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Developing prefabricated housing solutions to help people affected by bushfire and other disasters

The past few years have demonstrated Australia really is a land of bushfires and flooding rains. 2022 has been a very wet year for many. Communities in Victoria, southern New South Wales and Tasmania are currently experiencing record flood events. Earlier in the year, it was northern New South Wales and Southern Queensland. And not quite 3 years ago, the 2019-20 Australian bushfires destroyed over 5,900 buildings, including 2,779 homes, and killed at least 34 people.

Research shows suitable temporary accommodation options and timely reconstruction are crucial to helping communities recover and thrive from disasters such as bushfire and floods. Unfortunately, the traditional model of rebuilding can be extremely slow and complex. For example, one year after the Black Saturday fires in Victoria (in 2009), around 100 homes had been rebuilt. Estimates show only 23% of homes had been rebuilt after 2 years and only 44% after 3 years.

A collaborative research project funded by the Advanced Manufacturing Growth Centre (AMGC) Prefab Innovation Hub and Building 4.0 CRC aims to address this problem. Project #35 – Prefab Housing Solutions for Bushfire and Disaster Relief investigated using prefabricated housing solutions to provide both short-term and long-term accommodation for those affected by bushfires and other disasters.

This is a collaborative project with researchers from Monash University (led by Professor Melanie Dodd, Head of the Department of Architecture at Monash) and the University of Melbourne, who have highlighted the complexities involved in designing, manufacturing and installing prefabricated modular homes and units in bushfire affected regions around the country. And then set about finding ways to manage them.

To start, the project team established a framework that identifies the objectives of a prefabricated housing solution (e.g. cost, customisation, design appearance, construction methods), as well as broader community objectives (e.g. building regulations, recovery stage, neighbourhood character, access to finance).

"The framework can be used to develop a housing solution that contains the necessary components, complies with building regulations and meets community needs in a specific location," explained Professor Dodd.

The team also created a design template for new prefabricated housing solutions. The template considers 4 aspects of a housing solution:

- the construction system e.g. modular, flatpack, self-build
- program and performance e.g. building orientation, spatial design, bedrooms, outdoor spaces
- context e.g. access to infrastructure, neighbourhood character, affordability, compliance with housing regulations or codes
- site implementation e.g. immediate response, long-term house, permanent house, social engagement in design and construction.

"This template supports an incremental approach to addressing the primary stressor for people affected by a disaster – where they are going to live now and where they will live long term," explained Professor Dodd.

"The research shows slow reconstruction prolongs trauma and hinders recovery.

"To help alleviate this stressor, we developed a 'kit of parts' that can be used to provide accommodation immediately after a disaster, and can then be incrementally expanded to create a permanent home.

"The kit comprises different elements, from modular pods, to panel components, to traditional construction," she said.

The proposed next stage for the project is for researchers to engage with industry, government and community partners to prototype and test the design template.

"This next stage is critical to understand the factors that influence local context, such as building regulations, land use control, availability of finance, time and community preferences," said Professor Dodd.