

BAB V

PENUTUP

5.1 Kesimpulan

Terdapat tiga kesimpulan dalam penelitian ini, yaitu:

1. Nilai IKE rumah *baseline* yaitu 515 kWh/m²/tahun.
2. Dari beberapa strategi desain pasif, terdapat 5 faktor yang berpengaruh signifikan terhadap penurunan IKE yaitu mulai dari jadwal pengoperasian, peneduh jendela, jenis kaca, rasio jendela-dinding dan panel PV. Spesifikasi jadwal pengoperasian peralatan yang diaplikasikan yaitu 5 jam perharinya, peneduh jendela 2/3 dari tinggi jendela, jenis kaca menggunakan *triple Low-E* dan panel PV jenis *monocrystalline* dengan efisiensi 18% yang diaplikasikan pada atap dengan kemiringan 15°.
3. Nilai IKE rumah *baseline* + panel PV 263 kWh/m²/tahun dan rumah *improvement* + panel PV 105 kWh/m²/tahun. Produksi panel PV rumah *baseline* 51 kWh/m²/tahun dan pada rumah *improvement* 53 kWh/m²/tahun. Dengan data demikian, maka selisih antara IKE dan produksi listrik panel PV pada rumah *baseline* + panel PV yaitu 212 kWh/m²/tahun sedangkan pada rumah *improvement* + panel PV yaitu 52 kWh/m²/tahun. Nilai selisih pada rumah *improvement* lebih kecil dari IKE rumah *baseline*.

5.2 Saran

Penelitian ini hanya mencakup kajian di satu lokasi, akan lebih baik lagi apabila kedepannya dapat melibatkan eksplorasi lokasi bangunan di berbagai kota dengan suhu yang bervariasi sehingga dapat mengidentifikasi dampak strategi depan pasif terhadap kontribusi panel PV pada beragam kondisi lokasi bangunan.

Melalui analisis berbagai pengujian strategi desain pasif, ditemukan bahwa faktor jadwal pengoperasian memiliki dampak yang cukup signifikan pada perurunan IKE. Oleh karena itu, terdapat peluang untuk melakukan penelitian lebih lanjut mengenai bagaimana perbedaan bulan-bulan dalam setahun dalam mempengaruhi jadwal peroperasian peralatan.

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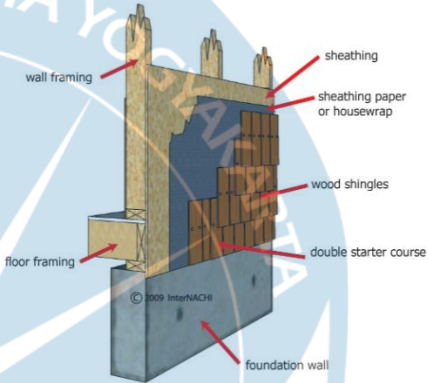
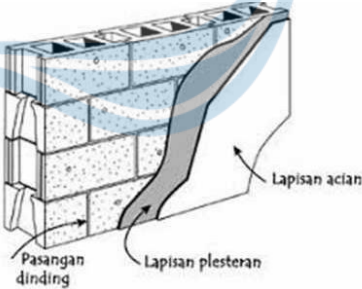

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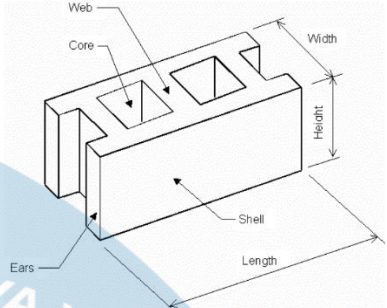
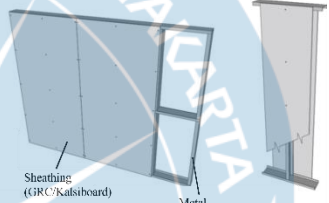
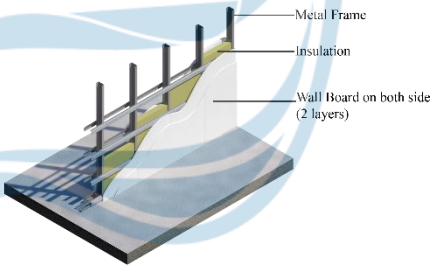

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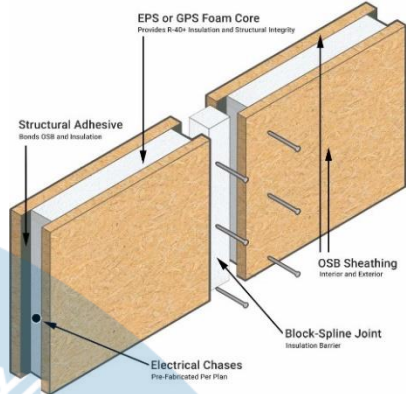
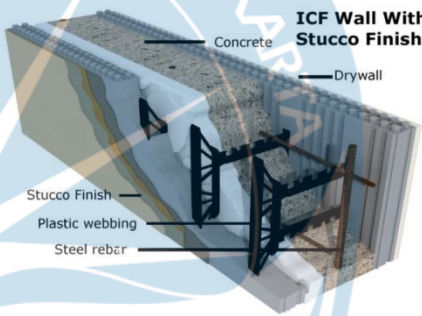
LAMPIRAN

LAMPIRAN 1. DATA PARAMETER INSIGHT 360 DAN REFERENSI GAMBAR

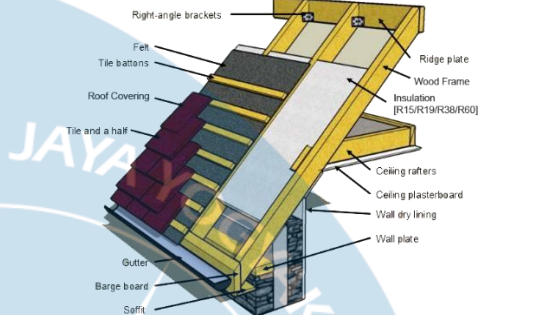
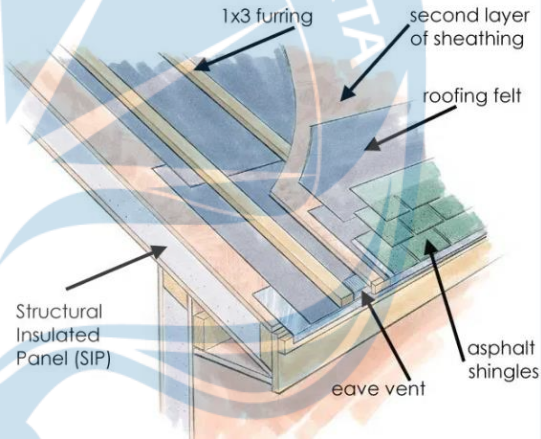
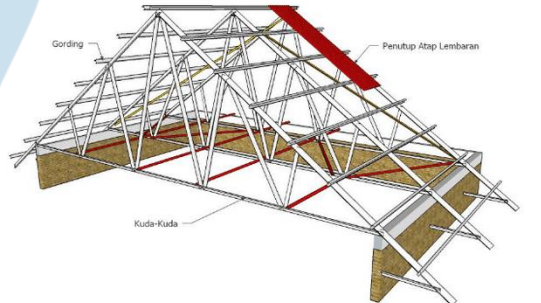
A. Konstruksi Dinding

NAMA	JENIS KONSTRUKSI DINDING	REFERENSI GAMBAR
R13 Wood	R13 Wood Frame Wall, Wood Shingle	 <p>Sumber: https://www.nachi.org/gallery/wood-siding/wood-shingle-siding</p>
BIM	Brick + concrete + wall paint (White)	 <p>Sumber: http://lalumuhammadwahyu.blogspot.com/</p>
Uninsulated	R0 Wood Frame Wall	 <p>Sumber: https://www.finehomebuilding.com/</p>

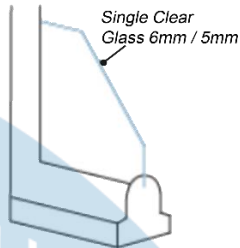
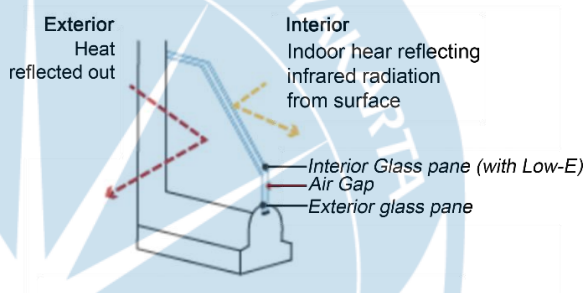
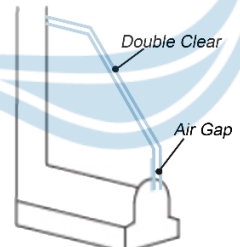
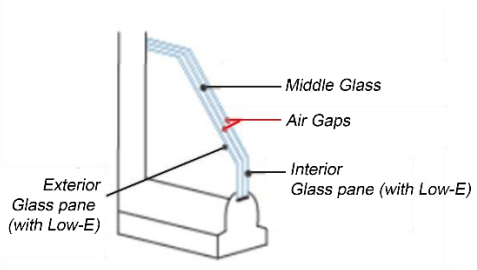
R2 CMU	Precast concrete blocks (CMU)	 <p>Sumber: https://kingsny.com/cement-blocks/</p>
R13 Metal	R13 Metal Frame Wall	 <p>Sumber: di olah dari (Kyprianou et al., 2021)</p>
R13+R10 Metal	R13 + R10 Metal Frame Wall	 <p>Sumber: https://www.metek.co.uk/solutions/walls/</p>
R38 Wood	R 38 wood Frame Wall	 <p>Sumber: https://dassalesm.xyz/product_details/6334945.html</p>

<p>12.25-inch SIP</p>	<p>Structurally Insulated Panel (SIP) Wall 12,25 inch (311mm)</p>	 <p>Sumber: https://www.integritytimberframe.com/sip-panels-101/</p>
<p>14-inch ICF</p>	<p>Insulated Concrete Form Wall 14 inch (36cm) U-0,034</p>	 <p>Sumber: https://www.howtolookatahouse.com/</p>

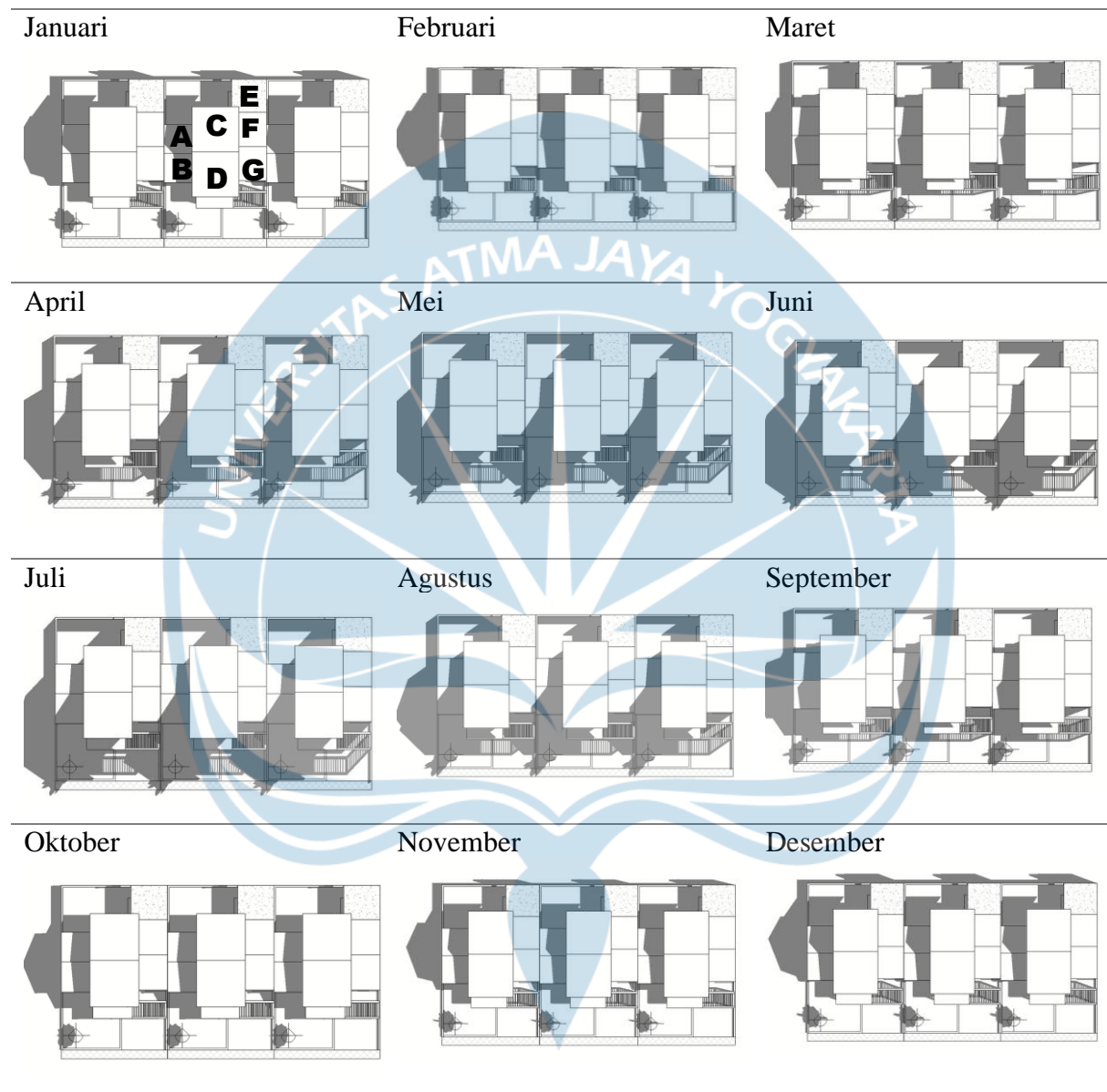
B. KONSTRUKSI ATAP

NAMA	JENIS KONSTRUKSI ATAP	REFERENSI GAMBAR
Uninsulated	R0 Over Roof Deck	
R10	R10 Over Roof Deck	
R15	R15 Insulation Wood Frame Roof	 <p>Sumber: www.myhouseextension.com</p>
R19	R19 Insulation Wood Frame Roof	
R38	R38 Insulation Wood frame Roof	
R60	R60 Insulation Wood Frame Roof	
10.25-inch SIP	Structural insulated panel (SIP) Roof 10.25 inch thick (260mm)	 <p>Sumber: https://greenixpanels.com/</p>
BIM	Light steel frame + Flat Concrete Roof tiles (painted)	 <p>Sumber: https://workshop.co.id/pemasangan-rangka-baja-ringan/</p>

C. JENIS KACA JENDELA

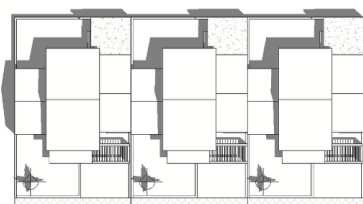
NAMA	JENIS KACA JENDELA	REFERENSI GAMBAR
Sgl Clr	Single Clear 6mm	 <p>Single Clear Glass 6mm / 5mm</p> <p>Single clear</p>
BIM	Single Clear glass 5mm	
Dbl LoE	Double Low-E (e3=0,2) Clear 3/13 Air	 <p>Exterior Heat reflected out</p> <p>Interior Indoor heat reflecting infrared radiation from surface</p> <p>Interior Glass pane (with Low-E)</p> <p>Air Gap</p> <p>Exterior glass pane</p> <p>Double Low-E</p>
Dbl Clr	Double Clear 6/13 Air	 <p>Double Clear</p> <p>Air Gap</p> <p>Double clear</p>
Trp LoE	Triple Low-E (e2-e5-0,1) clear	 <p>Middle Glass</p> <p>Air Gaps</p> <p>Exterior Glass pane (with Low-E)</p> <p>Interior Glass pane (with Low-E)</p> <p>Triple Low E</p>

Sumber: <https://www.yourhome.gov.au/passive-design/glazing>

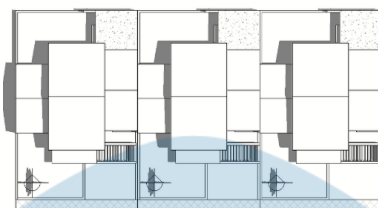
LAMPIRAN 2. HASIL ANALISIS BAYANGAN RUMAH BASELINE**PUKUL 09.00**

PUKUL 11.00

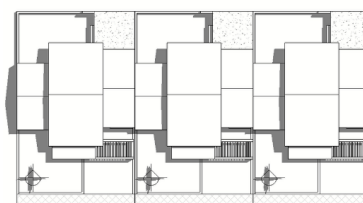
Januari



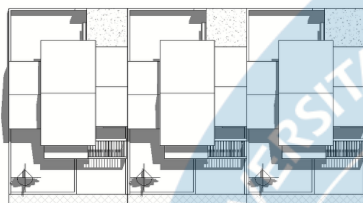
Februari



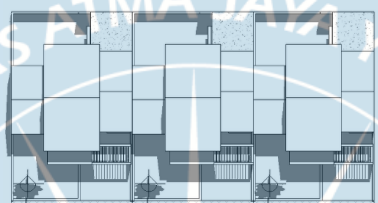
Maret



April



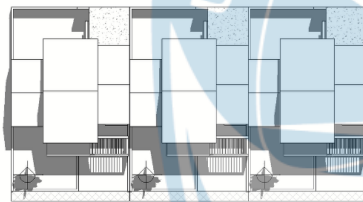
Mei



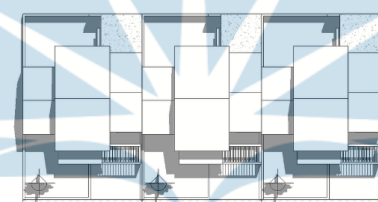
Juni



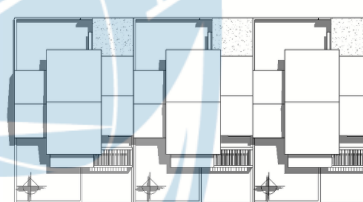
Juli



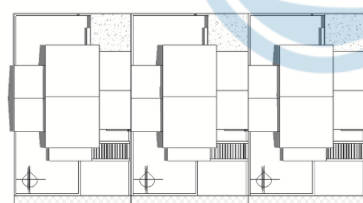
Agustus



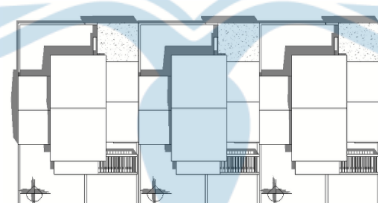
September



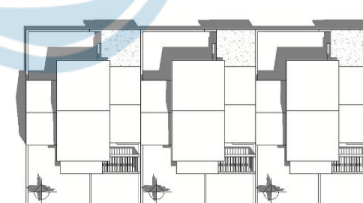
Oktober



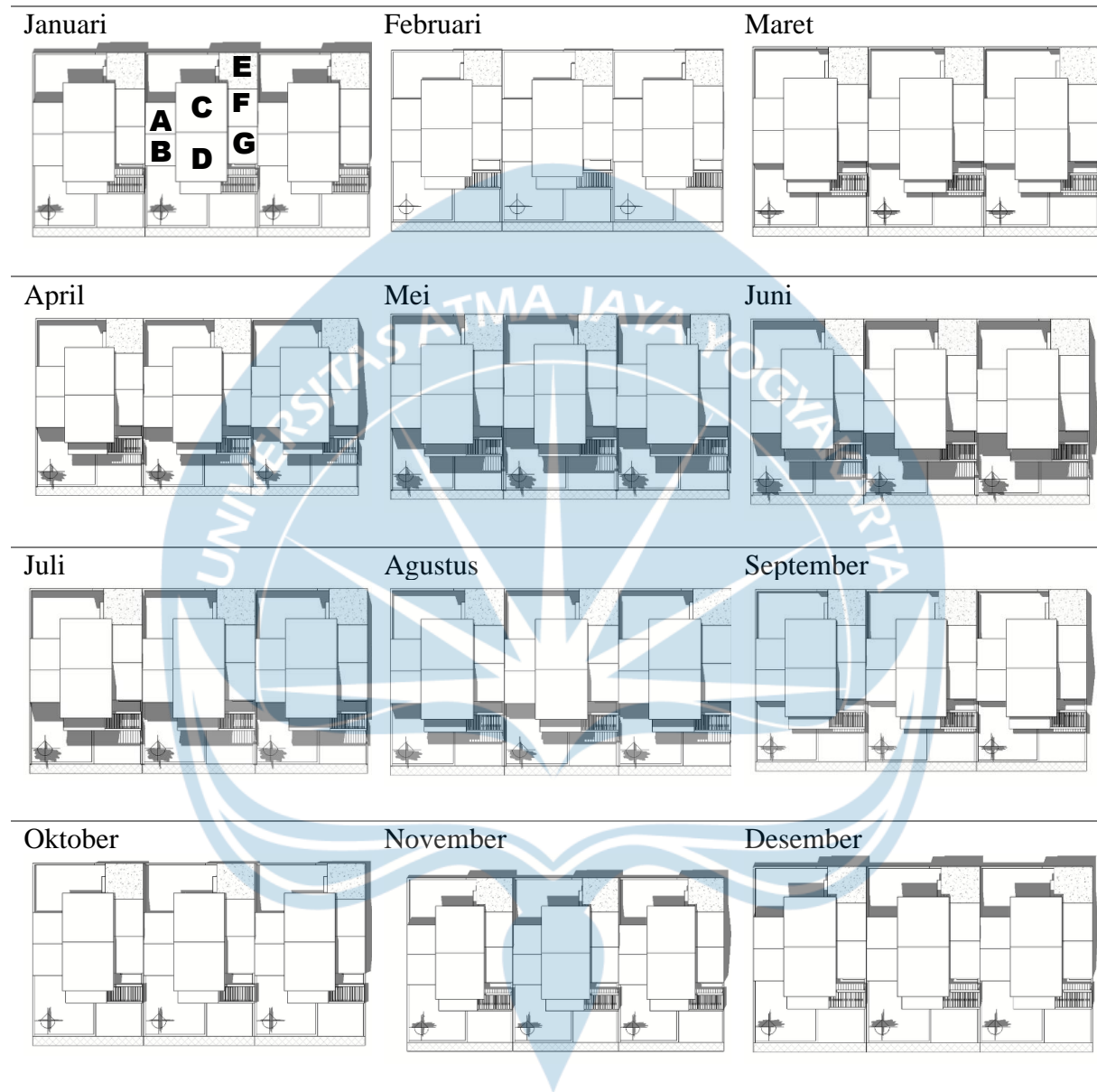
November



Desember

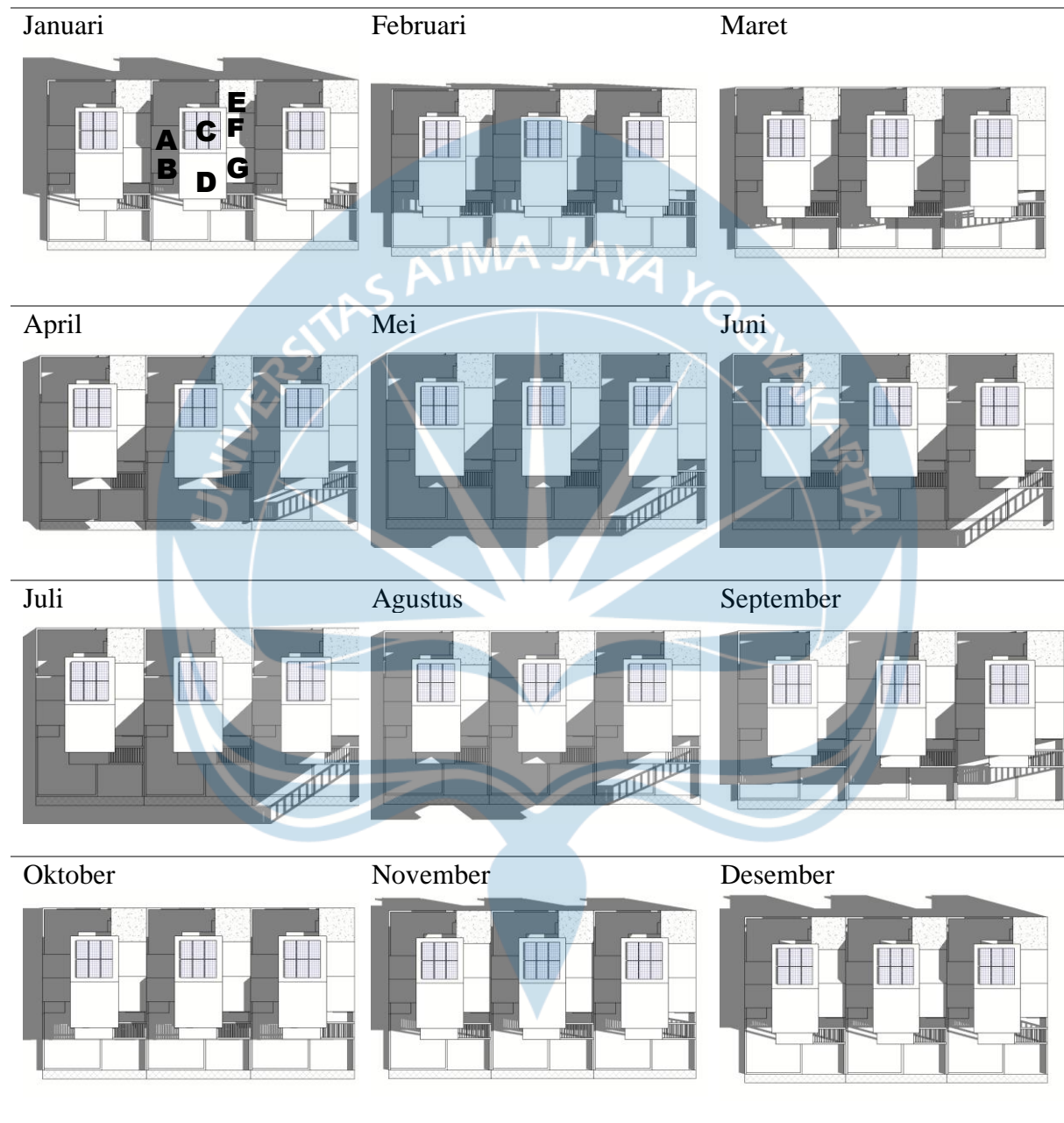


PUKUL 12.00



PUKUL 16.00

Atap di sisi timur dan barat terkena bayangan

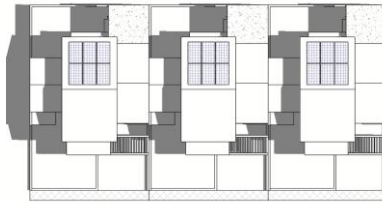
LAMPIRAN 3. HASIL ANALISIS BAYANGAN RUMAH *IMPROVEMENT***PUKUL 07.00**

PUKUL 09.00

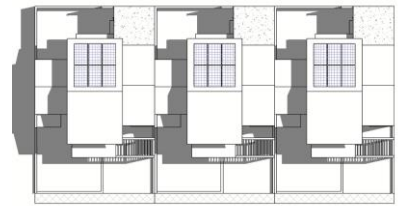
Januari



Februari



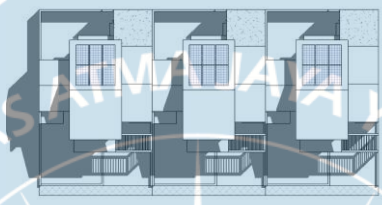
Maret



April



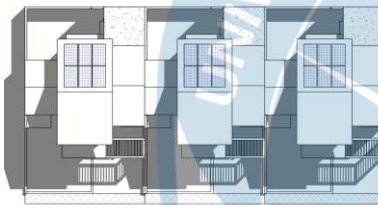
Mei



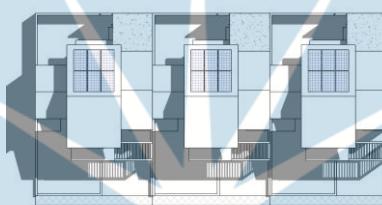
Juni



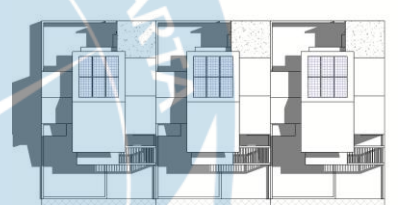
Juli



Agustus



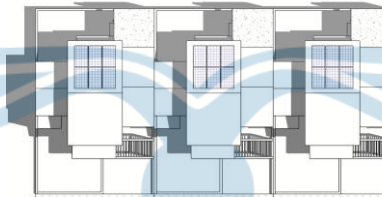
September



Oktober



November

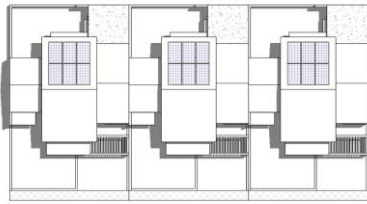


Desember

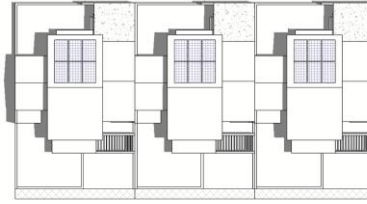


PUKUL 11.00

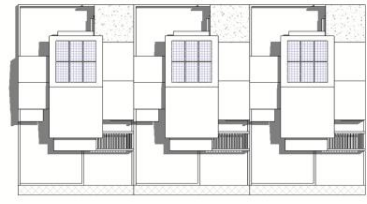
Januari



Februari



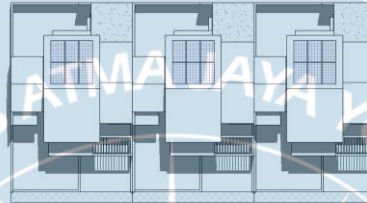
Maret



April



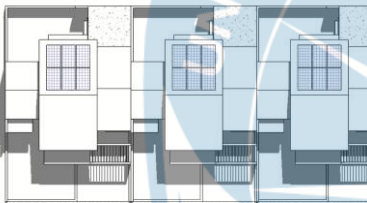
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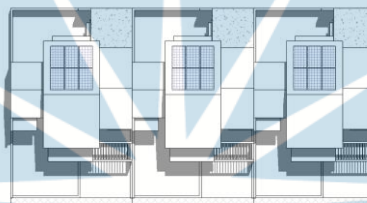
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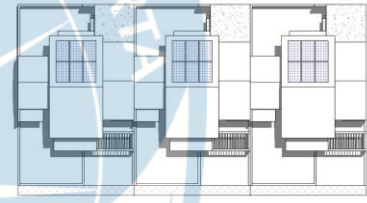
Juli



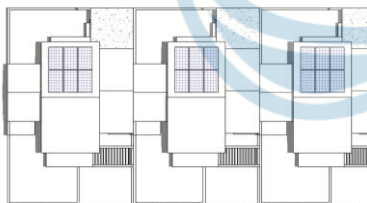
Agustus



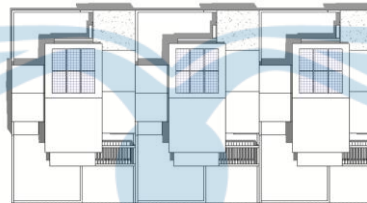
September



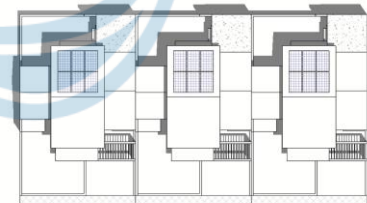
Oktober



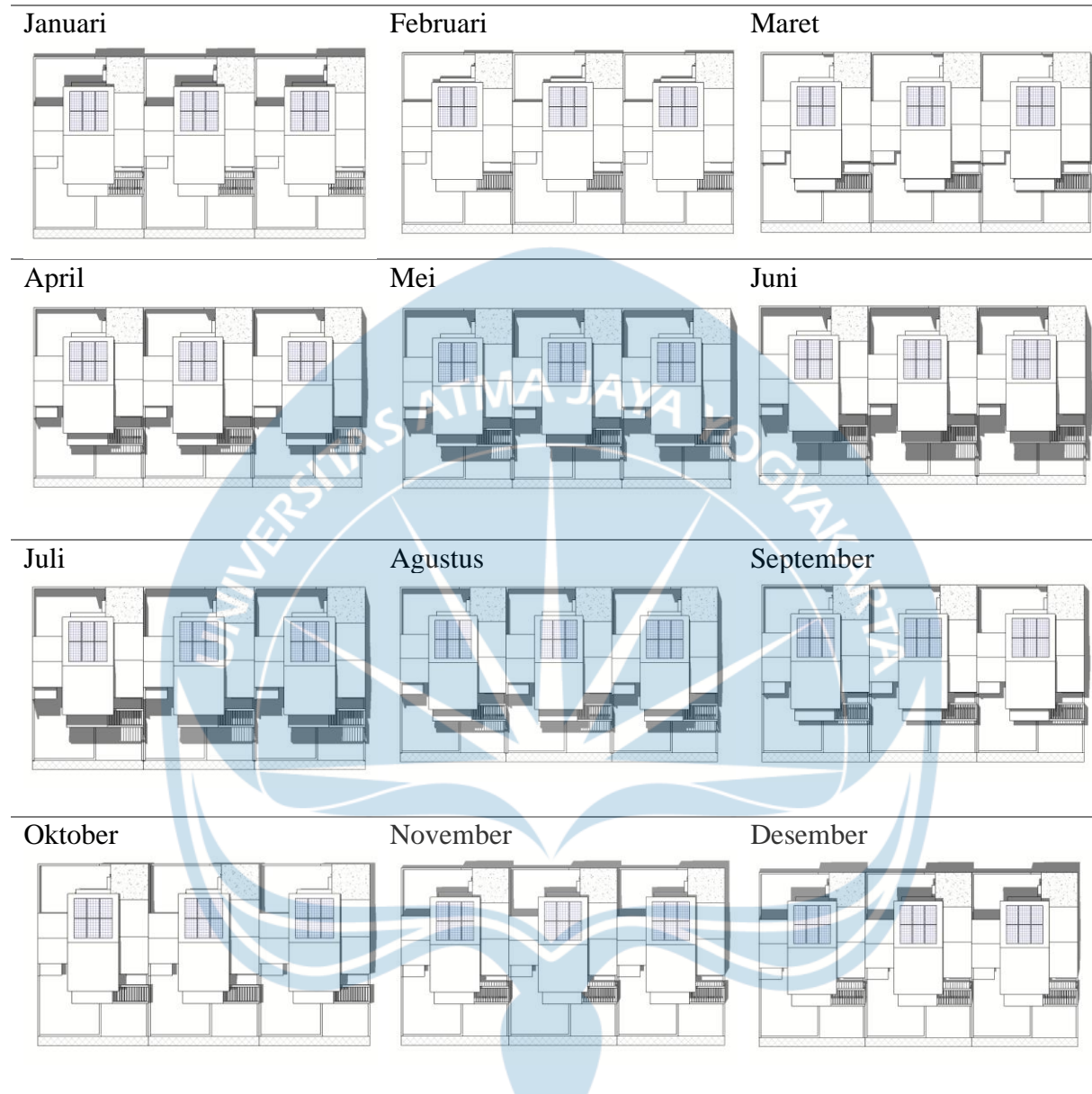
November



Desember



PUKUL 12.00



PUKUL 16.00

Januari



Februari



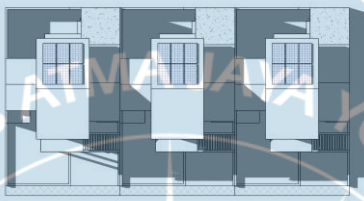
Maret



April



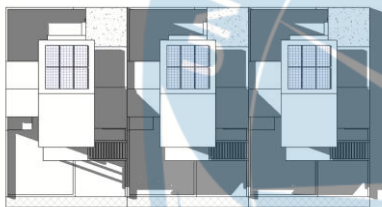
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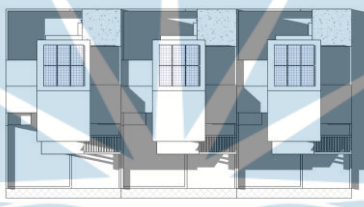
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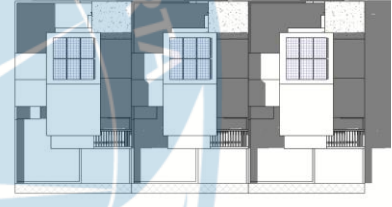
Juli



Agustus



September



Oktober



November



Desember



LAMPIRAN 4. HASIL PRODUKSI PANEL PV DARI BERBAGAI SUDUT KEMIRINGAN

Tilt	Ftransposition Factor (FT)	Loss With Respect to Optimum (%)	Global On collector plane (kWh/m²)	PV production (kwh/year)	Array Losses (kWh/kWp/day)
0	1	-2,10%	1929	2860	0,79
5	1,01	-0,80%	1955	2894	0,8
10	1,02	-0,10%	1969	2911	0,8
15	1,02	0%	1971	2911	0,8
20	1,02	-0,50%	1962	2895	0,79
25	1,01	-1,60%	1940	2862	0,78
30	0,99	-3,20%	1908	2813	0,77
35	0,97	-5,40%	1865	2748	0,74
40	0,94	-8,10%	1811	2666	0,72
45	0,91	-11,40%	1747	2567	0,7
50	0,87	-15,10%	1674	2454	0,67
55	0,83	-19,20%	1592	2326	0,65
60	0,78	-23,80%	1503	2186	0,62
65	0,73	-28,70%	1406	2037	0,59
70	0,68	-33,70%	1306	1884	0,55
75	0,62	-38,90%	1205	1737	0,5
80	0,58	-43,60%	1111	1594	0,47
85	0,53	-48,30%	1020	1455	0,44
90	0,48	-52,60%	934	1319	0,42

Monthly Hourly Sums For E_Grid 15° [Kwh]

	0H	1H	2H	3H	4H	5H	6H	7H	8H	9H	10H	11H	12H	13H	14H	15H	16H	17H	18H	19H	20H	21H	22H	23H
<i>January</i>	0	0	0	0	0	0	0	0,3	3,7	3,5	12,1	16,5	6,6	3,7	7,2	5,5	0,1	0	0	0	0	0	0	0
<i>February</i>	0	0	0	0	0	0	0	0,2	4,2	4,5	15,4	17,8	7,6	4,4	9,5	8,2	0,7	0	0	0	0	0	0	0
<i>March</i>	0	0	0	0	0	0	0	0,6	4,5	5,4	16,7	20,1	9,2	5,1	10,1	8,4	0,7	0	0	0	0	0	0	0
<i>April</i>	0	0	0	0	0	0	0	1,8	6,7	6,6	18,8	23,6	12,3	7,1	11,5	8,3	0,2	0	0	0	0	0	0	0
<i>May</i>	0	0	0	0	0	0	0	1,5	6,5	6,5	19,7	25,3	12,2	6,7	12,6	8,8	0	0	0	0	0	0	0	0
<i>June</i>	0	0	0	0	0	0	0	1,7	7,6	7,4	21,3	27	13,5	7,5	13,4	9,6	0	0	0	0	0	0	0	0
<i>July</i>	0	0	0	0	0	0	0	1,3	7,8	7,4	21,8	28	14,7	8,5	14,8	10,6	0,2	0	0	0	0	0	0	0
<i>August</i>	0	0	0	0	0	0	0	1,5	7,8	7,5	21,1	28,7	16,5	9,9	15,6	11	0	0	0	0	0	0	0	0
<i>September</i>	0	0	0	0	0	0	0,3	3,2	8,4	8,3	21,7	26,4	13,7	7,7	13	9,2	0	0	0	0	0	0	0	0
<i>October</i>	0	0	0	0	0	0	1	4,2	9,9	9,2	22,9	27,7	13,9	7,7	12,8	7,4	0	0	0	0	0	0	0	0
<i>November</i>	0	0	0	0	0	0	0,5	2,3	6,1	5,1	16,2	21,9	9,9	4,4	8,7	5,1	0	0	0	0	0	0	0	0
<i>December</i>	0	0	0	0	0	0	0	1,1	5,2	4,8	15,1	20,4	7,4	4	8,8	5,9	0	0	0	0	0	0	0	0
<i>Year</i>	0	0	0	0	0	0	1,9	19,7	78,5	76,1	222,8	283,5	137,5	76,7	138	98,1	2	0	0	0	0	0	0	0