure with all operational cabling concealed from view down the central pole. The steel core of the main upright trunk of each structure is clad in wood panelling to give the impression of a solid wooden column or trunk and the supporting branches are made from reclaimed hardwood beams. Metal bolts on the reclaimed marine piling surface also add to the rustic mood of the zoo. The bifacial, semitransparent solar panels allow light to filter through the canopy to create the dappled lighting effect that an Acacia tree would provide.

The trees are designed to provide lighting at night by reflecting light from an up-light over the centre of the trunk off a tin dome in the centre of the canopy. This dome has been designed to create pools of light at the base of each tree that spill together and onto the pathway. Star cut outs in the dome and the semi-transparent panels allow light to spill out the top of the trees as well creating a glowing effect for the grove when seen from the side or a distance.

Electrical equipment is located in a small shed out of view of the Solar Forest with all electrical conduit hidden in underground trenches.

Overall the design is aimed to fit seamlessly into the Zoo’s aesthetic while still providing a technically strong, effective result which adds to the site amenity and provide a talking and focus point for visitors as they enter the Zoo, elevating the overall visitor experience and showcasing the Zoo’s environmental credentials.

### **Environmental considerations**

In 2013 we became the first zoo in the world to be certified Carbon Neutral. We are also ISO 14001 certified and have a number of programs including our Zero Waste to Landfill, Single use Plastics policy, renewable energy and sustainable procurement. These initiatives really shaped our approach to project delivery and procurement of assets across our organisation. Environmental Sustainability drives everything we do. It's a key element of our values, and our business models. But it doesn't stop there, all external contractors are engaged in our vision and work with us to deliver strong projects focused on this vision.

No stone was left unturned, from contractor material lists, through to working processes, resource usage and waste minimisation, we looked at the whole process.

When quoting and providing concepts, contractors were asked to list the materials they may use and the processes to ensure efficient resource use. Waste minimisation was an integral part of this project with a very strong focus on recycling, minimising packaging for transport and using reclaimed materials where possible. We are also highly aware of where our materials are coming from and ask contractors to source ethically produced materials where possible.

Site preparation and construction was well coordinated by the horticulture and operations teams. Existing plantings in the site location were assessed for their habitat and environmental value and if any were removed they were replaced in a different location where possible. Earth spoil from holes dug to accommodate footings was redistributed on site to undulate the landscape for future plantings.

### **Engagement – Audiences and methods of engagement**

A variety of audiences calls for a variety of approaches; we wanted to create something aesthetically beautiful and bespoke, as well as something that could speak to both adults and children. The following methods of engagement certainly come in handy when we have visitors queuing for entry than require 'entertaining'. Our methods of engagement include;

- Face to Face engagement with Visitor Engagement Officers can be utilised - it is possible to plug a hairdryer into a tree, an amplifier, or make a smoothie. There is a PowerPoint which allows for fun activations to become a talking point about harvesting solar energy.
- Animated nest boxes – these are proving a hit with children as they are ones who first notice the frog hopping on the roof of Box 1 and/or the possum tail flicking in and out Box 3.
- Talking trees – connects the passing adult by attracting them to the location of the voice and then to what is being said. These are movement activated and triggered by breaking a laser beam to ensure the audio and animations are not constantly operating when the location is quiet or closed and draining power resources from the battery supply.

### **Question 3. Identify the resources needed for your projects (e.g. staff, materials, money). Demonstrate how you used these resources effectively.**

The Sustainability Project Team consisted of 6 people from cross functional teams – To ensure we had the right people on the project the following teams were represented;

- Sustainability Managers from Zoos Victoria and Werribee Open Range Zoo
- Operations General Manager
- Operations Manager
- Operations Project Manager
- Interpretation and Visitor Programs Manager

**Detail your project costs as accurately as possible including labour (incl. volunteers), materials and installation.** Our sustainability commitment received internal funding each year to deliver projects that have high sustainability outcomes but also engage our visitors in sustainability messaging and action.

The project costs for the Solar Forest were a part of the Capital Expenditure budget at Zoos Victoria and sits within the Wildlife Conservation Science - Sustainability budget.

**Solar Forest**

Price Summary				
Item	Description	Total	GST	Total
1	8 Solar Trees - Design, Construct and Install including permits	\$ 299,983.36	\$29,998.34	\$ 329,981.70
2	Talking Trees – Design Construct and Install of Animated Audio nest boxes	\$13,509.44	\$1350.94	\$14,860.38
				<b>\$344,842.08</b>

**Choice of interpretive media for maximum or desired effect**

Our intention was to make our visitors the hero of their own journey, putting them in control of their experience in order to create greater meaning and a more profound experience. Where they become the hero of their own narrative intersection with the installation. They embark on journey to meaningfully discover and experience for themselves the beauty of our solar array.

We want to make solar energy production a Social Norm - hoping that our visitors will join us and follow our lead and understand that Solar Panel can in fact be beautiful.

**Cost-effectiveness versus ‘reach’ to intended audience (here you may like to enlarge on project budget/cost)**

How do you put a price on saving the environment? Using the latest technology in Solar Panel production, this project was never intended to “pay for itself” over time (as some people may wish their home solar contribution may do for their energy bills). The true payment that we receive is knowing that we are inspiring visitors, fostering future environmental stewards and planting the seed to create future sustainability sparks.

**Innovative use of resources / sustainability / future proofing**

Our Solar Forest was designed and engineered to ensure the individual trees have a long lifespan and can withstand all atmospheric elements. Design considerations were also made to ensure the trees did not become habitat for local wildlife including nesting ringtail and brush tail possums and birds. Electrical cables were required to be hidden to ensure they didn’t become a tasty morsel for cheeky Corellas.

Solar Panels, inverters and batteries are warranted to last 10 years.

The design was commissioned with the intent that Zoos Victoria own all Intellectual Property with the intent that the engineered technical drawings can be sold to other like-minded organisations generating income for Zoos Victoria. This project becomes an established tried and tested prototype where we can offer data over time to potential purchasers.

**4. How has your project met clear and measurable outcomes for your client/organisation and stakeholders? How project met or exceed the organisation’s expectations (in relation to outcomes)**

We wanted to generate conversation by showcasing conservation – This project was not necessarily about the conservation outcomes associated with solar energy production but we happily accept the small contributions anyway. We wanted our visitors to go on journey of self-discovery building their capacity fostering future environmental stewards and planting the seed to create future sustainability sparks.

**How project met or exceed stakeholder/community expectations (in relation to outcomes)**

**How success of the project was measured**

The success of this project is measured by the conversation created as well as the conservation outcomes. We want to make solar energy harvesting a social norm. Our successes are also measured anecdotally, but we are tracking comments about the Sustainabilitrees on social media channels and in visitor recall of Fighting Extinction Messages in visitor satisfaction exit surveys quarterly.

**Commercial criteria (e.g. repeat business from your client or an increase in sales that can be directly attributed to your interpretation)**

The Solar Forest design was commissioned with the intent that Zoos Victoria own all Intellectual Property with the intent that the engineered technical drawings can be on sold to other like-minded organisations generating income for Zoos Victoria.

**Environmental criteria (reduced impact in an area that can be directly attributed to your interpretation)**

This off grid power generation means electricity from the Solar Forest not only powers the lighting of the Forest by night but is used to recharge the battery of electric vehicles such as the electric buggy used by our catering company. We are now looking to expand the battery storage for maximising renewable energy use at other nearby areas such as the retail shop.

**Pre /post project or audience research, monitoring, evaluation and consultation that has been conducted or is planned, including peer review and client assessment**

Audience reach is currently being tracked via comments about the Sustainabilitrees on social media channels and in visitor recall of Fighting Extinction messages via Visitor Satisfaction Exit Surveys quarterly. Solar energy harvested is tracked continually through a wireless monitoring system.

**Aspects of the project that did and did not work.**

The project demonstrated the viability of renewable energy production with strong interpretive elements.

**How the project could be improved.**

As we own the Intellectual Property for the specifications of the Sustainabilitrees we could improve the project by becoming proactive in its sales. A premade "Sustainabilitree Kit" would enable and enhance discussions with local and interstate Zoos, schools, parks, councils to extend the reach.