



C

1. Executive Summary	4
2. Regulations, Standards, and Guidelines	6
3. Introduction	7
4. Aged Care Facility in Canberra	8
4.1. Case study description	8
4.1.1. Climate	8
4.1.2. Building complex description	9
4.1.3. Energy consumption and sources	9
4.2. Building modelling input parameters	10

1. E.S.

A complete ... retrofitting package will lead to total energy savings of 88.2%

\gdll e\`cZZY[dg`cXg`VhZY` XZcXrt`d`gZY] XZ`i] Z`

i] ZhZ`dV`h!ZhiV`h] ZY`Vj`a`e`h`cZZY`ZcZg`n`g`i`gd ih#

Vj`a`e`h`h] dj`a`VZ`h] VYZY`#] Zj`hZ`d[`b`dg`Z` XZci`

Vl`h`i] Z`b`dhi`h`c`^`XVci``hhj`Z`id`VY`g`zh#

ZcZg`n] hZ`h`g``cdi``ch`c`^`XVci`#

` T] Z`=K68`h`h`i`Z`b``a`h`c`Z` XZcXrt`W`d]` [dg]e`VXZ`

I]`h`g`edg``hj`b`b`Vgh`Z`h`i] Z` cY`e`h`d`[i] Z`eZ`gd`p` ZY`



• 'GZ[j g/Mh] b Zci'd[1] Z'gld[!' ii e\ '& 'Xb 'd['b eZg/a

2.

R S

- National Construction Code of Australia 2019 Volume One.
- ANSI/ASHRAE 62.1-2019 Ventilation for acceptable indoor air quality
- ANSI/ASHRAE 55-2020 Thermal environmental conditions for human occupancy
- ASHRAE Handbook Fundamentals 2017, Chapter 18: Nonresidential cooling and heating load calculation
- ISO 17772-1-2017 Energy performance of buildings -Indoor environmental quality, Part 1: Indoor environmental input parameters for the design and assessment of energy performance of buildings
- AS 1668.2-2012 The use of ventilation and air conditioning in buildings, Part 2: Mechanical ventilation in buildings
- AS/NZS 1680.1-2006: Interior and workplace lighting, Part 1 - General principals and recommendations.
- AS/NZS 1680.2.1-2008: Interior and workplace lighting, Part 1- Specific applications. Circulation spaces and other general areas.
- AS/NZS 1680.2.2-2008: Interior and workplace lighting, Part 1 - Specific applications. Office and screen-based tasks.

3. | .

[dgb Zi] dYda\ñ'ēaXVi'đc\vcY' cY'ē\h'ZñeVch'đc'đ'

4. AFFC

4.1. Case study description

4.1.1. Climate

Xab ViZ'Xa/hh^ XVi 'dc!'8VcWZgg)'h'XViZ\dghZY'Vh'8[W

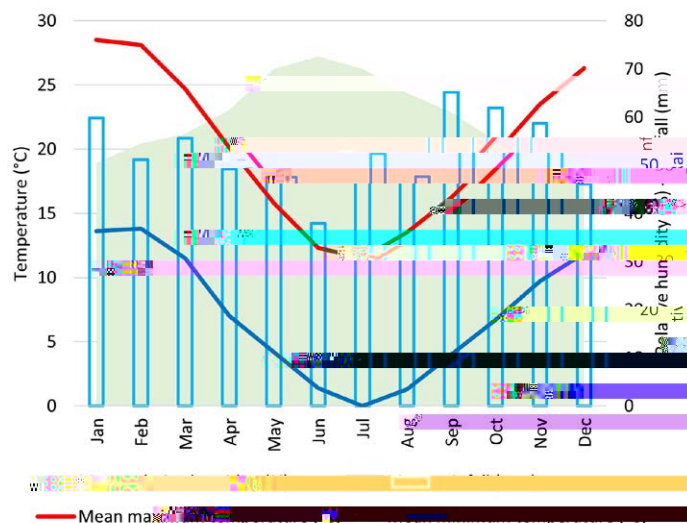


Figure 1. Climatic data for Canberra [5].



Figure 2. Northern view of buildings A and F of the complex.

4.1.2. Building complex description

Xá/hh^ XVi 'dc!VXXdg/ 'e\ 'id'i] Z'CVi 'dcVã8dchig Xi 'dc'

\gdhh' ddgVgZV'h')!*% 'b t#

4.1.3. Energy consumption and sources

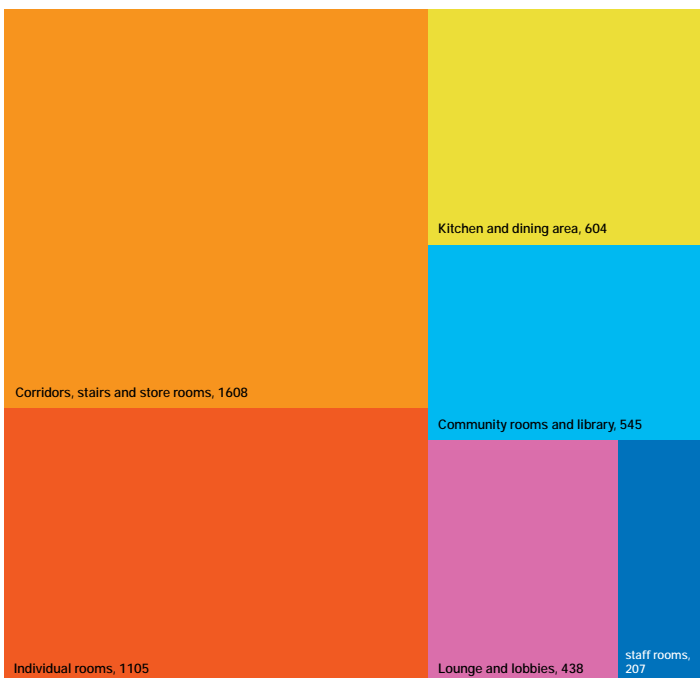


Figure 3. Gross floor divided area of case study building.

4.2.3.2. Roof

£ h

The r2.

4.2.5. Internal gains

4.3.2. Lighting analysis result

4.3.2.1. Natural lighting

4.3.2.2 Artificial lighting

4.3.2.2.1. Artificial lighting

Vy'ac\1 VhYZ cZY'c'H ZIX] J e'hd[iI Vg'VcY'i] Zc'

Figure 4. SketchUp model.

5. 2. TRNSys

hZied'ci!kZci'Wi'dc!'c agi'dc!VcY'Xdb [dgi'1 Zg'
YZ cZY'c1 GC7j'W#7nWY'c\i]Z'egleZgXab Vi'XYVIV'

5.3.1. Lighting retrofit

egdkYZY'cj b WZgd['a\]i'c\`° nij gZhVcY'XdchYZgh°
i] Vi i] Zn] dhi° j dgZhXZci`à/b eh'f VVZ'& I#

YZchfn1 VhYZXgVhZY!Vhjh b c\`i] Z' j dgZhXZci`à\]i`

5.3.2. Windows retrofit and wall insulation

Table 12. Illumination power density and energy consumption for the base case and the proposed scenarios.

Space	Base case		Scenario 1		Scenario 2	Maximum energy savings achieved (%)
	Max. illumination power density (W/m ²)	Energy consumption (kWh/year)	Max. illumination power density (W/m ²)	Energy consumption (kWh/year)	Energy consumption (kWh/year)	
Lobbies						
Lounges						
Staff rooms						
Kitchen & Dining areas						
Glazed corridors						
Corridors						
Resident bedrooms (x 65)						
Additional bedrooms (x9)						
Retail						
Kitchen						
Basement 314	64.71					



5.3.3. Roof insulation

5.3.4. Ceiling fans

6. R

6.1. Base building modelling

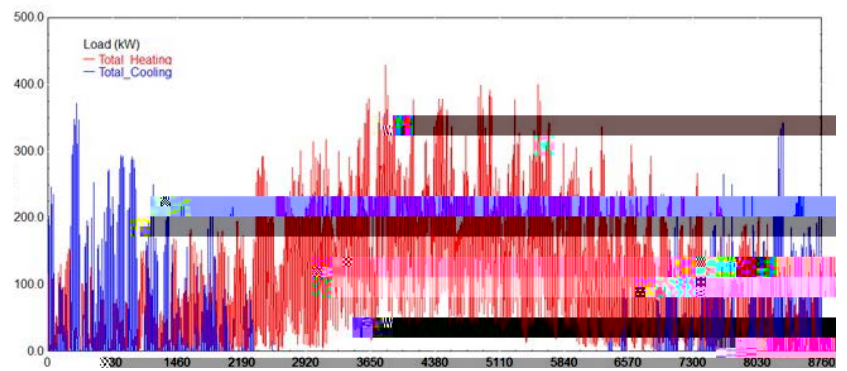


Figure 5. Hourly energy demand for HVAC purposes.

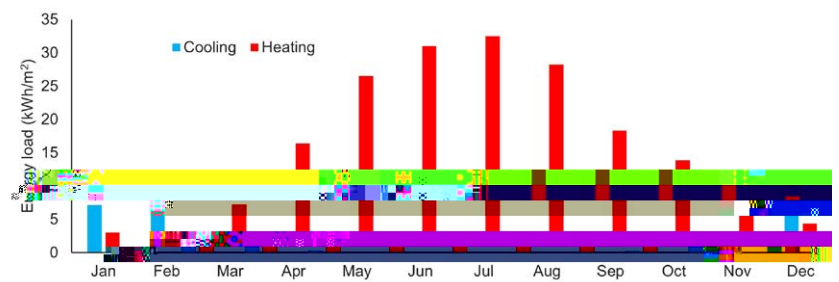


Figure 6. Monthly energy demand for HVAC purposes.

b dhi'gZigd ii'c\hiZeh# WZ'&) 'h] dl h'i] Z'c j ZcXZ'
d[Y{[ZgZci'gZigd ii'c\XVhZh'dc] ZVi'c\ VcY'Xddac\'

Y{[ZgZci'gZigd i'hXZcVgdh'dc'ZāXigXfn'VcY'cVij g/a\Vh'

aj h'gd/i'dc'd[i] Z'gZigd ii'c\ 'b eVXi'h'egzhZciZY'c'
→

Table 14. Simulation results – Heating and cooling loads.

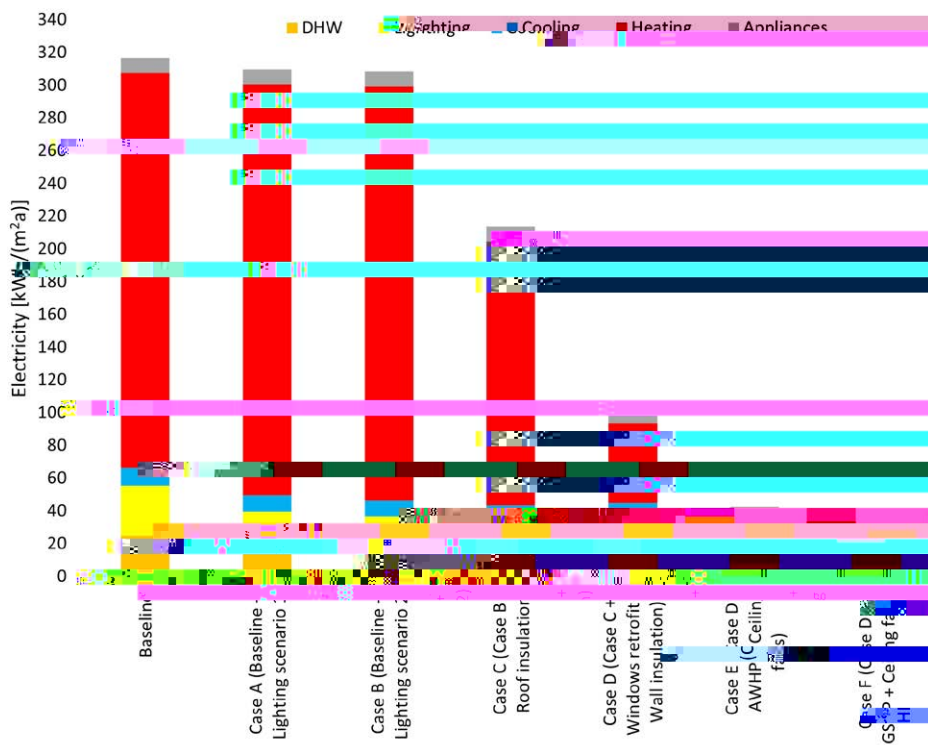


Figure 12. Site energy of the retrofit scenarios.

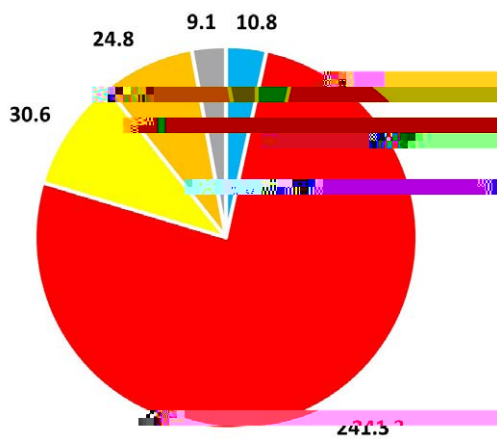


Figure 13. Share of site energy for the baseline (kWh/m²a).

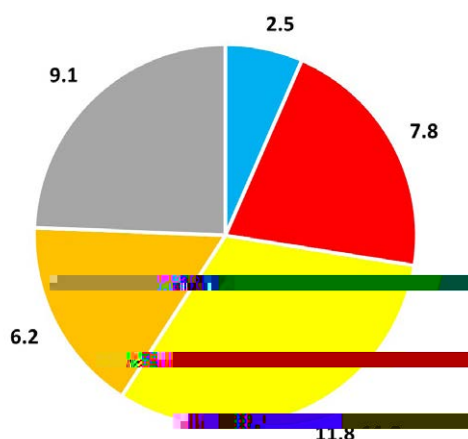


Figure 14. Share of Site energy for retrofit scenario - case F (kWh/m²a).

Table 16. Current and future energy demand of the case study aged care centre based on CSIRO weather database

ZcZg.nZ XZcXrhdVh'id'gYj XZ'i] Zgb VaaHhZh'

6.4. Discussion and recommendations

hdVh'id'gYj XZ'i]Z' cVaZcZg.n'g'fj 'gZb Zci#

gZheZXi kZ'hiVcYVg'hVcY'g\j a/i'dch#] Z' cY'e\h'

I ViZg\ZcZg/i'dc'Vg'Vhd'h^c^ XVci#] Z'[daadl e\'

Xdchj b ei'dc'd[(, # ^ L] \$b tV!Xdb eVg'Yid'i]Z'
W/hZa'cZ'd[(&+## ^ L] \$b tV# ■

° T] Z'Vg^ X'Vaa\]i'e\ 'VcVah'h'h]dl ZY'i] Vi'i]Z'
gZea/XZb Zci'd[~cZ XZci'a\]i'hdj gZhVcY'i]Zj hZ'

R

Climate Change

People using aged care

(# D XZ'd[Zck'gicb Zci \cY] Zg^V.Z!'Energy
saver – Aged-care toolkit

Updated world map of the Köppen-Geiger climate
Xà/hh^ XVi 'tc

Climate statistics for
Australian locations

Construction Code Volume One, 3 11ma

A

1

A

2



Fig. A3. Exterior view of the complex.

