Refuel 5.0 FORMAL CPD POINTS
Australian Institute of Architects

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1. WATER CONSERVATION AND ITS RELATIONSHIP TO SUSTAINABLE DESIGN

In designing buildings to be as sustainable as possible, the importance of implementing water-saving ideas and technologies is integral to any new building's designs. So, what are the latest water conservation ideas and technologies that need to be adopted in the built environment on a continent where water scarcity is an ever-present crisis? Where should we start with water conservation in Australia? Are water storage and water recycling and water desalination the answer? What about water efficient fixtures and appliances, rainwater and greywater reuse? What are the ideas that architects and designers could and should implement into their designs to ensure water is being recycled, reused and ultimately conserved?

At the end of this panel, attendees will be able to:

a] Name at least three types of water-saving designs used in Australia
- Use of water tanks
- Water restricting devices added to homes
- Addition of recycling of grey water

b] Show how houses can help with livability and sustainability
- Less urban water usage equals more water in the environment
- Increase the use of recycled water
- Lower the footprint of urban structures

c] What are some designs that can ensure water is being recycled, reused and conserved?
- Large roof area for water collection
- In-ground water tanks
- No pools/spas

Competency Standard – Design: Schematic Design
Relates to: 4.2 Evaluation of design options against values of physical, environmental and cultural contexts.

2. DESIGNING AND BUILDING FOR THE NEW BUSHFIRE PARADIGM

After the bushfire crisis in Australia, the way we design, and construct buildings is set to change. What else should we be doing to prevent what we saw in the 'black summer' of 2019/2020? Does our entire approach to design and building need an overhaul and where do we need to start? Along with designs, what materials should we be looking at to build the fire-proof structures of the future? When it comes to the bushfires, what can we learn from the First Nations of Australia and can this knowledge help us manage future bushfires and help us reduce the impact of fires across our built environment?

At the end of this panel, attendees will be able to:

a] Name at least three types of bushfire-resistant products
- Bushfire resistant building materials
- Gutter screens or enclosures
- External metals screens

b] List at least 3 building materials that can be used for building in bushfire-prone areas
- Concrete
- Timbercrete/Hempcrete
- Brick

c] What are some things that Indigenous history and culture can teach us about fires in Australia?
- burning was a crucial way that Aboriginal and Torres Strait Islanders cared for the land.
- learning to read trees, soil types, wind conditions and developing an "intimate" relationship with the landscape.
- Indigenous cultural burns work within the rhythms of the environment.

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3. PASSIVE DESIGNS, PASSIVE HOUSES AND MULTI-RESIDENTIAL BUILDS

The Australian climate requires that homes be designed or modified to ensure that the occupants remain thermally comfortable with minimal auxiliary heating or cooling in the climate where they are built. So does passive design fit into the eight climate zones in Australia and how is this design managed by the National Construction Code (NCC)? And while the northern European-derived passive house design is not always the best solution for Australia's climate, do we need to instead concentrate on vernacular design and focus more on local needs, local materials, and local traditions and how does Australia's growing love of high-rise apartments fit into all this? Do we need an Australian version of passive house design and what would that look like?

At the end of this panel, attendees will be able to:

a] Name at least three types of passive designs used in Australia
- Direct Gain
- Glasshouse Principle
- Thermal Mass

b] List all 8 climate zones in Australia that affect passive design
- Climate zone 1 - high humidity summer, warm winter.
- Climate zone 2 - warm humid summer, mild winter.
- Climate zone 3 - hot dry summer, warm winter.
- Climate zone 4 - hot dry summer, cool winter.
- Climate zone 5 - warm temperate.
- Climate zone 6 - mild temperate.
- Climate zone 7 - cool temperate.
- Climate zone 8 - alpine.

c] Show how passive design and passive houses can help with livability and sustainability
- 'Passive design' is design that takes advantage of the climate to maintain a comfortable temperature range in the home. Passive design reduces or eliminates the need for auxiliary heating or cooling, which accounts for about 40% (or much more in some climates) of energy use in the average Australian home.

Competency Standard – Design: Schematic Design
4.7 Coordination and integration of appropriate environmental systems, including for thermal comfort, lighting and acoustics.

4. PLANNING FOR A CARBON ZERO / CARBON POSITIVE FUTURE

Urban developments around the world are using smart design and new materials to create net-zero energy structures and even carbon positive districts that challenge everything we have learnt about design to date. When it comes to being sustainable, one of the most effective ways to lower a carbon footprint is to reduce or even entirely eliminate a building's reliance on external fossil-fuel derived energy for power and lighting. How can residential homes and for that matter, precincts reduce their carbon environmental footprint and how have some precincts around the world been designed to be carbon positive and what can we learn from these designs?

At the end of this panel, attendees will be able to:

a] Name at least three developments around the world that are using smart design and new materials to create net-zero energy structures and even carbon positive districts

- Hazelwood Green, a 180 acre, seven million square-foot mixed use development under construction in Pittsburgh, Pennsylvania.
- Near Mumbai, India, the 4500-acre development, Palava, is rapidly being built to zero energy standards. Well-designed low-energy buildings are renewably supplied, but it is the attention to transportation that sets Palava apart.
- Peña Station NEXT, outside of Denver, Colorado, is a new 400-acre smart development powered by a solar microgrid in conjunction with a one megawatt/ two MWh lithium-ion battery system. This 100-building district is connected to the local electric grid and provides services including solar to grid integration, ramp control, grid peak demand reduction, and frequency regulation.

b] What are the most effective ways to lower a carbon footprint in the built environment?

1. Start early. Evaluate and measure a building design's carbon footprint as early in the process as possible.
2. HVAC.
3. Continuous insulation.
4. Lighting.
5. Recycled content.
6. Water usage.
7. Renewable energy.
8. Location

c] Show how carbon positive is possible in an urban context

- In relation to the built environment, this would involve first calculating the carbon footprint of a development, then reducing emissions as much as possible through means such as energy efficiency measures, better building design, transport infrastructure, behaviour change or switching to renewable sources of energy, before finally offsetting the remaining, unavoidable emissions (for example, emissions embodied in materials of buildings and infrastructure).

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4. Planning for a carbon zero / carbon positive future - continued...

d] What are some of the quickest and easiest ways residential homes and for that matter, precincts reduce their carbon environmental footprint?

- First calculate your carbon footprint
- Eat low on the food chain
- Choose organic and local foods that are in season
- Reduce your food waste
- Compost your food waste if possible
- Don't buy fast fashion
- Wash your clothing in cold water
- Change incandescent light bulbs
- Switch lights off when you leave the room and unplug your electronic devices when they are not in use
- Drive less

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5. HOW DOES BUILDING AUTOMATION LEAD TO BETTER BUILDING SUSTAINABILITY?

The future of building design belongs to structures with extensive sensor networks that can control temperature, monitor power and energy, and water consumption, track sustainability performance in real-time, and much more. In fact, automation is key in buildings when we are considering their longevity and the future since sustainable buildings emit less pollution and greenhouse gases, while at the same time have lower operating costs while increasing the value of the assets. They are also able to reduce energy (and water) consumption by optimising the operational efficacy. So how is all this technology changing the way buildings are designed, built and managed and how do we measure its' impact on sustainability?

At the end of this panel, attendees will be able to:

a] Name at least three technologies currently used in building automation applications

1. Energy: Includes popular applications like wireless energy consumption monitoring.
2. Equipment: Those that optimize lighting and HVAC use.
3. Environmental quality: Devices might measure particulate matter or CO2.

b] What are the most effective ways to leverage technology to help lower carbon emissions?

- Applied to climate change mitigation, big data can help cities develop more impactful climate action plans. Google has started estimating greenhouse gas emissions for individual cities as part of an ambitious plan to use its valuable data to assist climate-concerned local leaders.
- On a city scale, AI can improve overall energy efficiency by incorporating data from smart meters and the Internet of Things (computing devices embedded in everyday objects that enable them to send and receive data) to forecast and predict city energy demand. This would help city utilities providers to optimize energy production, effectively reducing their impact on the climate.
- Blockchain, a technology that can make it easier for governments to keep track of their emissions. It is a public, transparent system that facilitates international cooperation, as countries can explore what climate action others are taking.
- 3D printing is an alternative means of manufacturing that significantly reduces carbon emissions and provides innovative solutions for a disaster-prone world. This is mainly achieved through raw material waste reduction.
- Virtual reality is a powerful and engaging tool to highlight the effects of climate change and help cities to identity priority communities to receive climate adaptation, economic development and risk reduction investments.

c] What are some ways technology can help reduce energy and water consumption in a building?

- Real time metering and frequent billing.
- Leakage detection.

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5. How does building automation lead to better building sustainability? - continued...

- Control mechanisms - tenancy/vacancy.
- Distribution management.
- Data, data and more data.

d] What are some of the latest technologies we will soon see in the building automation field?

- Cloud Computing
- Machine Learning + Artificial Intelligence
- Connectivity + Integration

Competency Standard – Design: Schematic Design
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