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Hunter Indoor Sports Centre
230054-02

Sustainability

Re: Sustainability & Climate Change

Northrop has been engaged to provide a detailed response to the Department of Planning, Housing and Infrastructure (DPHI) relating to Ecologically Sustainable Development (ESD).

The sustainability strategy for the overall project has an aim to provide an exemplary, healthy and state-of-the-art indoor sporting facility that creates an inclusive and connected community while contributing sustainably to social and ecological systems.

Figure 1 Hunter Indoor Sports Centre Sustainability Strategy Summary

The following process was undertaken in the development of the project's sustainability strategy

- Review of the project Secretaries Environmental Assessment Requirements (SEARs)
- Development of the Projects Net Zero Emissions Strategy
- Benchmarking of the project against relevant industry recognised building sustainability and performance standard to integrate environmental performance into the building.
- Development of the site-specific sustainability strategy that looks to optimise the overall sustainability outcomes in a wholistic manner.

This process was detailed within the ESD Report submitted within the SSDA.

DPHI Comments

DPHI has provided comment on the submitted SSDA documentation and have raised several comments regarding the operation of the facility and potential for additional sustainability measures to be incorporated. These primarily relate to the design's response to the State Design Review Panel commentary from 1 March 2024 with the concerns summarised as follows.

- Additional solar power generation could be installed on the building roof.
- Incorporation of low carbon, sustainable materials into the design; and
- Alignment with the NSW Net Zero Plan Stage 1: 2020-2030

Additional to this, commentary has been requested around the ventilation strategy to ensure that it is appropriate year-round for the facility.

The design team provides the following additional commentary on the initiatives incorporated in the building in relation to the noted areas of concern.

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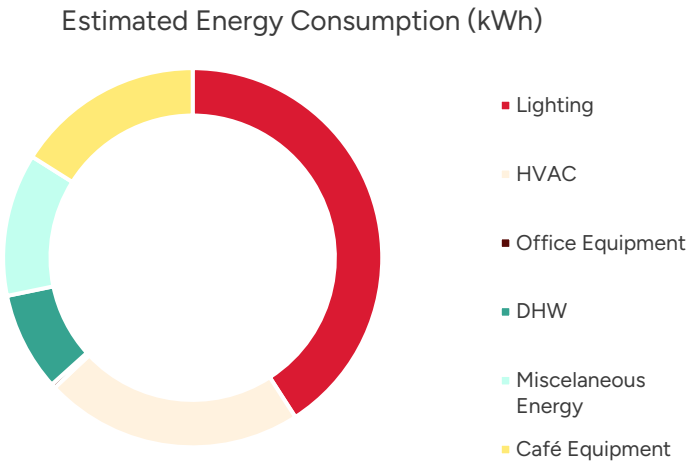
Solar Generation

The current proposal includes 780 solar panels across the roof area of the project's two stages. This likely equates to about 200kW of final solar production.

Noting that the project has proposed minimal conditioning to the project with a preference for passive design and natural ventilation the overall electrical demand for the facility is not expected to be particularly high and depending on the operation of the conditioning systems the proposed solar array may be sufficient to offset the annual energy operation of the facility. The below estimated breakdown of energy consumption has been calculated based on typical energy use of these types of facilities.



The above breakdown is based on the indicated operation of the facility with roof lighting providing good daylight within the facility and court air conditioning operating for competition events. Overall, it is expected that the facility would consume less than 400MWh per year. Based on this assessment and typical production metrics, it is likely that the onsite solar currently proposed would power circa 75% of the overall project energy demand.

The project is open to investigating the installation of additional solar onsite and batteries during the detailed design phase. The design team however note that energy production will likely be limited due to grid feed-in constraints, meaning that the maximisation of rooftop solar based only on roof area is unlikely to provide a real-world benefit. Export of excess solar power to the grid will require additional network approvals and protection so will require detailed engagement with the energy utility.

The current scale of solar installation has been sized to appropriately support the facility's expected energy consumption. It is noted that the roof's structural design allows for future expansion of the onsite solar system, should this provide benefits in the future in supporting either site energy consumption or the surrounding grids demand.

Low Carbon, Sustainable Materials

The project has aimed to incorporate lower carbon and sustainable materials into the project wherever possible. The inclusion of timber flooring within the court spaces, concrete mixes with fly ash to reduce the use of Portland Cement content and steel for the overall structure of the project results in the following key outcomes.

- Timber improves court outcomes while storing biogenic carbon within the building.
- Reducing Portland cement use reduces the carbon intensity of the concrete slabs and footings while diverting fly ash (a waste product from coal power generation) from landfill.
- Use of steel structure minimises the volume of materials used to support the building, allows for larger structural spans improving the building's flexibility and supports material recycling at end of life in alignment with the NSW Government Circular Economy Policy.

As part of the project design analysis was completed to consider a range of structural material options, including cross laminated timber, however the proposed structure was

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determined to provide the best overall solution for a space that provides long term flexibility, resilience and optimises lifecycle impacts.

Note: due to the nature of timber production used in CLT, most producers on sell the carbon capture through carbon offsetting schemes. This can negate the realised benefits of its use in buildings. This combined with its shorter structural spans, higher wastage rates and lack of circularity options resulted in steel being selected as the preferred structural material.

Alignment with NSW Net Zero Plan

Within the project's SSDA Sustainability Report Northrop provided a net Zero Emissions Statement (Appendix A of the report) which aligned to the Sustainable Buildings State Environmental Planning Policy (SEPP) and the NSW Government Policy for Net Zero Operations. This statement confirmed that the facility had been designed to operate without fossil fuels, and outlined how the onsite solar generation, passive design measures and infrastructure improvements were incorporated into the project to fully align with the targets set out by the NSW Government policy.

The statement confirmed that detailed predictive energy modelling would be completed in the detailed design stage to further optimise the onsite generation capacity and demonstrate the overall improvement in operational performance of the building when compared to a minimum compliant design.

The SDRP commentary referenced by DPHI however specifically points to the NSW Net Zero Plan Stage 1: 2020-2030. This plan is intended for government and policy planning purposes; however we provide the following commentary on how the project supports the delivery of the four priorities outlined within this plan.

1. Drive uptake of proven emissions reductions technologies.

   The removal of fossil fuels from the facility, the incorporation of natural ventilation for most areas within the building and incorporation of highly energy efficient lighting and equipment supports the delivery of this outcome.

2. Empower consumers and businesses to make sustainable choices

   The embodied materials reporting provided within the project's SSDA submission informs policy makers of embodied materials supporting the development and application of new standards. Alongside this the optimisation of building energy efficiency and future detailed modelling of energy consumption will help ensure that the project is empowered to make sustainable choices.

3. Invest in the next wave of emissions reduction innovation

   The design of the project as an all-electric building and future consideration of circular economy materials such as recycled steel supports the targeted commercialisation of low emissions materials and technologies.

4. Ensure that the NSW Government leads by example

   The installation of rooftop solar and engagement with the network on the potential application of batteries is strongly aligned with this priority by enabling state corporations to invest in community resilience and consider the future operation of the grid in this area.

Natural Ventilation and Passive Design

Passive ventilation strategies have been incorporated within the preliminary design concepts to allow for passive temperature control and improved air quality. The concept design is based on hybrid roof top ventilators which draw in air from the low-level motorised louvres for cross flow ventilation. This is then supported by the large fans in the main court area for air movement and warm air distribution in winter.

The Hybrid ventilators are motor assisted, meaning they utilise wind to drive the ventilation for efficiency, and have a motor to ensure ventilation when there is insufficient wind. These will be sized during the detailed design phase to meet the expected loads within the space, accounting for final occupancy and occupant preferences for outside air allowances. The initial allowance of ventilator numbers looks to draw air for 3.5 people per

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meter squared, as per AS1668.2. Larger models, or additional ventilators can be incorporated into the design pending final intended spectator numbers, or future flexibility on occupancy numbers.

The current concept allows for higher than minimum ventilation levels providing flexibility and resilience around occupant capacity and comfort conditions.

To address seasonal variation in temperatures the ventilation design is designed to be variable. During Summer the cross-ventilation strategy specifically looks to exploit stack driven relief of heat during summer. The low-level louvers draw cooler outdoor makeup air across the playing areas and exhaust heat at roof level. Large platform fans are then provided to improve air movement and comfort conditions through hot periods of the year providing good adaptive thermal comfort within the space.

During winter the louvres and rooftop ventilators can be controlled to allow heat to be retained within the occupied areas depending on indoor conditions and occupant desires. The roof level fans are then reversed to drive stratified warm air from high level and push it down to warm the occupied space.

The later stages of the project have made allowance for air-conditioning to be installed to accommodate the needs of the competition court areas with climate control. It is noted that these areas will still be able to operate with passive natural ventilation, as per the stage one courts, during regular operation.

Conclusion

Northrop have provided this supporting letter to address the concerns raised by DPHI regarding the overarching sustainability strategy for the project. To summarise the commentary in response to the DPHI concerns.

- The project solar array has been sized to accommodate the majority of the project's expected energy demand; further expansion has been allowed for within the structural design however would require approval from the network operator to allow significant export of power to the grid.
- Flexibility and lifecycle carbon was considered in the selection of the project material selection for the building structure with steel selected due to its reduced volume, longer spans (to enable uninterrupted court structures) and its end-of-life recyclability in alignment with the NSW Government Circular Economy Policy.
- The project is fully aligned to the NSW Government Policy on Net Zero Emissions as per the Net Zero Statement provided within the SSDA Sustainability Report. Additional to this the project design works to support the NSW Net Zero Plan Stage 1: 2020-2030 as noted in this letter.
- The natural ventilation strategy has considered seasonal variation in operation and looks to exploit adaptive thermal comfort within the facility though operable ventilation openings and indoor air movement. The strategy promotes air flow in summer and heat retention in winter allowing for a highly energy efficient and largely passive ventilation solution.

Should anything in this letter require further discussion or explanation please feel free to contact the undersigned.

Yours sincerely,

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