

THE RELATIONSHIPS BETWEEN OCCUPANTS' WELL-BEING AND ARCHITECTURAL SOLUTIONS IN THE GREEN OFFICE BUILDINGS

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ACPS 2021: Architecture, City, People, Structure
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PRESENTATION PLAN

1. General Information
2. Green certification in Poland
3. People first places - WELL Building Standard
4. Reference buildings:
 - Green Day
 - Nowy Targ
 - Centrum Południe phase 1
5. Conclusion and discussion

“The researchers found that **doubling the ventilation capacity also doubled cognitive function** test scores. Extending the value of that increased productivity through a full year led to an average of \$6,500 for each worker, the team estimated.”

- *Joseph G. Allen, Harvard University*

POLAND

as the leader in Central and Eastern Europe in terms of the number of certified buildings

- BREEAM
- LEED
- HQE
- GBS
- DGNB
- WELL Building Standard

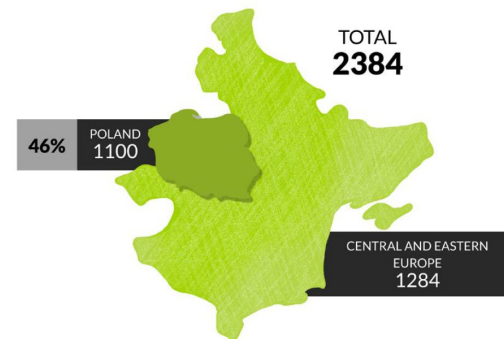


CHART 1 Certified buildings in CEE region. [1]

[1] Certified buildings in CEE region. Source: Kuczera A., *Polish certified green buildings in numbers 2021 Analysis*, Polish Green Building Council, 2021

GREEN CERTIFICATION IN POLAND

■ BREEAM ■ LEED ■ WELL ■ DGNB ■ GBS ■ HQE

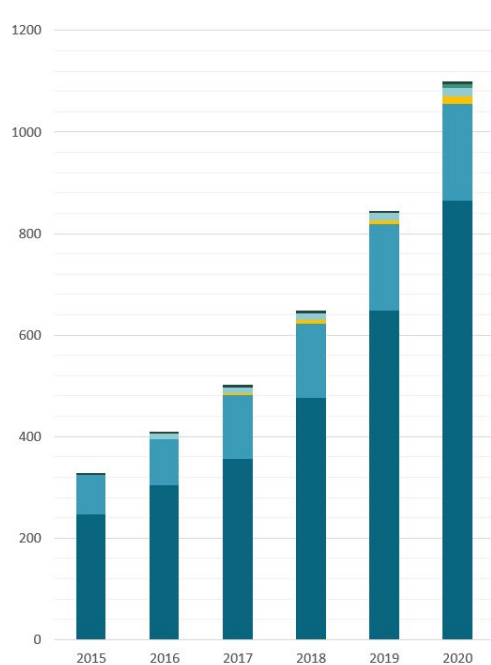


CHART 2 Number of certified buildings in Poland. [2]

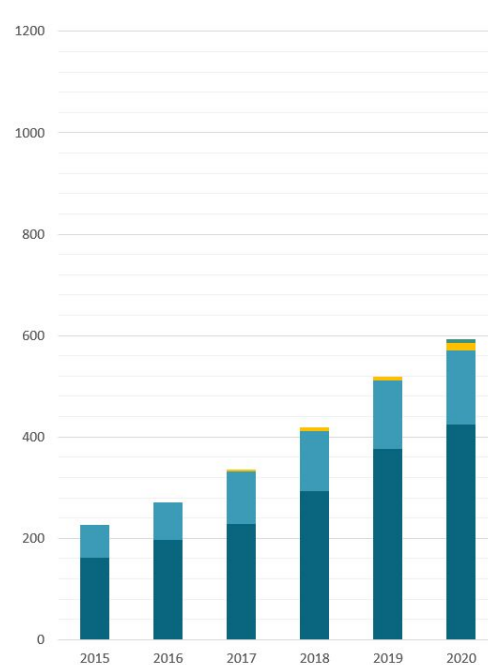


CHART 3 Number of certified office buildings in Poland. [3]

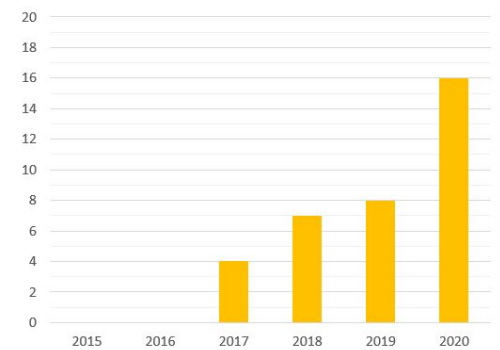


CHART 4 WELL certified office buildings in Poland. [4]



CHART 5 Increase in number of certified and WELL certified buildings in Poland. [5]

[2] Number of certified buildings in Poland. Source: own study based on Kuczera A., *Polish certified green buildings in numbers 2021 Analysis*, Polish Green Building Council, 2021

[3] Number of certified office buildings in Poland. Source: own study based on Kuczera A., *Polish certified green buildings in numbers 2021 Analysis*, Polish Green Building Council, 2021

[4] WELL certified office buildings in Poland. Source: own study based on Kuczera A., *Polish certified green buildings in numbers 2021 Analysis*, Polish Green Building Council, 2021

[5] Increase in number of certified and WELL certified buildings in Poland. Source: own study based on Kuczera A., *Polish certified green buildings in numbers 2021 Analysis*, Polish Green Buildings Council, 2021





PEOPLE FIRST PLACES WELL

WORLD

2014 - 2021

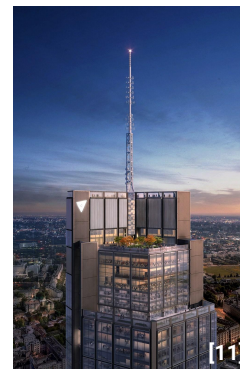
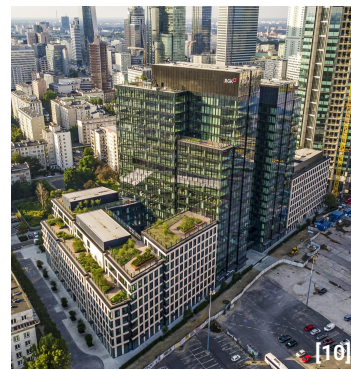
4918

POLAND

2017 - 2021

21

CHART 6 Number of WELL certified buildings in the world and Poland. [6]



[6] Number of WELL certified buildings in the world and Poland. Source: own study based on <https://www.wellcertified.com/>

[7] Spark C - Skanska office. Source: <https://baza.plgbc.org.pl/building/spark-c-biuro-skanska/>

[9] Varso 1, Warsaw. Source: <https://baza.plgbc.org.pl/building/varso-1/>

[11] Varso Tower, Warsaw. Source: <https://baza.plgbc.org.pl/building/varso-tower/>

[8] KTW1, Katowice. Source: <https://baza.plgbc.org.pl/building/ktw-1-2/>

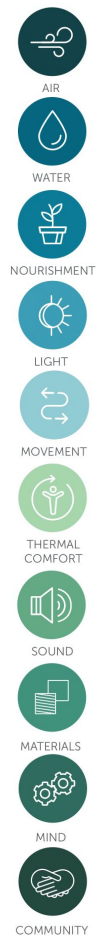
[10] Varso 2, Warsaw. Source: <https://baza.plgbc.org.pl/building/varso-ii/>

[12] Forest building 2, Warsaw. Source: <https://baza.plgbc.org.pl/building/forest-budynek-2/>



PEOPLE FIRST PLACES WELL

10 CONCEPTS 108 FEATURES



AIR			
Y	?	N	
			P AQU Fundamental Air Quality
			SMK Smoking Ban
			SMO Outdoor Smoking Ban
			LTA Long-Term Air Quality
			LTE Enhanced Long-Term Air Quality
			STA Short-Term Air Quality
			STE Enhanced Short-Term Air Quality
			SEP Pollution Source Separation
			PRK Parking Restrictions
			LEV Low Emission Vehicles
			AED Air Quality Education
0	0	0	TOTAL OPTIMIZATIONS

WATER			
Y	?	N	
			P WQT Drinking Water Quality
			WAD Public Water Additives
			PWT Periodic Water Quality Testing
			WQO High Quality Drinking Water
			WAC Drinking Water Access
			FAC Sanitary Facilities Provision
			WFS Water Feature Sanitation
			LEG Legionella Control
			SWA Stormwater Management
			OVF Overflow Water Management
0	0	0	TOTAL OPTIMIZATIONS

NOURISHMENT			
Y	?	N	
			P SUP Supermarket Access
			FRU Fruits and Vegetables
			HFO Healthy Food Procurement
			FAD Food Advertising
			NED Nutrition Education
			AGR Urban Agriculture I, Provision
			AGP Urban Agriculture II, Promotion
			FAF Food Affordability
			FSE Food Security
			FSA Public Food Inspection Information
			BRE Breastfeeding Support
0	0	0	TOTAL OPTIMIZATIONS

LIGHT			
Y	?	N	
			P LMP Lighting Master Plan
			LCS Lighting Control Schedule
			EMI Community-wide Emission Caps
			LCT Obtrusive Light Control
			LTR Light Trespass Mitigation for Sleep
			SVI Visibility Facilitation
			RLI Right-Of-Way Lighting
			LEX Lighting for Exteriors
			MLI Mass Transit Lighting
0	0	0	TOTAL OPTIMIZATIONS

MOVEMENT			
Y	?	N	
			P MIX Mixed-Use Development
			MNP Movement Network Planning
			WAK Walkability
			PED Pedestrian-Scale Design
			PDS Enhanced Pedestrian Environments
			CYC Cyclist Infrastructure
			BPK Bicycle Parking
			CYS Enhanced Cyclist Environments
			BSH Community Bicycle Share
			TRA Mass Transit Infrastructure
			TRN Mass Transit Support
			WAY Community Wayfinding
			PAS Physical Activity Spaces
			PRG Activity Programming
			PET Pet Support
0	0	0	TOTAL OPTIMIZATIONS

THERMAL COMFORT			
Y	?	N	
			P EXT Extreme Weather Warnings
			HET Urban Heat Adaptation: Community Support
			HPE Urban Heat Adaptation: Public Education
			CLD Urban Cold Adaptation: Community Support
			CPE Urban Cold Adaptation: Public Education
			HIM Urban Heat Island Mitigation
			VEG Urban Vegetation and Green Spaces
			WAT Urban Water Bodies
			SUN Personal Sun Exposure
0	0	0	TOTAL OPTIMIZATIONS

SOUND			
Y	?	N	
			P SOU Sound Planning
			SMP Community Sound Mapping
			PLN Planning for Acoustics
			ORD Noise Ordinance
			NLV Noise Level Limit
			HEA Hearing Health Education
0	0	0	TOTAL OPTIMIZATIONS

MATERIALS			
Y	?	N	
			P HWM Hazardous Waste Management
			WST Waste Stream Management
			REM Site Remediation and Redevelopment
			CRE Construction Remediation
			ODS Outdoor Structures
			PES Landscaping and Pesticide Use
			HAZ Hazard Communication
0	0	0	TOTAL OPTIMIZATIONS

MIND			
Y	?	N	
			P AMH Access to Mental Health Services
			CRI Mental Health Crisis Support
			ABU Substance Abuse and Addiction Services
			ARK Substance Abuse and Addiction Services for At-Risk Pop.
			ALC Alcohol Environment
			RDR Responsible Driving
			IPV Support for Victims of Interpersonal Violence
			SGR Integration of Streetscape Greenery
			CHI Outdoor Child Play Spaces
			GRE Restorative Green Spaces
			BLU Restorative Blue Spaces
			BLT Restorative Built Spaces
			SCE Preservation of Scenic Views
0	0	0	TOTAL OPTIMIZATIONS

SUMMARY			
Y	?	N	
0	0	0	Preconditions (10 possible)
0	0	0	Optimizations (100 pts possible)
0	0	0	Innovations (10 pts possible)
0	-	-	Certified buildings (30 pts possible)

COMMUNITY			
Y	?	N	
			P VIS Community Visioning
			HIA Health Impact Assessment Screening
			HII Health Impact Assessment Implementation
			SOC Social Spaces
			PUB Public Spaces
			SAN Sanitation
			CHW Community Health and Wellness
			CHR Community Health Resilience
			PR1 Access to Primary Health Care
			EDU Educational Opportunity
			HOU Fundamental Housing Quality
			EQU Housing Equity and Affordability
			DIG Digital Connectivity
			ENG Civic Engagement
			PRE Preservation and Rehabilitation
			CEL Celebration of Place
			ART Public Art
			SAF Community Confidence
			POC Post-Occupancy Surveys
0	0	0	TOTAL OPTIMIZATIONS

INNOVATION			
Y	?	N	
			○ GND Green Rating Systems
			○ INP Planning for Health
			○ INV Innovate WELL
			○ WLP WELL Accredited Professional
0	0	0	TOTAL OPTIMIZATIONS

CERTIFIED BUILDINGS			
0	0	0	
0			Points from health/wellness certified buildings (max 30)
0			Points from green certified buildings (max 10)
0			TOTAL POINTS FROM CERTIFIED BUILDINGS (MAX 30)

CHART 7 WELL certification matrix and concept icons. [13]

[13] WELL certification matrix and concept icons. Source: <https://www.wellcertified.com/>





[17]



[18]



[19]



[20]



[21]

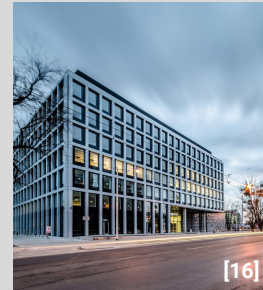
REFERENCE BUILDINGS



[14]



[15]



[16]

Name:	GREEN DAY		
Address:	Szczytnicka 9 Street, Wroclaw, Poland	Area:	21 588 sqm
Year of realisation:	2014	Class:	A
Certified:	LEED on July 07, 2014	Certification level:	Gold (71 points)
Architects:	Maćków Pracownia Projektowa		
Tenants:	Credit Suisse		

[14] Green Day, Wroclaw. Source: https://www.bryla.pl/bryla/1,85301,17359103,Biurowiec_Green_Day_we_Wroclawiu.html

[16] Green Day, Wroclaw. Source: <http://www.mackow.pl/projects/green-day-kopia-2/>

[17] Credit Suisse office, Green Day, Wroclaw. Source: <https://polska-org.pl/4523751,foto.html?idEntity=4523734>

[18] Credit Suisse office, Green Day, Wroclaw. Source: <https://polska-org.pl/4523752,foto.html?idEntity=4523734>

[19] [20] [21] Cyclist infrastructure, Green Day, Wroclaw. Source: <https://kolektyf.com/green-day-skanska/>

[15] Green Day, Wroclaw. Source: <https://foto-ml.pl/green-day>



REFERENCE BUILDINGS



[24]



[25]



[22]



[23]



[26]



[27]

Name:	NOWY TARG		
Address:	Pl. Nowy Targ 28, Wrocław, Poland	Area:	30 072 sqm
Year of realisation:	2019	Class:	A
Certified:	LEED on December 23, 2019	Certification level:	Platinum (81 points)
Architects:	Maćków Pracownia Projektowa		
Tenants:	SpyroSoft, Schaeffler, Tillberg Design of Sweden, Fresenius Netcare		

[22] Nowy Targ, Wrocław. Source: <http://www.mackow.pl/projects/nowy-targ/>

[24] Hall of Nowy Targ, Wrocław. Source: <http://www.mackow.pl/projects/nowy-targ/>

[26] Installation. Nowy Targ, Wrocław. Source: own photography [Paweł Kirschke]

[23] Nowy Targ, Wrocław. Source: <http://www.mackow.pl/projects/nowy-targ/>

[25] Patio. Nowy Targ, Wrocław. Source: own photography [Paweł Kirschke]

[27] Cyclist infrastructure. Nowy Targ, Wrocław. Source: own photography [Paweł Kirschke]



LEED SCORECARDS FOR GREEN DAY AND NOWY TARG

SUSTAINABLE SITES AWARDED: 23 / 28

Code	Description	Status
SSp1	Construction activity pollution prevention	REQUIRED
SS1	Site selection	1/1
SS2	Development density and community connectivity	5/5
SS3	Brownfield redevelopment	0/1
SS4.1	Alternative transportation - public transportation access	6/6
SS4.2	Alternative transportation - bicycle storage and changing rooms	2/2
SS4.3	Alternative transportation - low-emitting and fuel-efficient vehicles	3/3
SS4.4	Alternative transportation - parking capacity	2/2
SS5.1	Site development - protect or restore habitat	0/1
SS5.2	Site development - maximize open space	0/1
SS6.1	Stormwater design - quantity control	0/1
SS6.2	Stormwater design - quality control	1/1
SS7.1	Heat island effect - nonroof	1/1
SS7.2	Heat island effect - roof	0/1
SS8	Light pollution reduction	1/1
SS9	Tenant design and construction guidelines	1/1

WATER EFFICIENCY AWARDED: 10 / 10

Code	Description	Status
WEp1	Water use reduction	REQUIRED
WE1	Water efficient landscaping	4/4
WE2	Innovative wastewater technologies	2/2
WE3	Water use reduction	4/4

ENERGY & ATMOSPHERE AWARDED: 16 / 37

Code	Description	Status
Ep1	Fundamental commissioning of building energy systems	REQUIRED
Ep2	Minimum energy performance	REQUIRED
Ep3	Fundamental refrigerant Mgmt	REQUIRED
Ea1	Optimize energy performance	7/21
Ea2	On-site renewable energy	0/4
Ea3	Enhanced commissioning	2/2
Ea4	Enhanced refrigerant Mgmt	2/2
Ea5.1	Measurement and verification - base building	0/3
Ea5.2	Measurement and verification - tenant submetering	3/3
Ea6	Green power	2/2

MATERIAL & RESOURCES AWARDED: 6 / 13

Code	Description	Status
MRp1	Storage and collection of recyclables	REQUIRED
MR1	Building reuse - maintain existing walls, floors and roof	0/5
MR2	Construction waste Mgmt	2/2

MATERIAL & RESOURCES CONTINUED

MR3	Materials reuse	0/1
MR4	Recycled content	2/2
MR5	Regional materials	2/2
MR6	Certified wood	0/1

INDOOR ENVIRONMENTAL QUALITY AWARDED: 8 / 12

Code	Description	Status
Eqp1	Minimum IAQ performance	REQUIRED
Eqp2	Environmental Tobacco Smoke (ETS) control	REQUIRED
Eq1	Outdoor air delivery monitoring	1/1
Eq2	Increased ventilation	1/1
Eq3	Construction IAQ Mgmt plan - during construction	1/1
Eq4.1	Low-emitting materials - adhesives and sealants	1/1
Eq4.2	Low-emitting materials - paints and coatings	1/1
Eq4.3	Low-emitting materials - flooring systems	0/1
Eq4.4	Low-emitting materials - composite wood and agrifiber products	0/1
Eq5	Indoor chemical and pollutant source control	1/1
Eq6	Controllability of systems - thermal comfort	0/1
Eq7	Thermal comfort - design	0/1
Eq8.1	Daylight and views - daylight	1/1
Eq8.2	Daylight and views - views	1/1

INNOVATION AWARDED: 4 / 6

Id1	Innovation In design	1/1
Id2	LEED Accredited Professional	1/1

REGIONAL PRIORITY CREDITS AWARDED: 4 / 4

Ea1	Optimize energy performance	1/1
Ea3	Enhanced commissioning	0/1
Ea5.2	Measurement and verification - tenant submetering	0/1
WE1	Water efficient landscaping	1/1
WE2	Innovative wastewater technologies	1/1
WE3	Water use reduction	1/1

TOTAL 71 / 110

CHART 8 LEED scorecard for Green Day. [28]

SUSTAINABLE SITES AWARDED: 22 / 28

Code	Description	Status
SSp1	Construction activity pollution prevention	REQUIRED
SS1	Site selection	1/1
SS2	Development density and community connectivity	5/5
SS3	Brownfield redevelopment	1/1
SS4.1	Alternative transportation - public transportation access	6/6
SS4.2	Alternative transportation - bicycle storage and changing rooms	2/2
SS4.3	Alternative transportation - low-emitting and fuel-efficient vehicles	3/3
SS4.4	Alternative transportation - parking capacity	0/2
SS5.1	Site development - protect or restore habitat	0/1
SS5.2	Site development - maximize open space	1/1
SS6.1	Stormwater design - quantity control	0/1
SS6.2	Stormwater design - quality control	0/1
SS7.1	Heat island effect - nonroof	1/1
SS7.2	Heat island effect - roof	1/1
SS8	Light pollution reduction	0/1
SS9	Tenant design and construction guidelines	1/1

WATER EFFICIENCY AWARDED: 10 / 10

Code	Description	Status
WEp1	Water use reduction	REQUIRED
WE1	Water efficient landscaping	4/4
WE2	Innovative wastewater technologies	2/2
WE3	Water use reduction	4/4

ENERGY & ATMOSPHERE AWARDED: 26 / 37

Code	Description	Status
Ep1	Fundamental commissioning of building energy systems	REQUIRED
Ep2	Minimum energy performance	REQUIRED
Ep3	Fundamental refrigerant Mgmt	REQUIRED
Ea1	Optimize energy performance	14 / 21
Ea2	On-site renewable energy	0/4
Ea3	Enhanced commissioning	2/2
Ea4	Enhanced refrigerant Mgmt	2/2
Ea5.1	Measurement and verification - base building	3/3
Ea5.2	Measurement and verification - tenant submetering	3/3
Ea6	Green power	2/2

MATERIAL & RESOURCES AWARDED: 6 / 13

Code	Description	Status
MRp1	Storage and collection of recyclables	REQUIRED
MR1	Building reuse - maintain existing walls, floors and roof	0/5
MR2	Construction waste Mgmt	2/2

MATERIAL & RESOURCES CONTINUED

MR3	Materials reuse	0/1
MR4	Recycled content	2/2
MR5	Regional materials	2/2
MR6	Certified wood	0/1

INDOOR ENVIRONMENTAL QUALITY AWARDED: 7 / 12

Code	Description	Status
Eqp1	Minimum IAQ performance	REQUIRED
Eqp2	Environmental Tobacco Smoke (ETS) control	REQUIRED
Eq1	Outdoor air delivery monitoring	0/1
Eq2	Increased ventilation	1/1
Eq3	Construction IAQ Mgmt plan - during construction	1/1
Eq4.1	Low-emitting materials - adhesives and sealants	1/1
Eq4.2	Low-emitting materials - paints and coatings	1/1
Eq4.3	Low-emitting materials - flooring systems	1/1
Eq4.4	Low-emitting materials - composite wood and agrifiber products	0/1
Eq5	Indoor chemical and pollutant source control	0/1
Eq6	Controllability of systems - thermal comfort	0/1
Eq7	Thermal comfort - design	1/1
Eq8.1	Daylight and views - daylight	0/1
Eq8.2	Daylight and views - views	1/1

INNOVATION AWARDED: 6 / 6

Id1	Innovation In design	1/1
Id2	LEED Accredited Professional	1/1

REGIONAL PRIORITY CREDITS AWARDED: 4 / 4

Ea1	Optimize energy performance	0/1
Ea3	Enhanced commissioning	0/1
Ea5.2	Measurement and verification - tenant submetering	1/1
WE1	Water efficient landscaping	1/1
WE2	Innovative wastewater technologies	1/1
WE3	Water use reduction	1/1

TOTAL 81 / 110

CHART 9 LEED scorecard for Nowy Targ. [29]

[28] LEED scorecard for Green Day. Source: <https://www.usgbc.org/projects/green-day?view=overview>

[29] LEED scorecard for Nowy Targ. Source: <https://www.usgbc.org/projects/nowy-targ>



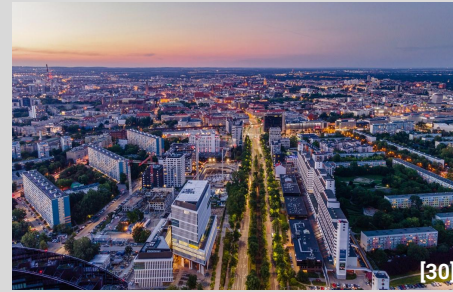
REFERENCE BUILDINGS



[32]



[33]



[30]



[31]



[34]

CENTRUM POŁUDNIE phase 1

Name:			
Address:	Powstańców Śląskich Street, Wrocław, Poland	Area:	36 217 sqm
Year of realisation:	2020	Class:	A
Certified:	LEED in October, 2018 (pre-certified) WELL (candidate) WELL Health-Safety Rating (2021)	Certification level:	Platinum (LEED pre-certified)
Architects:	APA Wojciechowski		
Tenants:	Coventry University, AmRest, Nexontis Solutions		

[30] Centrum Południe phase 1, Wrocław. Source: <https://www.skanska.pl/oferta/biura/nasza-oferta/wroclaw/centrum-poludnie/>

[31] Centrum Południe phase 1, Wrocław. Source: own photography [Pawel Kirschke]

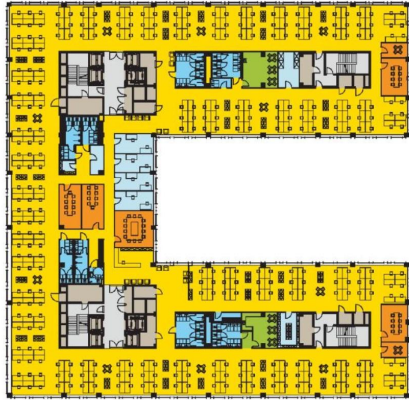
[32] Hall of Centrum Południe phase 1, Wrocław. Source: https://www.propertydesign.pl/design/185/centrum_poludnie_od_srodka_zagladamy_do_ekologicznego_biurowca_we_wroclawiu,32431.html

[33] Hall of Centrum Południe phase 1, Wrocław. Source: https://www.propertydesign.pl/design/185/centrum_poludnie_od_srodka_zagladamy_do_ekologicznego_biurowca_we_wroclawiu,32431.html

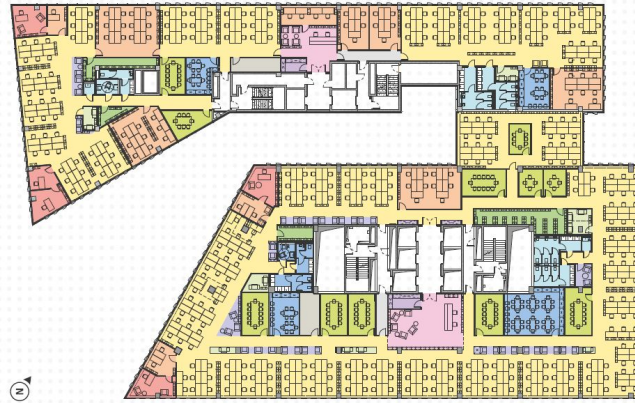
[34] Green concrete. Centrum Południe phase 1, Wrocław. Source: <https://biznes.wprost.pl/galeria/14273/7/centrum-poludnie.html>

REFERENCE BUILDINGS PLANS

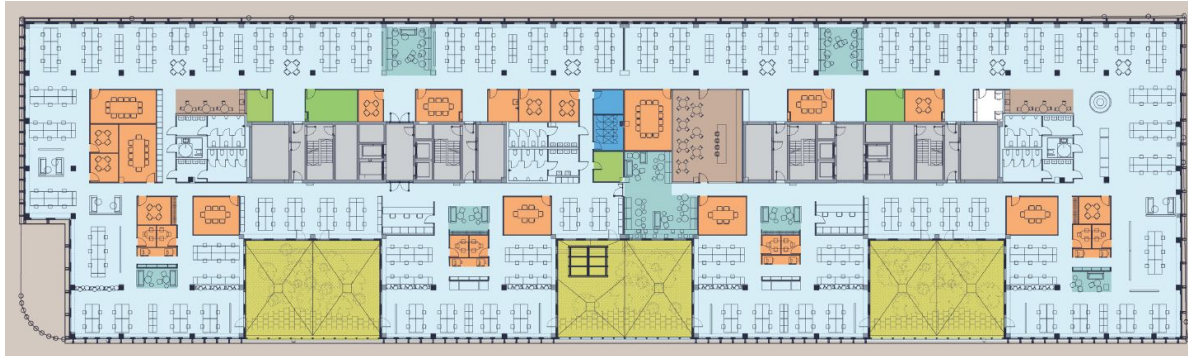
GREEN DAY



CENTRUM POŁUDNIE phase 1



NOWY TARG



GREEN DAY

Project: Maćków Pracownia Projektowa

CENTRUM POŁUDNIE phase 1

Project: APA Wojciechowski

NOWY TARG

Project: Maćków Pracownia Projektowa

CHART 10 Green Day

- an exemplary layout of a typical floor. [35]

CHART 11 Centrum Południe phase 1

- an exemplary layout of a typical floor. [36]

CHART 12 Nowy Targ

- an exemplary layout of a typical floor. [37]

[35] Green Day - an exemplary layout of a typical floor. Source: *Green Day brochure*, Skanska, 2014. https://issuu.com/skanskapropertypl/docs/green_day_pl

[36] Centrum Południe phase 1 - an exemplary layout of a typical floor. Source: *Centrum Południe brochure*, Skanska, 2020. <https://www.skanska.pl/oferta/biura/nasza-oferta/wroclaw/centrum-poludnie/>

[37] Nowy Targ - an exemplary layout of a typical floor. Source: *Nowy Targ brochure*, Skanska, 2019. <https://www.skanska.pl/oferta/biura/nasza-oferta/wroclaw/nowy-targ/>



REFERENCE BUILDINGS COMPARISON

CHART 13 Comparison of reference buildings connected with occupants' health and well-being. [38]

	GREEN DAY	NOWY TARG	CENTRUM POŁUDNIE 1
Criteria fulfilled for class A	+	+	+
Area / Storeys	21 588 sqm / 6+2	30 072 sqm / 7+2	36 217 sqm / 15+2
Certificates (year)	LEED GOLD (2014)	LEED Platinum (2019)	LEED Platinum (pre-certified 2018), WELL (candidate), WELL Health-Safety Rating
Access to Natural Light	75%	no information	95%
Enhanced Pedestrian Environments		Green spaces	Green (self-cleaning) concrete
Urban Vegetation and Green Spaces	green roof	patios and terraces	open air spaces - 25% of complex
Urban Heat Island Mitigation		Sunlight Reflecting Elements	Sunlight Reflecting Elements
Periodic Water Quality Testing			+
Chilled Beams Air Conditioning		+	+
Cyclist Infrastructure	+	+	+
Obtaining and Saving Energy	Renewable sources	Renewable sources	100% from dedicated renewable sources - wind farm on the roof
Storm and Overflow Water Management	Water-saving fittings	Water-saving fittings	Water-saving fittings, grey and rain water system

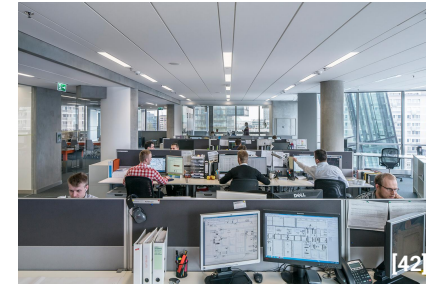
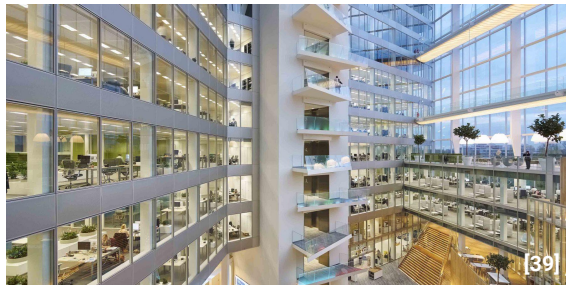
[38] Comparison of reference buildings connected with occupants' health and well-being. Source: own study based on <https://www.wellcertified.com/> and Investors materials.



1 **Health benefits**, especially connected with **sense of safety** should be a priority in the design and operations.

2 **WELL Building Standard** as a tool to improve health and well-being has the potential to be the certificate of the future.

3 International WELL Building Institute act rapidly on current events by creating a strategy to fight the spread of COVID-19 - **WELL Health-Safety Rating**.



[39] Deloitte office, The Edge, Amsterdam. Source: <https://www.avex-int.com/nl/en/deloitte-the-edge-smartest-building/>

[40] SpyroSoft office, Nowy Targ, Wrocław. Source: own photography [Pawel Kirschke]

[41] The ASID office gained Platinum certifications from both WELL and LEED. Source: <https://www.terramai.com/blog/examples-well-certified-buildings/>

[42] Buro Happold office, Warsaw - first WELL certification in Poland. Source: <https://www.burohappold.com/news/burohappold-engineering-unveils-new-healthy-office-warsaw/>

