

Total Energy Used from Low Carbon Sources

The facility at FK Salemba encompasses a total land area of **45,376.89 m²**. With total carbon emissions recorded at **982.7 metric tons**, this figure highlights the environmental impact of the facility. The annual electricity consumption amounts to **1,161,362.54 kWh**, providing a basis for evaluating energy efficiency relative to the size of the property. Additionally, water consumption is noted at **15,896.76 m³**, indicating resource use in terms of water. By analyzing these metrics together—carbon emissions, energy and water usage, and land area—stakeholders can gain valuable insights into the facility's sustainability performance and identify opportunities for reducing emissions, enhancing energy efficiency, and managing resources more effectively.

FMUI has a policy for ensuring all renovations or new builds are following energy efficiency standards in Green Building Policy, manifested in the development and renovation of spaces at the Faculty of Medicine UI.

Energy-efficient Renovation and Building

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In alignment with the Green Building standards outlined in our construction and renovation policies, systematic and progressive endeavours unfold across various stages, encompassing technical planning, construction execution, utilization, and ultimately, demolition. Prior to these stages, FMUI initiates the process by the identifying Green Building implementation.

A. LUAS KESELURUHAN LANTAI GEDUNG FKUI

No.	Nama Gedung	Lokasi	Luas Keseluruhan (m²)
1	Gedung IMERI	Salemba	21.785,54
2	Gedung Utilitas	Salemba	378
3	Gedung H	Salemba	10.019,71
4	Gedung Anatomi	Salemba	2.580,45
5	Gedung Parasitologi	Salemba	3.861,36
6	Gedung ex. Perpustakaan (Wisma Parasitologi)	Salemba	433,9
7	Gedung Kimia	Salemba	1.550,90
8	Gedung Ilmu Gizi	Salemba	895,9
9	Gedung Patologi Anatomi (2 Gedung)	Salemba	2.118,36
10	Gedung IKK	Pegangsaan Timur	1.077,48
11	Gedung Mikrobiologi (3 gedung)	Pegangsaan Timur	3.320,19
12	Gedung KDK Kayu Putih	Kayu Putih	683,64
TOTAL			48.705,43

B. Luas Area Smart Building

No.	Nama Gedung	Otomatisasi		Keamanan				Energi		Air		Kualitas Udara				lighting				Transport		Acces Card	Luas Bangunan (m²)
		Building Management System (BMS)	Support Via APP atau Online Service	Sistem pencegahan dan deteksi anti pencurian (terhubung BMS)	Sistem Pemadam Kebakaran (Fire Alarm, Hydrant) (terhubung BMS)	CCTV (terhubung BMS)	Sistem anti banjir (terhubung BMS)	Pemantauan (terhubung BMS)	Pengelolaan (terhubung BMS)	Pemantauan (Monitoring) (terhubung BMS)	Pemanfaatan Air Hujan	Monitoring Temperatur Ruangan	Monitoring Kualitas Udara	Mengontrol dan mengatur suhu secara langsung (terhubung BMS)	Menurunkan temperatur ruang tanpa alat elektronik (oleh bangunan)	LEDs	Kontrol Pencahayaan otomatis (sensor) (terhubung BMS)	pengontrol radiasi matahari	Pencayaan Alami	Elevator	Escalator		
		B1	B2	S1	S2	S3	S4	E1	E2	A1	A2	I1	I2	I3	I4	L1	L2	L3	L4				
1	Gedung IMERI	X	X	X	√	√	X	X	X	X	√	√	X	X	X	√	X	X	√	√	X	√	21.785,54
2	Gedung Utilitas	X	X	X	√	X	X	X	X	X	X	X	X	X	X	√	X	X	X	X	X	√	378,00
3	Gedung H	X	X	X	√	√	X	X	X	X	√	√	X	X	X	√	X	X	√	√	X	√	10.019,17
4	Gedung Anatomi	X	X	X	√	X	X	X	X	X	X	X	X	X	X	√	X	X	√	X	X	X	3.861,36
5	Gedung Parasitologi	X	X	X	√	X	X	X	X	X	X	X	X	X	X	√	X	X	√	X	X	√	4.397,74
6	Gedung ex. Perpustakaan (Wisma Parasitologi)	X	X	X	√	X	X	X	X	X	X	X	X		X	√	X	X	√	X	X	X	443,90
7	Gedung Kimia	X	X	X	√	X	X	X	X	X	X	X	X	X	X	√	X	X	√	X	X	√	1.486,04
8	Gedung Patologi Anatomi 1	X	X	X	√	√	X	X	X	X	X	X	X	X	X	√	X	X	√	X	X	√	1.544,21
9	Gedung Patologi Anatomi 2	X	X	X	√	√	X	X	X	X	X	X	X	X	X	√	X	X	√	X	X	√	1.544,21
10	Gedung Mikrobiologi	X	X	X	√	X	X	X	X	X	X	X	X	X	X	√	X	X	√	X	X	√	1.460,93
Jumlah																						45.376,89	

● Smart Building Implementation

= (luas smart building: luas keseluruhan lantai) x 100 %

= (45.376,89 : 48.705,43) x 100%

= 0,92 x 100%

= 93%



Sistem Fire Alarm Gedung IMERI



Sistem Fire Alarm Gedung H



**Sistem CPA (*Central Plan Automation*)
Chiller Gedung IMERI**



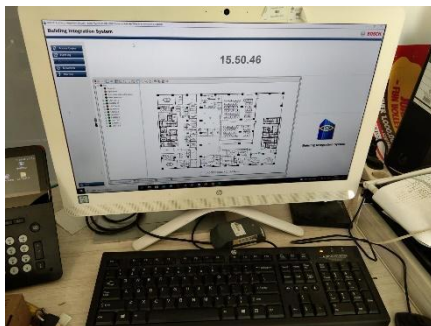
Saklar Otomatis Chiller Gedung H



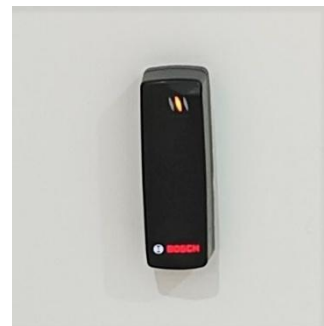
CCTV Gedung IMERI



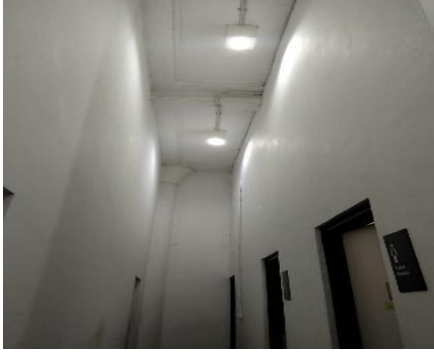
CCTV Gedung - H



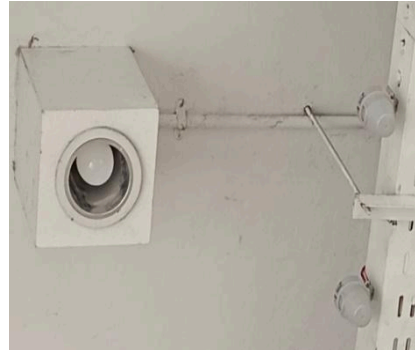
**Sistem Building Intregation System
untuk access card di Gedung IMERI**



Access card di gedung IMERI



**Lampu Toilet Gedung Menggunakan
Sensor Gerak**



**Pemasangan Sensor Cahaya di Selasar
Gedung H**



Kran Sensor Wastafel Gedung H



**Kran Sensor Wastafel Lab. Departemen
Mikrobiologi**



**Sistem Pemadam Kebakaran Gedung
IMERI**



**Sistem Pemadam Kebakaran Gedung
IMERI**



**Sistem genset
Gedung IMERI
menggunakan ATS (*Automatic Transfer
Switch*)**

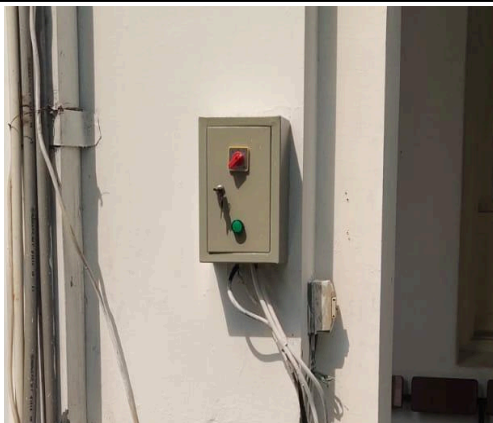
**Water Fountain
di Gedung H**



**Timer Otomatis Exhaust Fan Basement
Gedung IMERI**



**Pemakaian UPS untuk Alat
Laboratorium**



**Panel Otomatis untuk Kran Siram Taman
di Taman FKUI (depan Departemen
Farmasi)**



**Pintu Kaca Gd IMERI menggunakan
Sensor Otomatis**



Vending Machine
untuk Pembelian Minuman secara
Otomatis



Printing Station untuk Mencetak
Dokumen secara Digital sehingga
Menghemat Pemakaian Kertas



Alarm Pendeteksi Banjir di Gedung Utilitas



Sistem Alarm di Gedung Utilitas



Lampu Vertical Garden Berbasis
Sensor Cahaya



PLTS untuk Penerangan Jalan Berbasis
Sensor Cahaya

Deskripsi:

1. The fire alarm system has been installed in the IMERI Building, Building H, the Parasitology Building, the Anatomical Pathology Building, and the Microbiology Building.
2. The Control Planning Automation (CPA) system for the chiller in the IMERI Building is designed to manage the chiller from a control room. Additionally, there is an automatic switch for the chiller in Building H that allows for turning the chiller on and off as needed.
3. CCTV to monitor conditions inside and outside the building. CCTV has been installed in the IMERI Building, Building H, the Parasitology Building, the Pathology Building, the Chemistry Building, and the Microbiology Building.
4. Smart lock systems have been installed in the IMERI Building, Building H, the Parasitology Building, the Anatomical Pathology Building, the Chemistry Building, and the Microbiology Building. The smart locks at FKUI include various types, utilizing cards, fingerprints, and security codes. In the IMERI Building, the smart locks are integrated with the Building Integration System (BIS), allowing them to be controlled from a computer.
5. Motion sensor lights have been installed in the restrooms of the IMERI Building, Building H, the Anatomy Building, the Microbiology Building, the Community Medicine Building, the Anatomical Pathology Building, the Chemistry Building, and the Parasitology Dormitory. These lights automatically turn off when no one is present in the restroom, enhancing energy efficiency.
6. Light sensors have been installed for lighting in the corridors of Building H at FKUI. The lights automatically turn on when sunlight is dim or dark and turn off when there is ample natural light.
7. Automatic sensor faucets for sinks have been installed to conserve water usage. These sensor faucets are located in Building H and the Microbiology Building.
8. An automatic fire suppression system has been installed in the IMERI Building, designed to activate in the event of a fire within the premises.
9. The generator operates automatically using an Automatic Transfer Switch (ATS) to provide backup power when the main electricity source (PT. PLN) is interrupted. This generator, with a capacity of 2000 KVA, is located in the Utility Building and supplies backup electricity to the IMERI Building.
10. The water fountains are designed to purify raw water into safe drinking water, eliminating the need for cooking before consumption. These water fountains are located in the lower lobby and on the connecting floor of Building H at FKUI.
11. Automatic timers are used to turn electronic and mechanical devices on and off according to their settings. This system controls various functions, such as garden lights, automatic irrigation faucets, and exhaust fans. Timers have been installed in both the IMERI Building and Building H.

12. Uninterruptible Power Supply (UPS) systems have been installed for laboratory equipment to ensure continued operation during power outages. The UPS units for laboratory equipment are located in the IMERI Building.
13. Automatic glass sensor doors are installed in the IMERI lobby, allowing the glass doors to open and close automatically.
14. Automatic vending machines are available for purchasing beverages.
15. A digital printing station is available for printing documents. Both machines are located on the lower level connecting the IMERI Building and Building H.
16. A flood protection alarm system is in place to safeguard equipment and assets from flooding in the utility building area.
17. Fire protection system that operates automatically in the event of a fire within the Utility building.
18. Light sensor-based solar power system for illuminating the vertical garden area.
19. Light sensor-based solar power system for street lighting in the FKUI area.

[7.2.2] Upgrade Buildings to Higher Energy Efficiency

To fulfill the elements of Green Building reflected in development and renovation policies, FKUI undertakes efforts that begin with the technical planning stage, construction implementation, utilization, and deconstruction.

1. Conducting identification of the implementation of green building compliance.



PEMENUHAN TEKNIS BANGUNAN HIJAU GEDUNG FAKULTAS KEDOKTERAN UI
TAHUN 2022

No.	Syarat Teknis	Uraian	Keterangan		
			Tersedia	Tidak	Kriteria
	a. pengelolaan tapak;	a. ruang terbuka hijau (RTH) privat;	v		2.3
		b. penyediaan jalur pedestrian;	v		1.21, 2.3, dan 5.16
		c. pengelolaan tapak besmen;	v		
		d. penyediaan lahan parkir;	v		5.12
		e. sistem pencahayaan ruang luar;	v		2.3
	b. efisiensi penggunaan energi;	a. selubung bangunan;	v		2.3
		b. sistem ventilasi;	v		2.3
		c. sistem pengondisian udara;	v		2.3
		d. sistem pencahayaan;	v		2.3
		e. sistem transportasi dalam gedung; dan	v		2.22
		f. sistem kelistrikan.	v		2.1
	c. efisiensi penggunaan air;	a. sumber air;	v		4.4
		b. pemakaian air; dan	v		4.4 dan 4.5
		c. penggunaan peralatan saniter hemat air (<i>water fixtures</i>).	v		4.3
	d. kualitas udara dalam ruang;	a. pelarangan merokok;	v		2.10
		b. pengendalian karbondioksida (CO ₂) dan karbonmonoksida (CO); dan	v		2.4, 2.10, dan 5.9
		c. pengendalian penggunaan bahan pembeku (<i>refrigerant</i>).	v		2.9
	e. penggunaan material ramah lingkungan;	a. pengendalian penggunaan material berbahaya; dan	v		2.9
		b. penggunaan material bersertifikat ramah lingkungan (<i>eco labelling</i>).	v		2.9
	f. pengelolaan sampah; dan	a. penerapan prinsip 3R (<i>reduce, reuse, recycle</i>);	v		3

		b. penerapan sistem penanganan sampah; dan	v		3.1, 3.2
		c. penerapan sistem pencatatan timbulan sampah.	v		3.3 dan 3.4
	g. pengelolaan air limbah.	a. penyediaan fasilitas pengelolaan limbah padat dan limbah cair sebelum dibuang ke saluran pembuangan kota; dan	v		4.1
		b. daur ulang air yang berasal dari limbah cair (<i>grey water</i>).	v		4.2
	h. Pelaksanaan konstruksi	a. penerapan metode pelaksanaan konstruksi hijau;	v		2.9
		b. pengoptimalan penggunaan peralatan;	v		2.9
		c. penerapan manajemen pengelolaan limbah konstruksi;	v		3.4
		d. penerapan konservasi air pada pelaksanaan konstruksi; dan	v		2.13
		penerapan konservasi energi pada pelaksanaan konstruksi	v		2.13
		e. penerapan SMK3	v		Pengisian JSA
		f. penerapan perilaku ramah lingkungan.	v		
		g. penggunaan material konstruksi;	v		2.13
		h. pemilihan pemasok dan/atau sub-kontraktor; dan	v		Produk lokal
		i. konservasi energi.	v		2.13
	i. pemanfaatan bangunan	a. organisasi dan tata kelola pemanfaatan bangunan gedung hijau;	v		2.13
		b. standar operasional dan prosedur pelaksanaan pemanfaatan; dan	v		2.13
		c. penyusunan panduan penggunaan bangunan gedung hijau untuk penghuni/pengguna	v		2.13
	j. Pembongkaran bangunan	a. prosedur pembongkaran, termasuk dokumentasi keseluruhan material konstruksi bangunan, struktur dan/atau bagian bangunan yang akan dibongkar, dan material dan/atau limbah yang akan dipergunakan kembali; dan			
		b. upaya pemulihan tapak lingkungan, yang terdiri atas upaya pemulihan tapak bangunan dan upaya pengelolaan limbah konstruksi, serta upaya peningkatan kualitas tapak secara keseluruhan	v		2.13

2. Supporting evidence for the implementation of green building.

a. Site Management (Pengelolaan Tapak):



The FKUI building, located in the Salemba and Pegangsaan Timur campus areas, is easily accessible by public transportation. Its strategic location near the RSCM busway stop on Jl. Diponegoro and the UI busway stop on Jl. Salemba Raya facilitates public transport connections, including Trans Jakarta, Jaklingko, mikrolet, bajaj, and other public vehicles, as well as the commuter line accessible from Cikini train station, which is within walking distance. The majority of the FKUI population uses available public transport, resulting in fewer vehicles around the Faculty compared to the daily population. The distance from FKUI to the busway stop is approximately 200 meters, while Cikini station is about 1.2 kilometers away. This is advantageous for FKUI, as it promotes a more environmentally friendly approach and allows for time efficiency by avoiding traffic congestion.

- b. The pedestrian pathways are available and integrated with the main road sidewalks, including special routes for persons with disabilities that connect to the entrance of Building H.

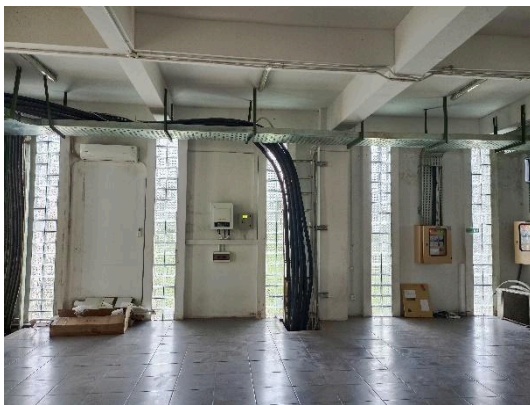


- c. Examples of Green Open Spaces

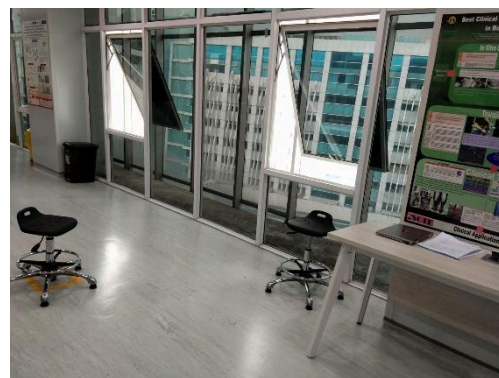


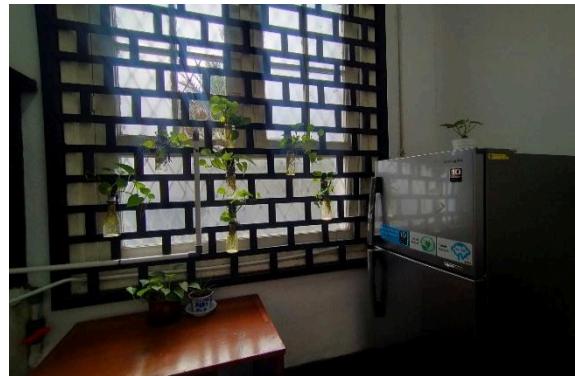


- d. Using glass materials (stopsol layer) that can reduce the entry of solar heat into the building.



- e. Natural lighting is utilized for illumination within the building, with operable windows and air ventilation to ensure airflow throughout Building H (floors 1 and 2), the Anatomy Building, the Parasitology Building, IKK, and Microbiology.

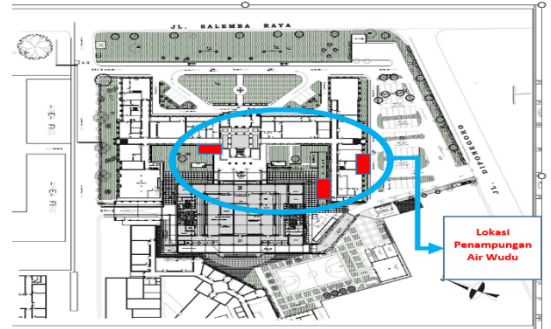






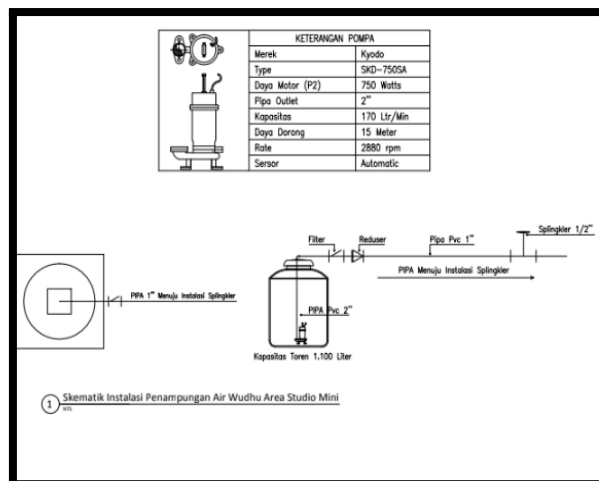
f. Water conservation;





1. Utilization of Used Ablution Water (Air Wudhu)

The use of recycled water includes utilizing leftover abluion water for watering plants, with three units each holding 1,100 liters.



Skema Bekas Air Daur Ulang Wudhu



2. Utilization of Rainwater

Utilization of rainwater for plant irrigation.



Bak Penampungan Air Hujan

3. Utilization of AC Water

The use of air conditioning (AC) water for watering plants involves collecting the water from Building H in containers and then storing it in a rainwater reservoir, which is subsequently used for irrigating plants. Additionally, the AC water from the IMERI building is distributed to the STP (Sewage Treatment Plant) and WTP (Waste Treatment Plant) for treatment and recycled into water used for flushing toilets in the IMERI facility.



Jerigen Penampungan Air AC Gedung H FKUI



Bak Penampungan Air AC Gedung H FKUI jadi satu dengan Bak Penampungan Air Hujan

NO	LOKASI	KETERANGAN	PERHARI (Liter)	PERTAHUN (Liter)
1	Departemen Farmasi 1	FCU	40	10.560
2	Departemen Farmasi 2	FCU	40	10.560
3	Komite Etik & Senat Akademik Fakultas	FCU	40	10.560
4	Ruang Rapat DGB & SAF	AC Split	20	5.280
5	Ruang Dekanat & Wakil Dekan	AC Split	32	8.448
6	Ruang Manger & sekretaris	AC Split	26.5	6.996
7	Departemen Farmako 1	FCU	40	10.560
8	Departemen Farmako 2	FCU	40	10.560
9	Studio Mini	FCU	40	10.560
10	DPK	FCU	40	10.560
11	Departemen Biologi 1 (Ruang Staff)	AC Split	20	5.280
12	Departemen Biologi 2 (Ruang Staff)	AC Split	20	5.280
13	IMERI	FCU	27.440	7.244.160



Air Bekas AC IMERI disalurkan ke STP WTP untuk Diolah Kembali

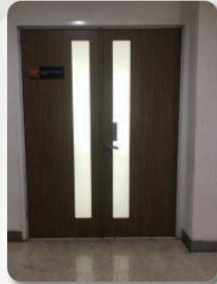
Data Pemanfaatan air AC di Fakultas Kedokteran Universitas Indonesia

4. Use of Environmentally Friendly Materials

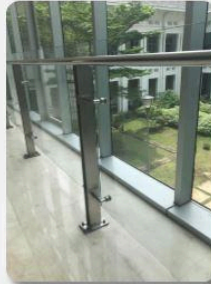
Semua material yang digunakan adalah material produksi lokal dan ramah lingkungan



Pintu masuk ruang Auditorium menggunakan kusen kayu dan pintu panel solid cat melamik



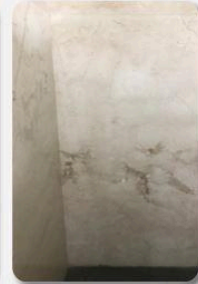
Kusen Aluminium, daun pintu multiplek rangka dengan kaca 5 mm, pada ruangan kerja dan ruangan edukasi



Railing sekeliling jendela kaca dan tanggac bahan stainless steel dan kaca tempered 1,2mm



Granite tile untuk dinding toilet



Granite tile untuk lantai toilet

Material yang digunakan pada gedung IMERI

Material yang digunakan merupakan produksi lokal dan ramah lingkungan

1. Stainless steel (sumber : <https://wira.co.id/stainless-steel/>)

- Tahan suhu tinggi dan rendah
- Mudah dibuat
- Kuat dan tahan lama
- Sangat mudah dibersihkan ataupun dirawat
- Tahan lama, dengan biaya siklus hidup yang rendah
- Menarik secara estetika
- Ramah lingkungan serta dapat didaur ulang.

2. Kaca tempered

Kaca Tempered mempunyai kekuatan (daya tahan) tiga sampai lima kali kaca biasa, tahan terhadap perubahan suhu, kaca tempered aman digunakan karena jika sampai pecah, pecahan kaca tempered akan berbentuk serbuk kecil-kecil dan tidak tajam, dapat menghemat energi listrik.

3. Homogenous Tile (Dianita et al, 2014)

Lebih kuat dan lebih tahan lama dibandingkan keramik biasa, lebih tebal dari pada keramik biasa, memiliki tampilan yang mewah, tidak mudah tergores.

4. Marmer (Dianita et al, 2014)

Bersifat kuat sehingga dapat menahan beban yang berat, marmer bersifat dingin sehingga dapat menurunkan suhu di dalam ruangan.

5. Keramik (Dianita et al, 2014)

Tahan terhadap noda, lebih mudah dibersihkan apabila terkena kotoran, tahan terhadap air, keramik mudah didapatkan, harganya lebih murah dibandingkan homogenous tile.

6. Vinyl FloorSheet 201201A (Dianita et al, 2014)

Berbahan Polyvinyl Chloride (PVC), Vinyl punya daya tahan lebih kuat dibanding lantai keramik biasa, perawatannya mudah.

7. Karpet (Dianita et al, 2014)

Kelebihannya adalah meredam bunyi suara, tampil mewah, dan kemudahan pemasangannya. Hanya saja perlu perawatan berkala untuk menyedot debu yang menempel.

8. Aluminium untuk kusen untuk curtain wall
(Karuniasuti, 2015)

Aluminium memiliki keunggulan dapat didaur ulang (digunakan ulang), bebas racun dan zatpemicu kanker, bebas perawatan hematbiaya, lebihkuat, tahan lama, anti karat

9. Fabricpanel, sandwich panel (dinding dan plafond)
(Herosonna, 2017)

Komposit sandwich dibuat untuk mendapatkan struktur yang ringan tetapi mempunyai densitas rendah, tahan karat, kuat, kokoh, mempunyai kekakuan dan kekuatan yang tinggi.

10. Gypsum Board

tidak mengandung asbestos yang dapat menyebabkan kanker, - mempunyai kandungan volatile organic compound (VOC) yang jauh di bawah ambang batas yang ditentukan, - tidak mudah terbakar, - pada ruangan ber-AC, gipsium lebih

11. Cat eksterior : Jotun JotaShield

Berkualitas tinggi, konsisten, akurat, tahan lama anti jamur dan rendah Volatile Organic Compound (VOC), sehingga aman untuk diaplikasikan pada tembok. (Indarto dan Aryanto, 2017)

12. Cat interior : dulux pentallite

Merk cat tembok Dulux adalah cat anti merkuri, sehingga aman untuk digunakan. telah mendapatkan Singapore Green Label sebagai standar produk berkelanjutan. (Indarto dan Aryanto, 2017)

13. Cat pintu besi : nippon

Nippon Paint (Green Choice Series), yang diformulasikan untuk ramah lingkungan dan aman bagi kesehatan, berbahan dasar air, tidak mengandung timah dan merkuri, serta kandungan Volatile Organic Compound (VOC) mendekati



Use of Environmentally Friendly Refrigerants

- Reclaimed teak wood (papan jati bekas) used for the nameplate in the lobby of Building H, FKUI.
- Using environmentally friendly materials.
- Utilizing reclaimed materials (water tanks) for ablution water storage.





5. Air Quality Measurement

Indoor Air Quality: Air quality and comfort measurements are conducted by PPDS Occupational Medicine students from the Department of Community Medicine, in collaboration with the K3L team at FKUI, twice a year.



To support the Green Building policies at FKUI, the Dean's policy was issued in 2022, namely:

1. Surat Keputusan Dekan FKUI Nomor: SK-1568/UN2.F1.D/HKP.02.04/2022 tentang Tim Kawasan Tanpa Rokok di FKUI;
2. Surat Keputusan Dekan FKUI Nomor: SK-1569/UN2.F1.D/HKP.02.04/2022 tentang Kebijakan Mitigasi dan Adaptasi Perubahan Iklim Global di Fakultas Kedokteran Universitas Indonesia
3. Surat Keputusan Dekan Nomor: SK-1570/UN2.F1.D/ HKP.02.04/2022 tentang unsur pelaksanaan *green building* (Gedung Hijau) yang tercermin dalam pengembangan dan renovasi ruangan di FKUI;

Penghematan Energi Listrik;

5. Surat Keputusan Dekan FKUI Nomor: SK-1572/UN2.F1.D/HKP.02.04/2022 tentang Kebijakan Untuk Mengurangi Penggunaan Kertas dan Plastik di FKUI;
6. Surat Keputusan Dekan FKUI Nomor: SK-1573/UN2.F1.D/HKP.02.04/2022 tentang Tim Pengelola Air Bersih di FKUI;
7. Surat Keputusan Dekan FKUI Nomor: SK-1574/UN2.F1.D/HKP.02.04/2022 tentang Tim Tata Perpakiran di FKUI;
8. Surat Keputusan Dekan FKUI Nomor: SK-1575/UN2.F1.D/HKP.02.04/2022 tentang Tim Kebijakan Transportasi di FKUI;
9. Standard Prosedur Operasional Pelaksanaan Penghematan Pemakaian Tenaga Listrik;
10. Nota Dinas Dekan FKUI Nomor: ND-7185/UN2.F1.D/RTK.01.07/2022 perihal Kebijakan Untuk Mengurangi Penggunaan Kertas dan Plastik;
11. Nota Dinas Dekan FKUI Nomor: ND-7186/UN2.F1.D/RTK.01.07/2022 Kebijakan Transportasi di Lingkungan FKUI

12. Book: IMERI FKUI Menuju Green Building dapat diakses di link kami:
<https://online.pubhtml5.com/drfg/hfuj/>

