Sustainable Housing: Using energy wisely across the whole life of your home

Melinda's presentation on energy in the home put forward a comprehensive overview of **all aspects of energy usage in the home**, including sources of energy consumption, the difference between embodied energy and operational energy, end of life outcomes, our behavioural impact and how to take action.

She began by explaining that energy is more than just electricity, and **locks in emissions for decades**. Consideration of the unique factors of your home at the beginning of a build or retrofit can help you make decisions that will suit your needs and situation, save you money and benefit the climate. But compromise is inevitable, and there is never a perfect solution to everything!

Melinda explained the distinction between **embodied energy** – the energy used to build a home such as bricks, concrete, colorbond (and to make everything used in the home such as food, clothing, appliances, furniture), and **operational energy** – the energy used to run a home in day to day use (heating, cooling, cooking, lighting, appliance use, electronic use, wastage).

She challenged us to consider what matters most – embodied emissions (47%) or operational emissions (53%). The answer – they both matter! Upfront embodied emissions are locked in by construction, whereas operational energy emissions can reduce as renewable energy supply increases. One daunting fact: **a typical house results in 1000 tonnes of CO2 energy per square metre of construction, resulting in a house that weighs more in CO2 than in actual weight.** One third of Australia's emissions are from building activities, so it pays to think carefully about construction energy costs and how they might be reduced.

She introduced us to the **construction material pyramid** which sets out the construction materials in descending order of energy intensity. At the top is aluminium sheeting, bricks in the middle, wood at the bottom. In considering which materials to use, there is a trade-off between the energy cost of construction and longevity/quality. Also needing to be factored in is how much we use – aluminium sheets emit more energy in their production, but we use more concrete and bricks in an average building.

Embodied emissions can be reduced by **re-using and recycling materials**, and **choosing more sustainable material transport options** – hyper-local supply, electric freight and international sea freight is preferable to air freight and long-distance road freight.

Another tip to reduce embodied emissions – **build smaller**! Melbourne has the dubious distinction of having the largest average house size in Australia.

Moving on to **operational energy**, Melinda invited us to participate in an exercise to guess what uses the most energy in the house. The answer is heating, followed by hot water. Although the data she based this on came from current usage statistics – mostly gas heating and hot water in Victoria – the results would probably still apply for heat

pump heating and hot water. AI data usage was not included, but this will inevitably increase over time.

Another sobering fact: by the 2030s, **cooling will have outstripped heating as the highest energy usage in the home.**

The message therefore, to reduce heating and cooling loads, is to **increase the thermal efficiency of buildings** through:

- Sealing houses more thoroughly
- Increasing insulation (roof insulation the most effective, followed by wall and floor insulation)
- Double glazing windows
- Reducing thermal bridging (conductive materials that span outside to inside)
- Using natural systems to heat and cool (cross-ventilation, orient living rooms to the north, reduce windows on west and south, wide eaves).

Appliance efficiency is also a factor. Heat pump space heating and water heating is 3-5 times more efficient than gas and conventional electricity. By adding solar panels and a battery the costs can be reduced even further. EVs are more efficient than fossil vehicles, cost less to run and have health and pollution benefits. She presented a comparison of the costs of heating a 2 star 160 sqm home by gas - $2400 per year – with a 6 star house of the same size heated by electricity - $340 per year.

In choosing household appliances such as fridges, washing machines etc., choose a **high star energy rating**, but only compare energy ratings with appliances of the same size/capacity. A smaller appliance will always use less energy than a larger one.

End of life outcomes to consider: **construction waste is roughly 40% of Australia's waste.** Much wastage occurs because of the difficulty of separating out materials and the lack of recycling options. Solutions can include:

- designing for disassembly/reuse/recycling,
- looking for energy-efficient products that also support the circular economy,
- seeking out leftovers from other builds, second hand items and auction items.

Behavioural impacts were also touched upon. These include using passive features first (e.g. thermal efficiency), low-energy features second. Also, setting heating and cooling to the right temperatures (every 1 degree warmer uses 15% more energy!), using an efficient shower head and keeping showers shorter, keeping mixer taps on full cold, using electric appliances during solar production, scheduling hot water heating, and using cross-ventilation to cool the house on hot days.

Mel finished by advising those contemplating new builds, refits or renovations to their home to **be aware of the strengths and weaknesses of their home or site** and to leverage off these. She emphasised the importance of choosing a builder and designer with values that align with yours, and who can work well together.

Finally she included a list of **useful resources**:

- Your home: Australia's guide to environmentally sustainable homes
  www.yourhome.gov.au
- Sustainable Builders Alliance
  www.thesba.com.au
- My Efficient Electric Home (MEEH)
  https://www.facebook.com/groups/MyEfficientElectricHome/
- Sustainability Victoria
  https://www.sustainability.vic.gov.au/