

Green roof or solar? It turns out both is best

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The rooftop with combined solar panel and green roof. Credit: UTS research team

The benefits of combining solar panel installations with green roofs has been confirmed by new research, which demonstrates significant improvements in energy production, stormwater filtration and most surprisingly, a major increase in animal biodiversity.

The study, led by UTS researchers Peter Irga, Fraser Torpy and Robert Fleck set out to measure the advantages of green roofs in cities, and was supported by Lendlease and Junglefy.

Undertaken in Barangaroo in central Sydney, the researchers compared the conventional photovoltaic (PV) [solar system](#) on International House with a combined PV solar and integrated Junglify green roof system (biosolar roof) on Daramu House over an eight-month period that spanned summer and winter.

"We utilized a unique experimental design, where the presence of the green roof was the sole variable, with both study sites in the same geographic location and of the same height, size, and shape," said Chief Investigator, Dr. Peter Irga.

The research found that [surface temperatures](#) on the green roof were significantly lower, in some cases by up to 20°C during summer. This improved the solar energy output by 3.6 percent, equating to \$2595 over the eight-month duration of the project.

"The efficiency of solar panels decreases when temperatures rise above 25°C, so by bringing down the surface temperature on typical hot Sydney summer days, the green roof enables the solar PV system to generate more electricity," said Irga.

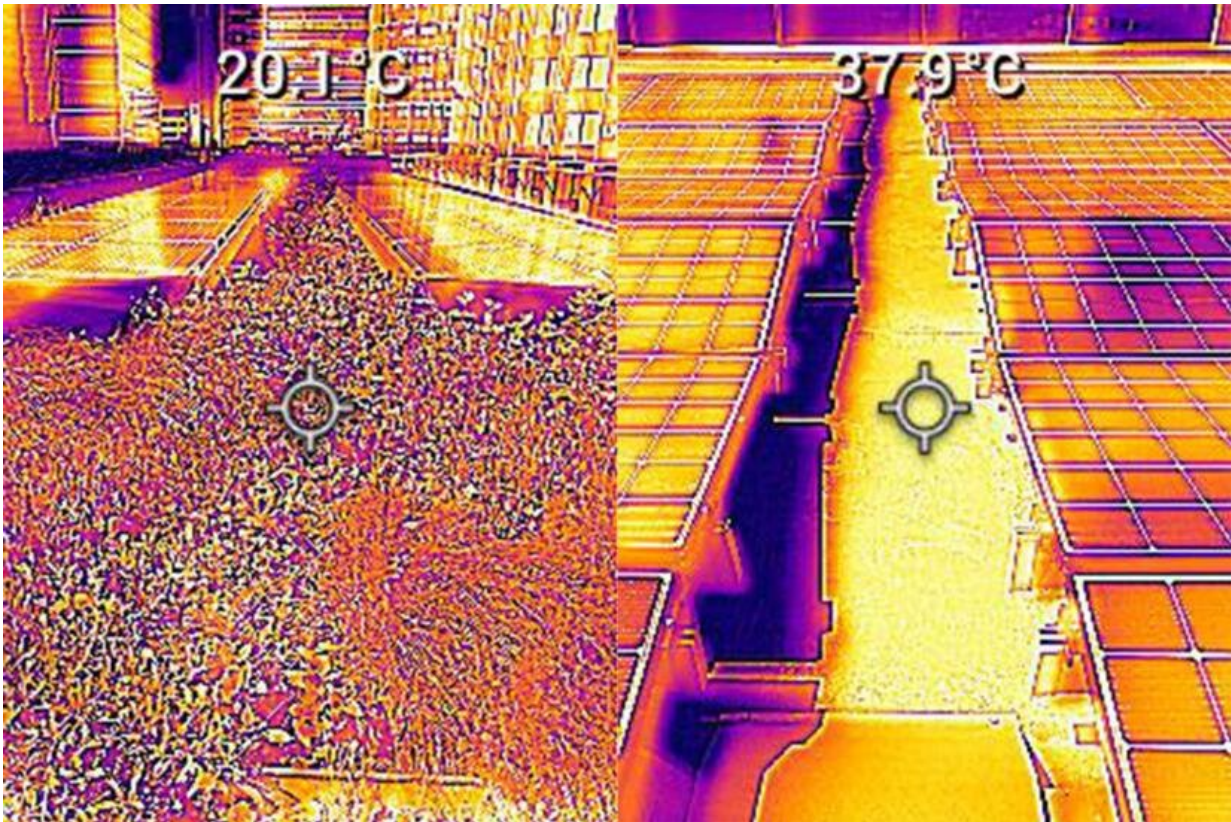
"The surface temperature reduction shows how green roofs could play an important part in combating the [urban heat island effect](#), a major issue in our cities."

The green roof also absorbed almost nine tons of greenhouse gasses, the equivalent of planting 110 trees.

While many of the results confirmed predicted benefits, the level of biodiversity observed on the city rooftop took the researchers by surprise.

"Animals thrived on the green roof, with insect and bird life increasing

seven and fourfold, respectively," said Principal Investigator Robert Fleck.



Surface temperatures were up to 20 degrees lower on the green roof compared with the standard solar roof on hot days. Image: UTS research team. Credit: University of Technology, Sydney

"Our camera traps recorded images of the native Australian Blue Banded bee, Australian stingless bees, as well as Spotted Doves and Australian Ravens.

"The most exciting discovery was of a deceased bird that appeared to have been attacked by a predatory bird such as a peregrine falcon, which

suggests that the urban roof is supporting complex food web systems," said Fleck.

Additionally, stormwater modeling on both roofs showed the biosolar roof could reduce flows into stormwater drains by more than 600 L per second compared to the conventional [roof](#).

"This shows that green roofs are a powerful tool in reducing the impacts of flooding during storm events, particularly where climate instability is leading to longer, drier periods and more intense storm events," said Irga.

Insulation was another benefit of the integrated system, preventing heat transferring inside the building as well as retaining heat in cooler periods.

Lucy Sharman, Sustainability Manager at Lendlease said integration of greenery into our urban environments is vital to create more liveable cities that can mitigate the impacts of our changing climate.

"This research has made a valuable contribution to our understanding of the multiple, measurable benefits of green roofs.

"We hope this extremely positive collaboration between industry, researchers and government inspires other organizations to look at the benefits of biosolar systems," said Sharman.

Jock Gammon, the co-founder of Junglefy, the company that installed the [green roof](#), agrees.

"The time is now to turn every rooftop green and create critical connections between people, places and plants," he said.

UTS researchers are now working with Junglefy to identify ways plant-based systems can influence building ventilation and temperature control to reduce energy use.

More information: Green Roof & Solar Array—Comparative Research Project Final Report July 2021:
opus.lib.uts.edu.au/bitstream/10453/150142/2/City%20of%20Sydney%20Final%20Report%20EPI%20R3%20201920005.pdf

Provided by University of Technology, Sydney

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