

A photograph of a woman with long dark hair, wearing a black turtleneck and glasses on her head, smiling and resting her chin on her hand. She is sitting at a table with a man in a checkered shirt and tie, who is leaning over and looking at a document. The background shows other people in a conference room setting. A yellow starburst graphic is in the top right corner.

AIA

Leadership Summit

February 24–26, 2025
Washington, DC

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Questions related to specific products and services may be addressed at the conclusion of this presentation.

ESG & The Built Environment

What Does it Mean for Practitioners ?

VIKKI LEW *AIA RIBA LEED AP WELL AP EDAC CFAESG*

Chair, Sustainability Committee | AIA International

Chair, COTE | AIA Hong Kong

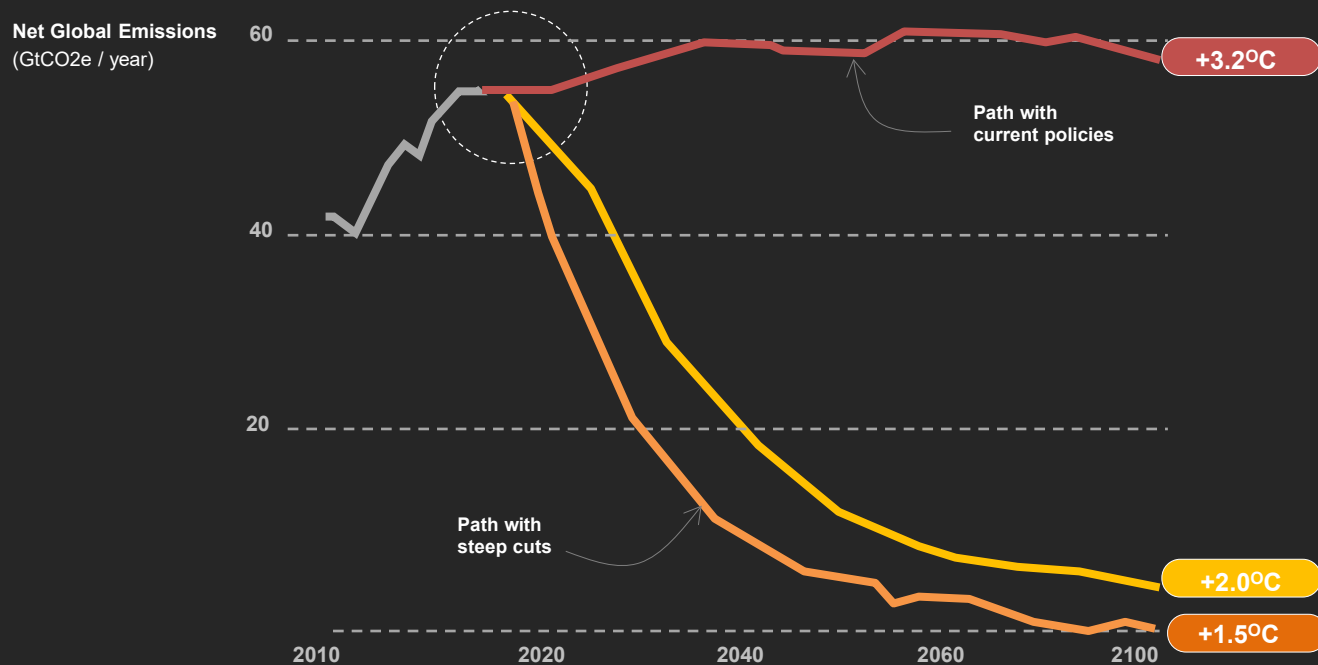


AIA
Leadership Summit



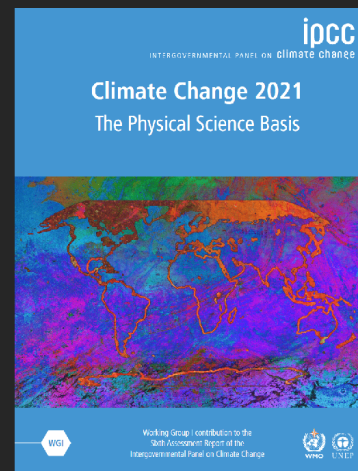
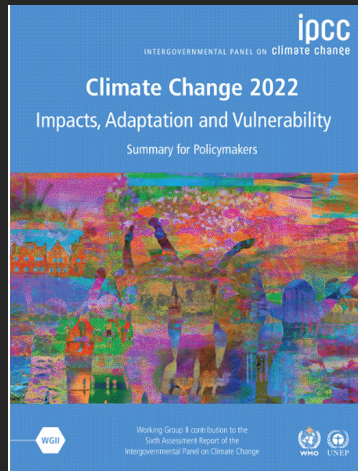
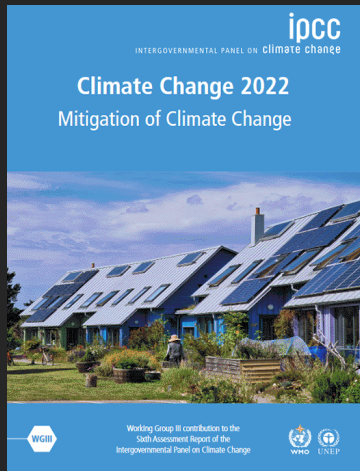
Climate Urgency

Where We Are



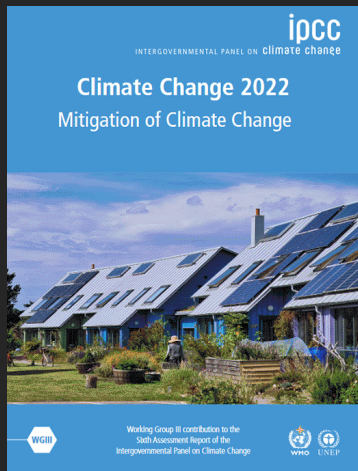
Built Environment

IPCC AR6

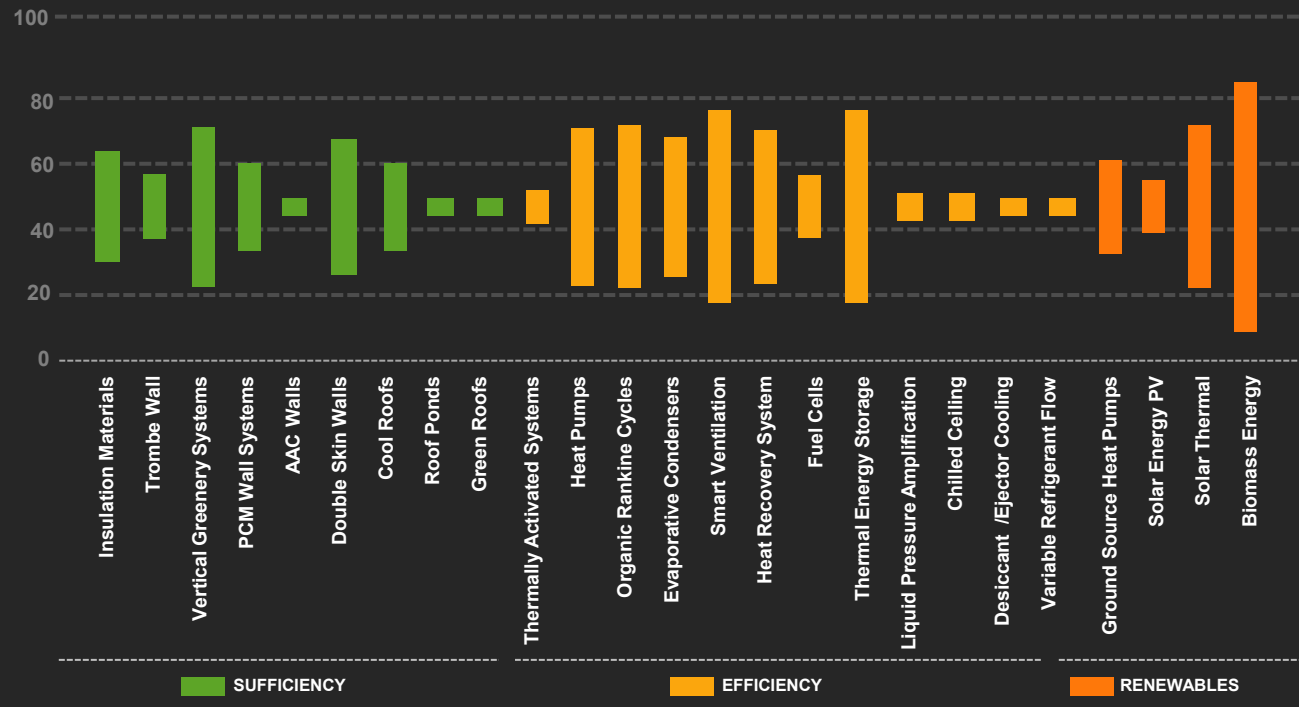


Built Environment

IPCC AR6 - Buildings

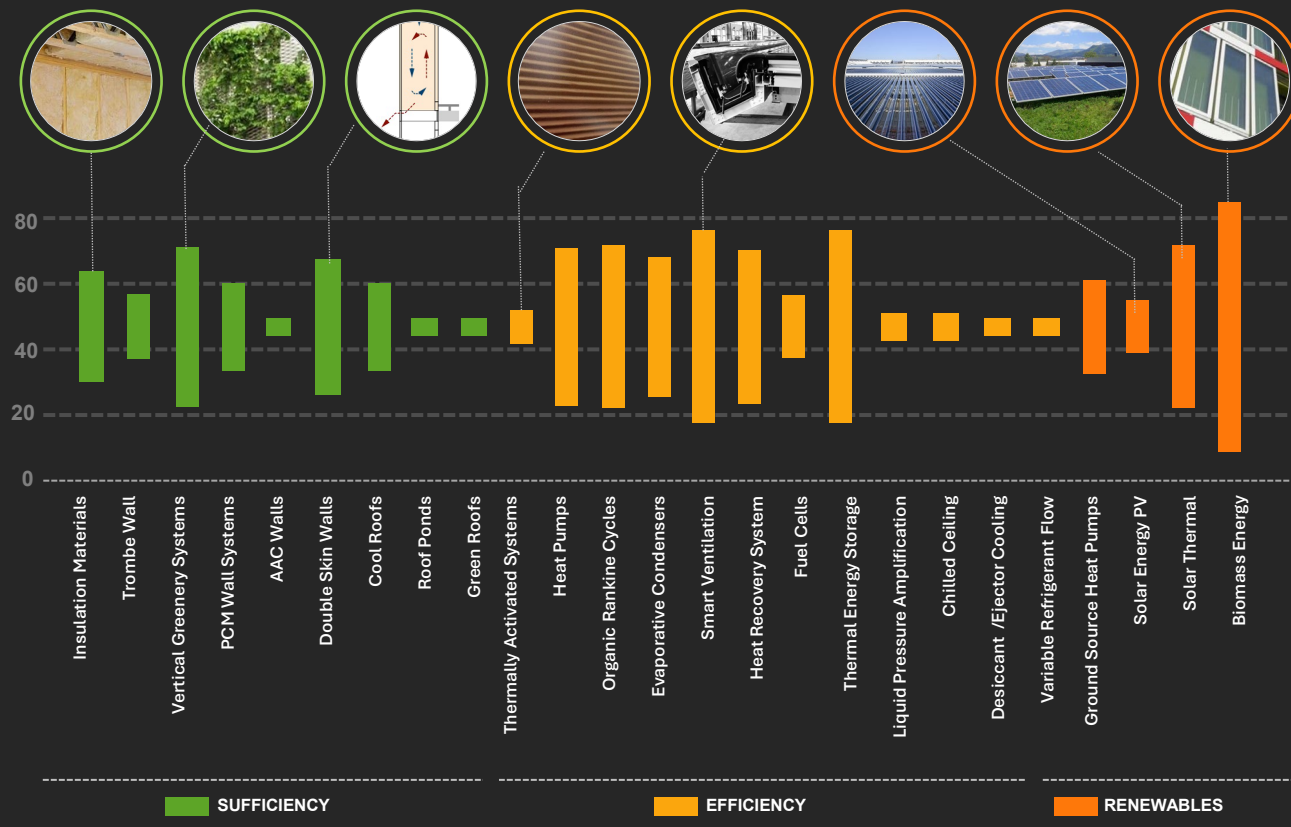
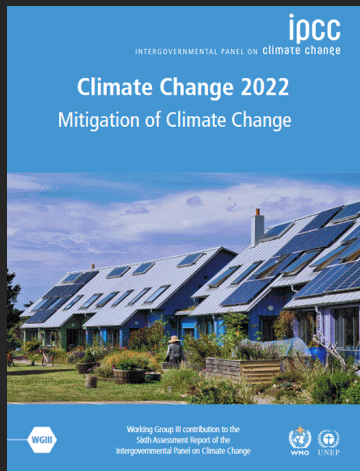


Source: IPCC Sixth Assessment Report
Working Group III: Mitigation of Climate Change
Figure 9.11. Energy savings potential of technology strategies
for climate change mitigation in buildings.



Built Environment

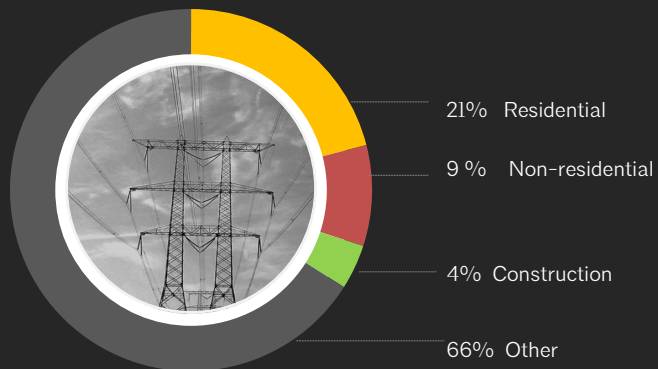
IPCC AR6 – Energy



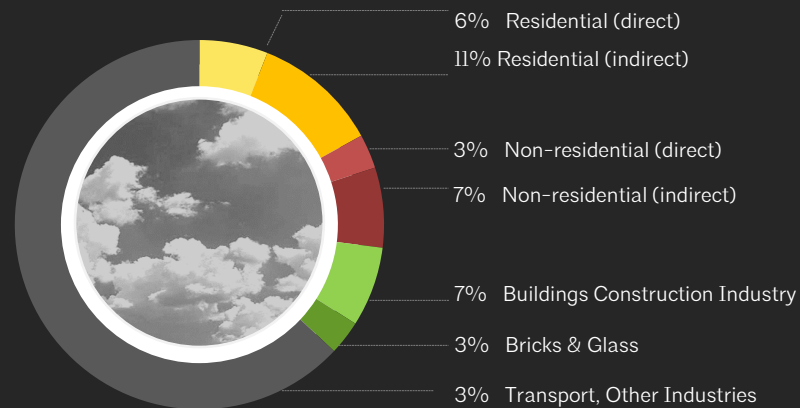
Source: IPCC Sixth Assessment Report
Working Group III: Mitigation of Climate Change
Figure 9.11. Energy savings potential of technology strategies
for climate change mitigation in buildings.

Built Environment

Why Buildings



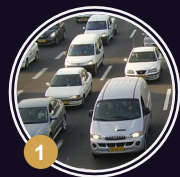
ENERGY DEMAND BY SECTOR 2022



EMISSIONS BY SECTOR 2022

CLIMATE STABILIZATION WEDGES

Feasible with Existing Technology



1

Efficient vehicles



2

Reduced vehicle use



3

Efficient buildings



4

Efficient baseload coal plant



5

Gas power coal plant



6

Coal plant CO2 capture



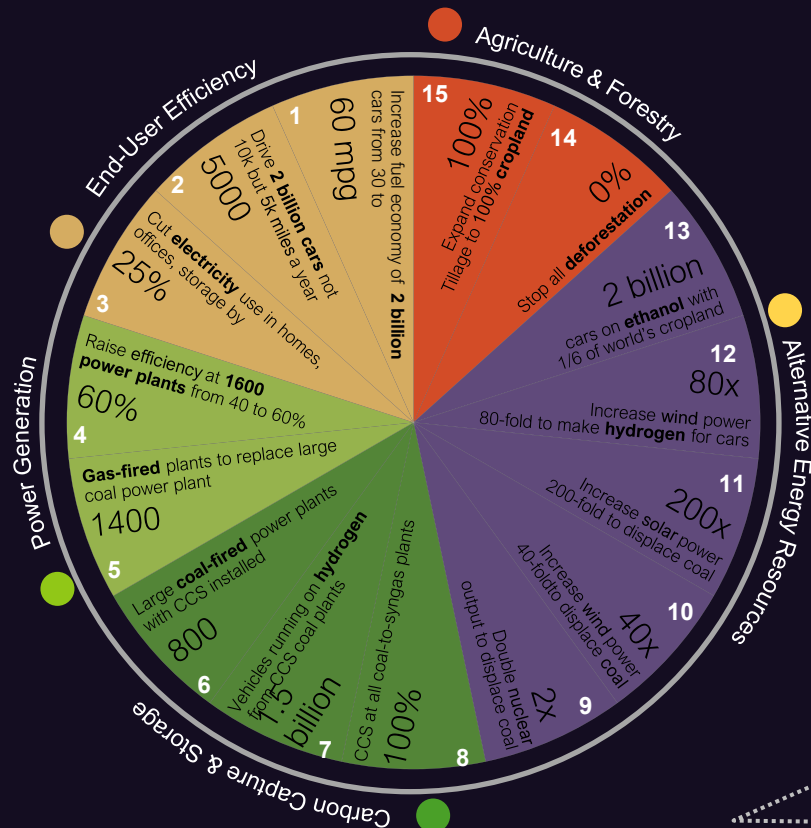
7

H2 plant CO2 capture



8

Synfuel plant CO2 capture



14

No deforestation.



15

Conservation tillage



12

Wind H2 in fuel cell cars



13

Biomass for fossil fuel



10

Wind power for coal power



11

Solar for coal power



9

Nuclear power for coal power

Source: S. Pacala & R. SOCOLOW
Princeton Carbon Mitigation Initiative

ESG – Environment Social Governance

Non-Financial Matters



ENVIRONMENTAL

SOCIAL

GOVERNANCE

Climate Change	Natural Resources	Pollution & Waste	Environmental Opportunity	Human Capital	Product Liability	Stakeholder Opposition	Social Opportunities	Corporate Governance	Corporate Behaviour
Greenhouse Gas Emissions	Water Stress	Toxic Emission & Waste	Opportunities in Clean Tech	Labour Management	Product Safety & Quality	Controversial Sourcing	Access to Communication	Board Diversity	Business Ethics
Product Carbon Footprint	Biodiversity & Land Use	Packaging Material & Waste	Opportunities in Green Building	Health & Safety	Responsible Investment	Community Relation	Access to Finance	Executive Pay	Anti-Competitive Practice
Financing Environmental Impact	Raw Material Sources	Electronic Waste	Opportunities in Renewable Energy	Human Capital Development	Financial Product Safety		Access to Health Care	Ownership	Corruption & Instability
Climate Change Vulnerability				Supply Chain Labor Standards	Privacy & Data Security		Opportunities in Health	Accounting	Tax Transparency

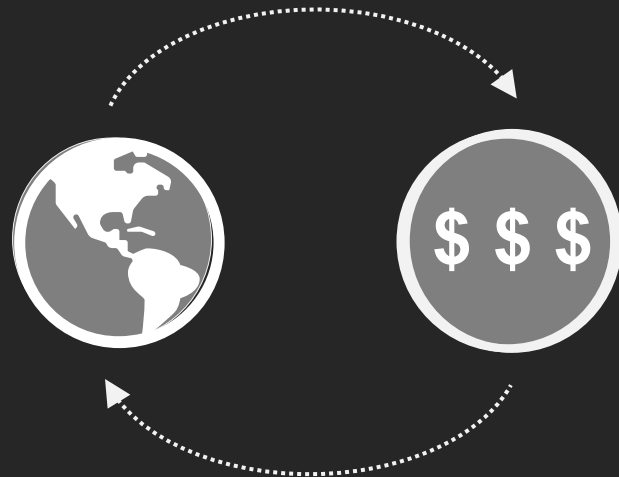
Source: MSCI, PWC

ESG – Environment Social Governance

Materiality



SINGLE MATERIALITY



DOUBLE MATERIALITY

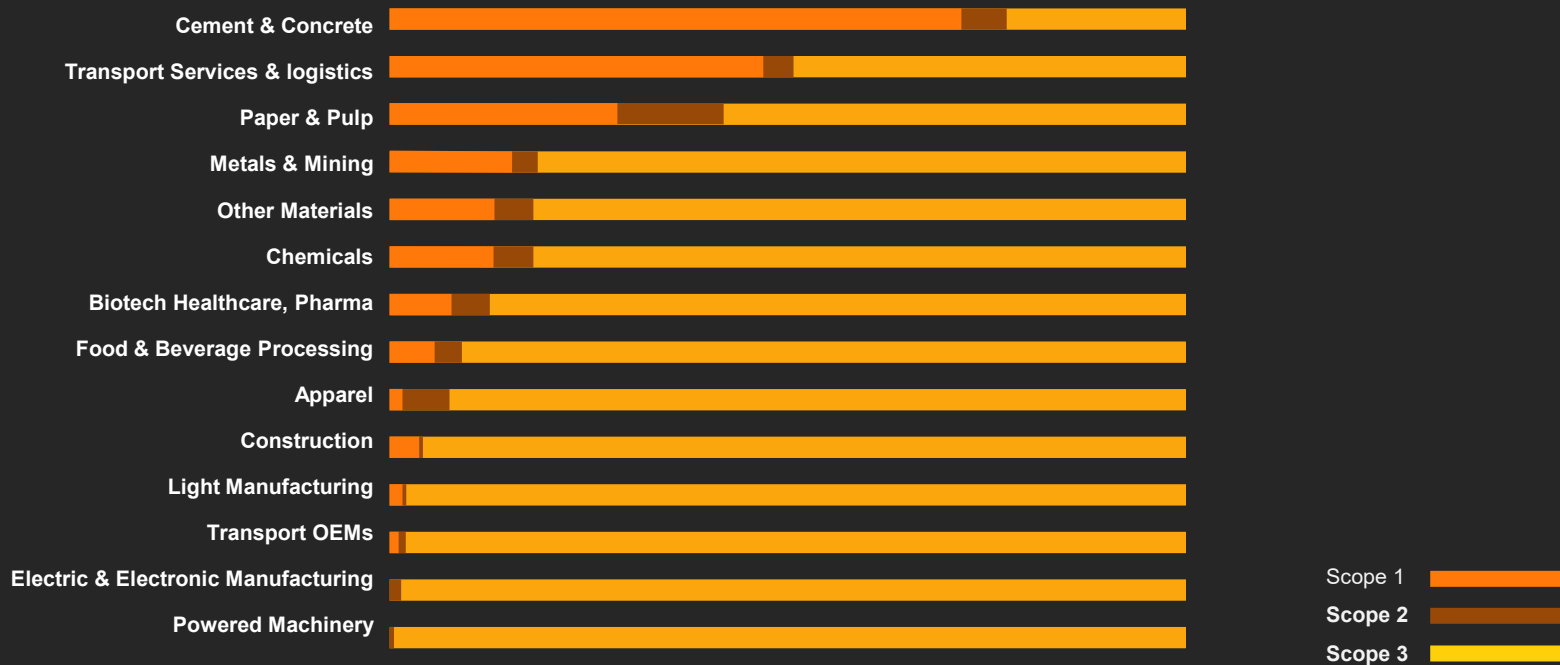
ESG Disclosures

Global Movement



Sustainability Reporting

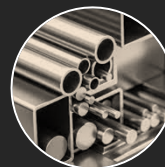
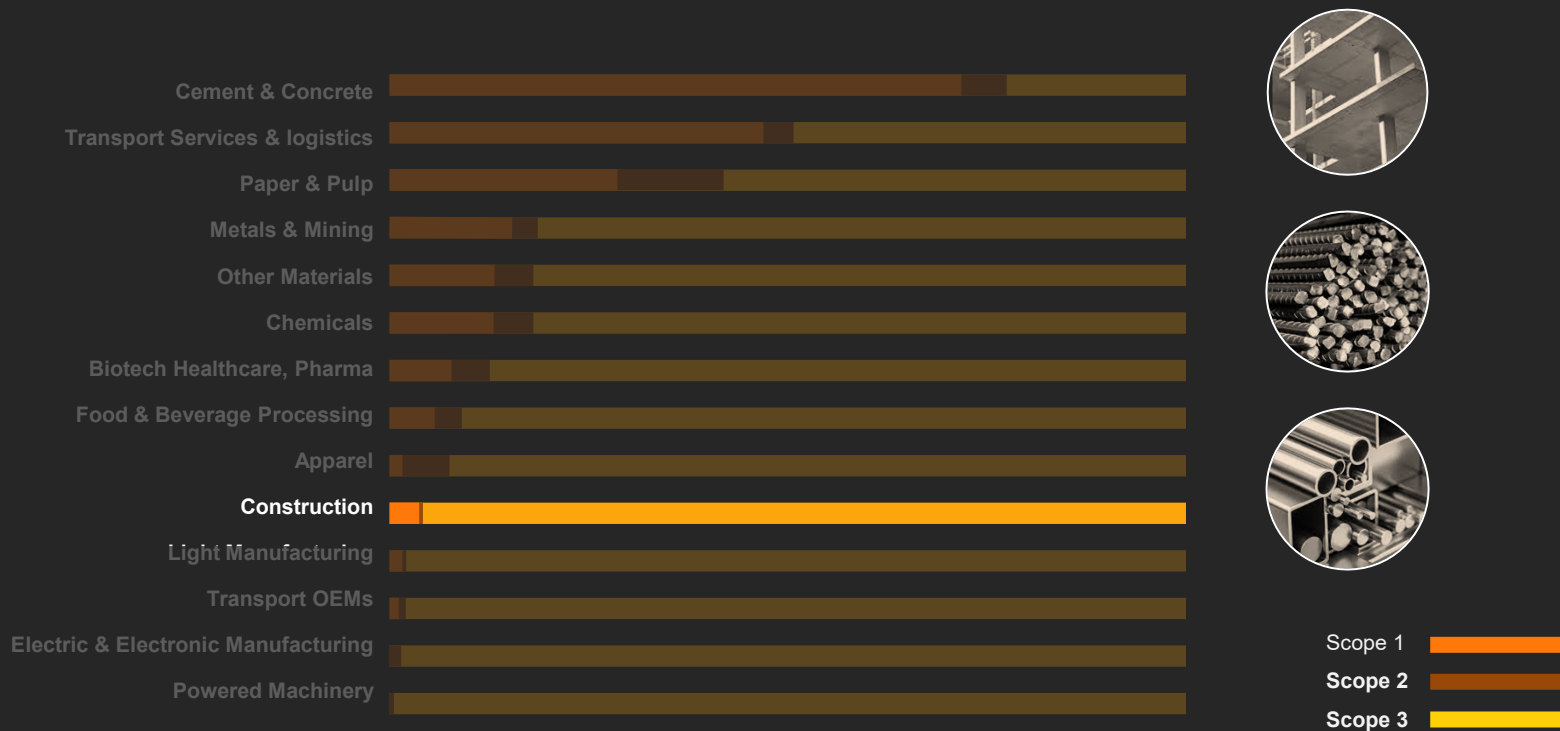
Value Chain Emissions



Source: CDP Technical Note: Relevance of Scope 3 Categories by Sector

Sustainability Reporting

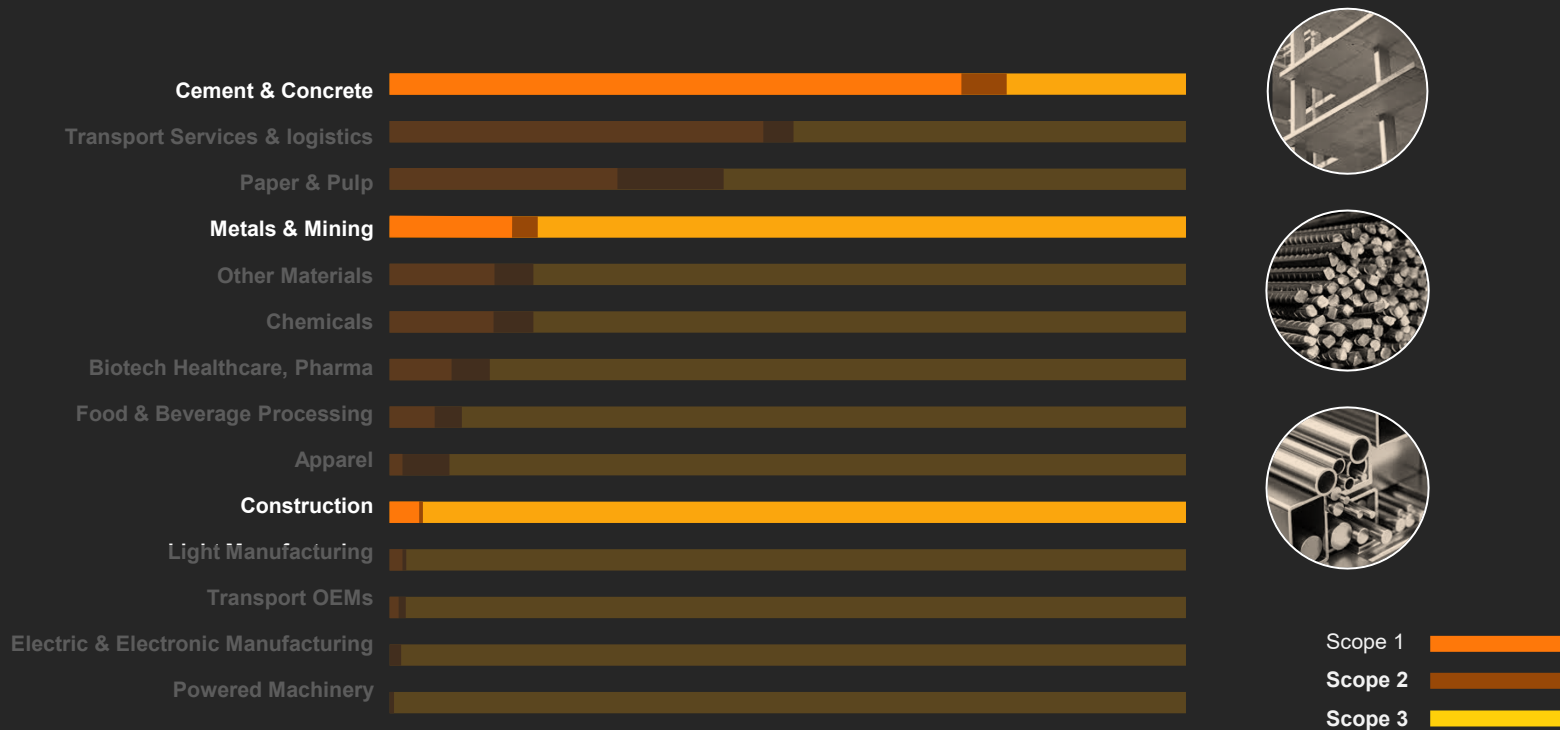
Value Chain Emissions



Source: CDP Technical Note: Relevance of Scope 3 Categories by Sector

Sustainability Reporting

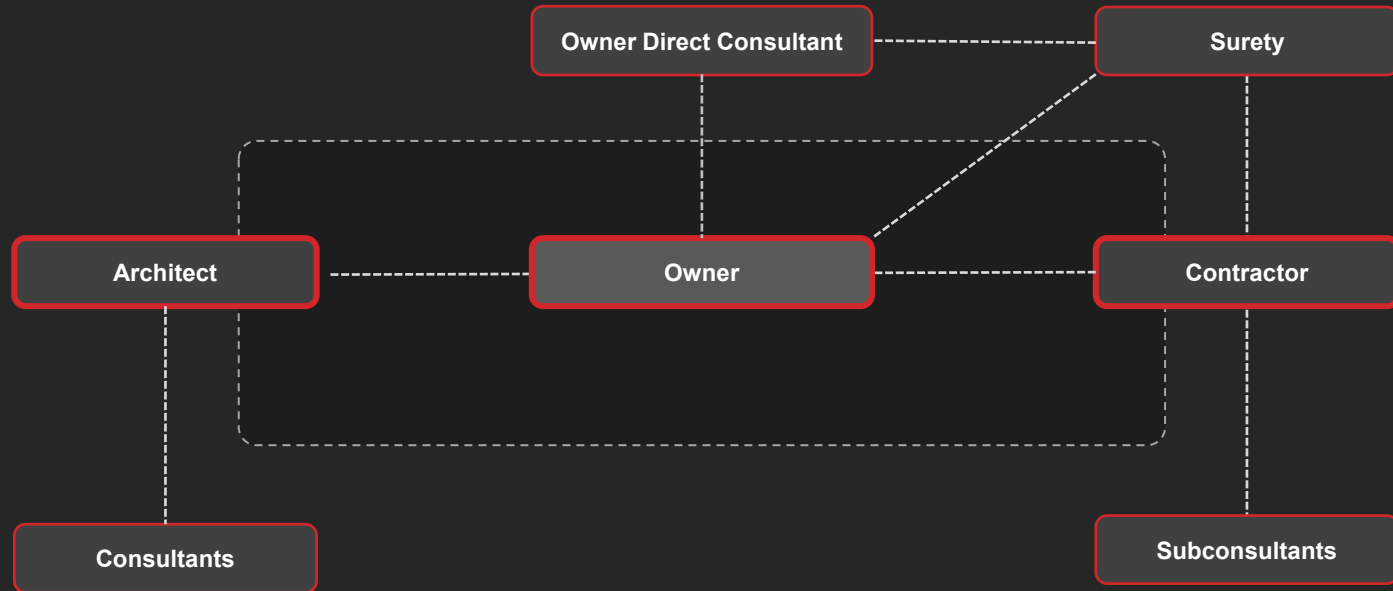
Value Chain Emissions



Source: CDP Technical Note: Relevance of Scope 3 Categories by Sector

Contract Relation

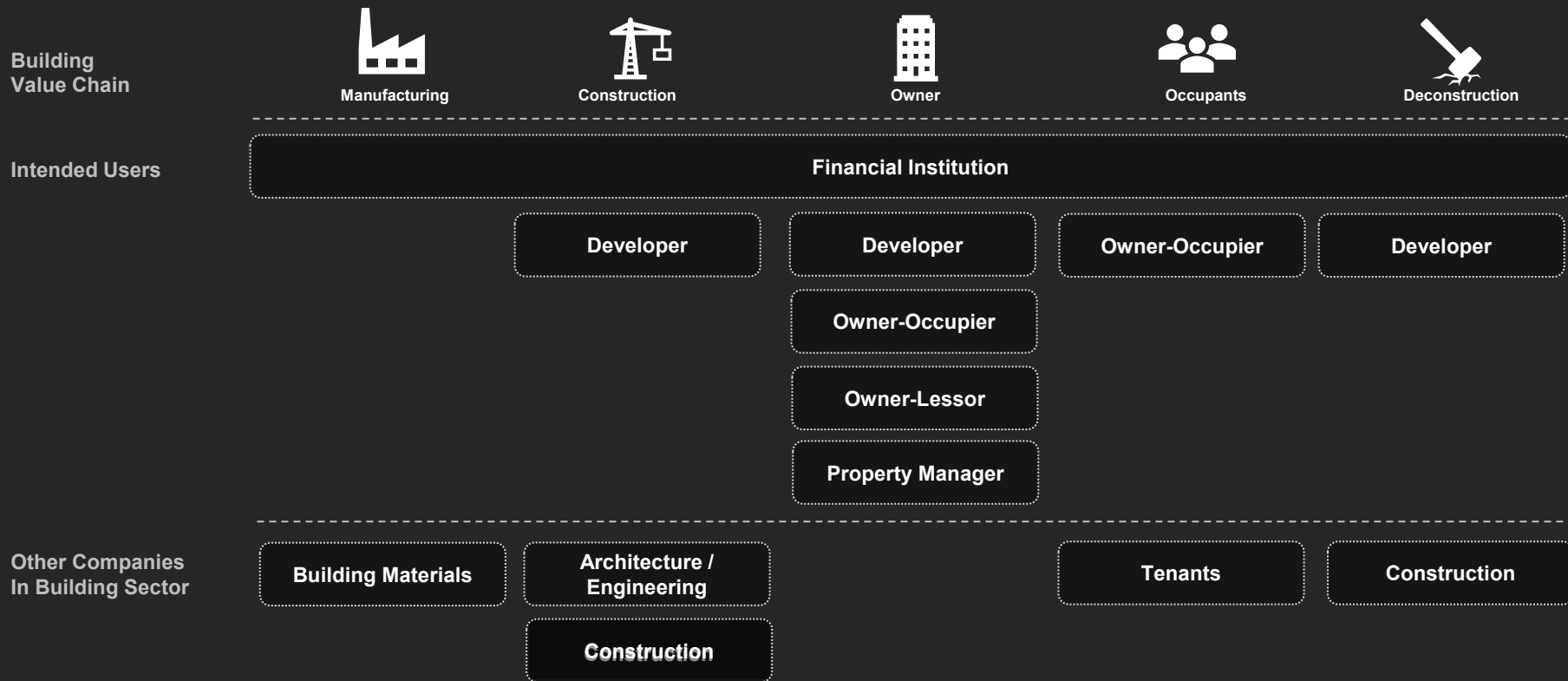
Design-Bid-Build



A201 General Condition

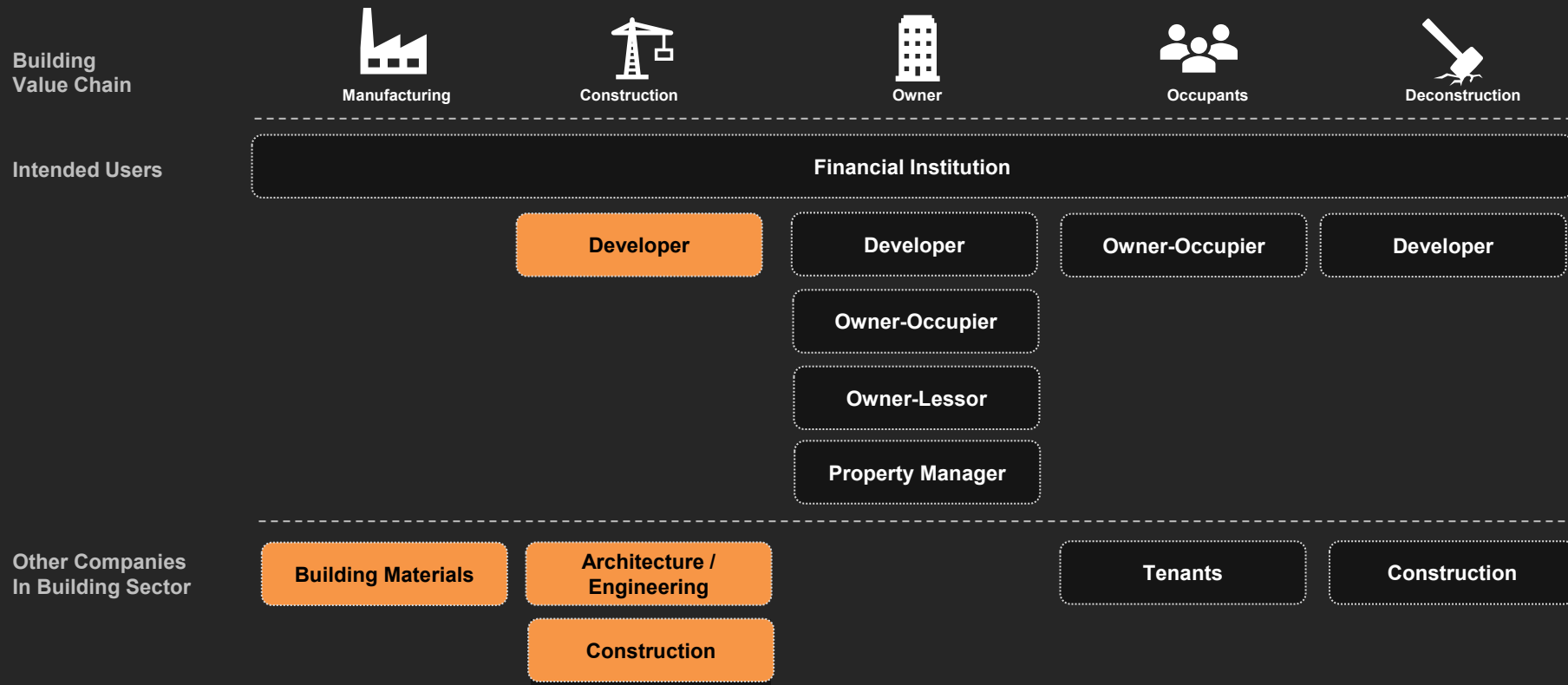
Building Sector Value Chain

SBTi



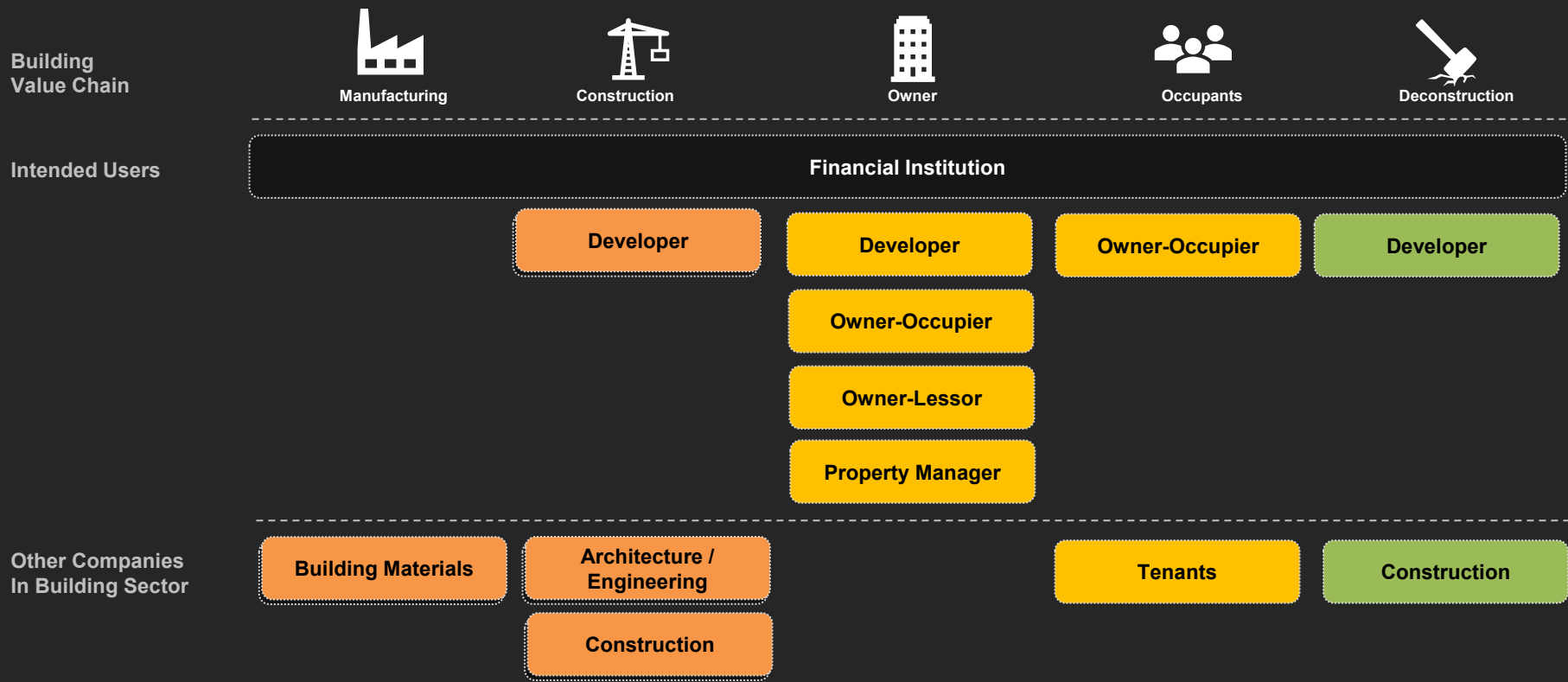
Building Sector Value Chain

SBTi



Building Sector Value Chain

SBTi



Source: Intended Users Within the Buildings Value Chain.
Buildings Sector Science-Based Target Setting Criteria (2024)

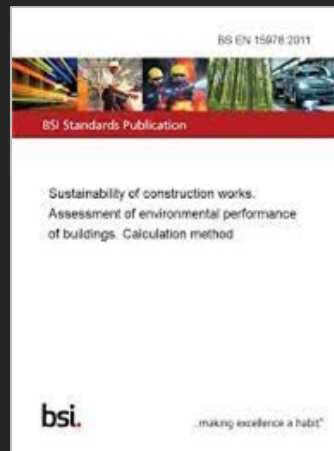
Building Emissions

Life Cycle Stages

BS EN 15978:2011

Sustainability of construction works.

Assessment of environmental performance of buildings. Calculation method



**[A1 - A3]
Product
Stage**



**[A4 - A5]
Construction
Stage**



**[B]
Use Stage**



**[C]
End of Life**



**[D]
Beyond
Life Cycle**

Embodied Impact

A1

Raw Materials Supply

A2

Transport

A3

Manufacturing

A4

Transport

A5
Construction &
Installation Process

B1

Use

B2

Maintenance

B3

Repair

B4

Replacement

B5

Refurbishment

C1
Deconstruction
/ Demolition

C2

Transport

C3

Waste Processing

C4

Disposal

Circularity

Reuse, Recovery

Recycling Potential

Operational Impact

B6

Operational Energy

B7

Operational Water

Building Emissions

Embodied Carbon



100%

Carbon Production Potential

Building nothing

Build less

Build clever

Optimize material usage and design

Build efficiently

Use low carbon construction

0%

Planning

Design

Construction

Operation & Maintenance

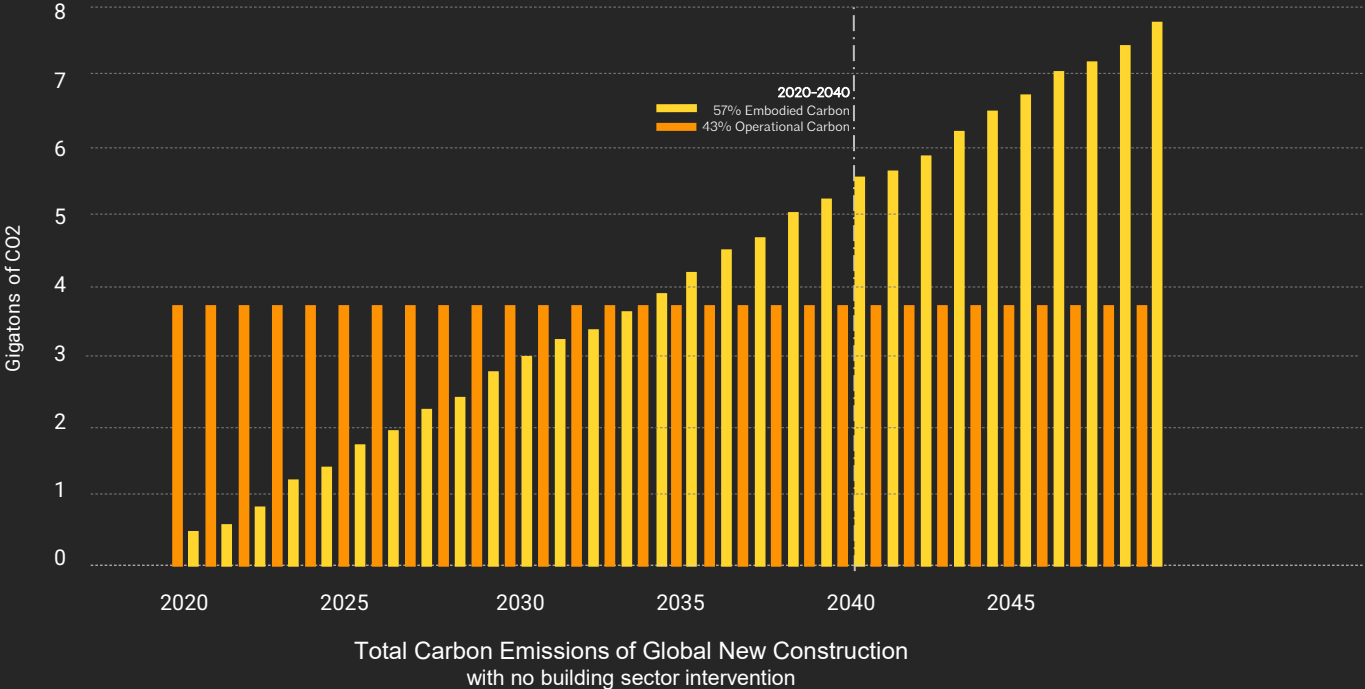
Opportunities to reduce embodied carbon

Building Emissions

Life Cycle Impact

Embodied Carbon

Operational Carbon



Buildings



?



ESG



AIA
Leadership Summit



Standards & Methodologies

ESG & Buildings

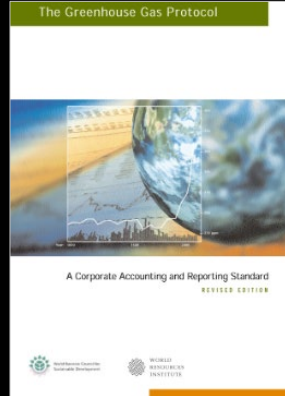


Sustainability Disclosure

IFRS S1
General Sustainability-related Disclosures

IFRS S2
Climate-related Disclosures

ISSB

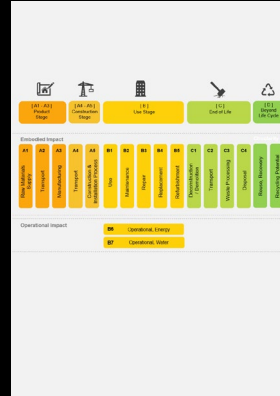


Carbon Accounting

Greenhouse Gas Protocol

Corporate Value Chain
(Scope 3) Standards

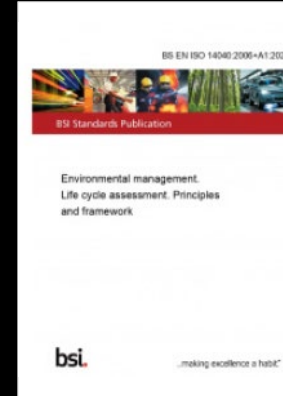
WRCSD / WRI



Building Calculation Method

ISO 14040
Environmental Management
Life Cycle Assessment
Principles & Framework

ISO



Life Cycle Assessment

ISO 14040
Environmental Management
Life Cycle Assessment
Principles & Framework

ISO



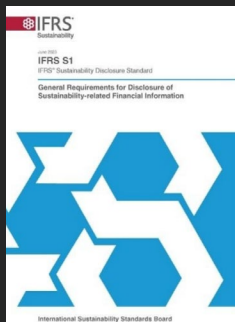
Green Building Certification

LEED v5
New Construction
Core and Shell
Commercial Interiors
Existing Buildings

USGBC

IFRS ESG Standards

Sustainability Disclosure



IFRS S1 - General Sustainability-related Disclosures

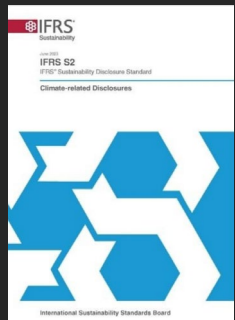


Fair & Impartial Information,
compare with **industry and regional peers**.

Sustainability-related
risks and opportunities

Value chain, financing, geographic footprint,
geopolitical and regulatory environments

Simultaneous disclosure of financial
and sustainability information.



IFRS S2 - Climate-related Disclosures



Governance of climate-related risks

Risk management processes of
climate-related risks and assessment

Climate risk exposure
Effect on business model and cash flow

Greenhouse gas exposure
Industry-specific disclosure

Sector Specific Metrics

Sustainability Disclosure



IFRS S2 - Climate-related Disclosures

Real Estate



Engineering &
Construction

Industry-based Disclosure Requirements

Energy Consumed

baseline, tenant,
whole building

Renewable Energy

renewable
percentage

Water Management

water withdrawal
risk mitigation

Climate Change Adaptation

exposure risk

Tenant Sustainability

submetering
& incentives

Projects Environmental Impact

code, regulations
standards

Structural Integrity & Safety

defects & safety
incidents

Life Cycle Impact of Buildings

energy, water,
certification

Climate Impact of Business Mix

climate mitigation
renewable

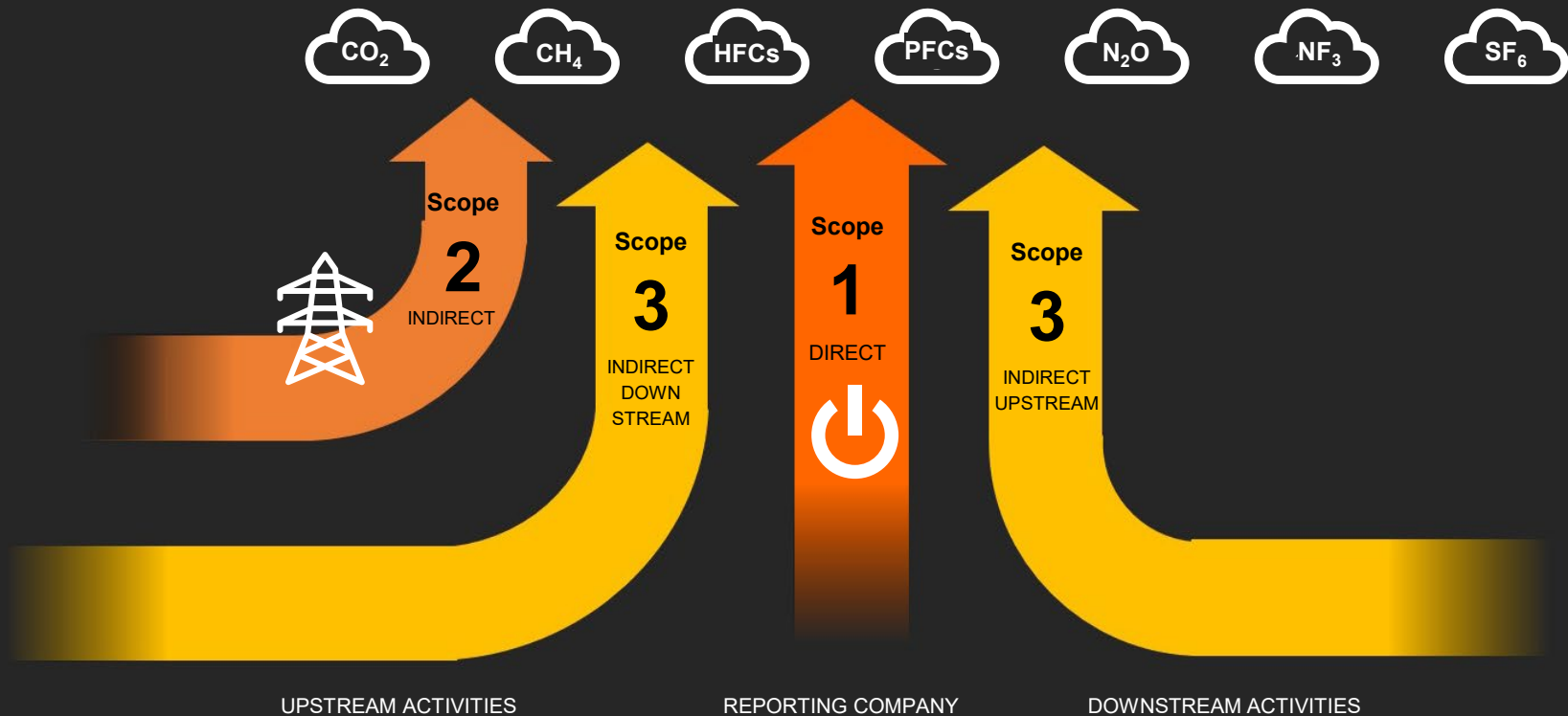
Activity Metrics

active and
commissioned
projects

IFRS S2 - Climate-related Disclosures
Appendix B, Industry-based
Disclosure Requirements
*Volume B33 - Engineering & Construction
Services (ISSB, 2023)*
Volume B36 Real Estate (ISSB, 2022)

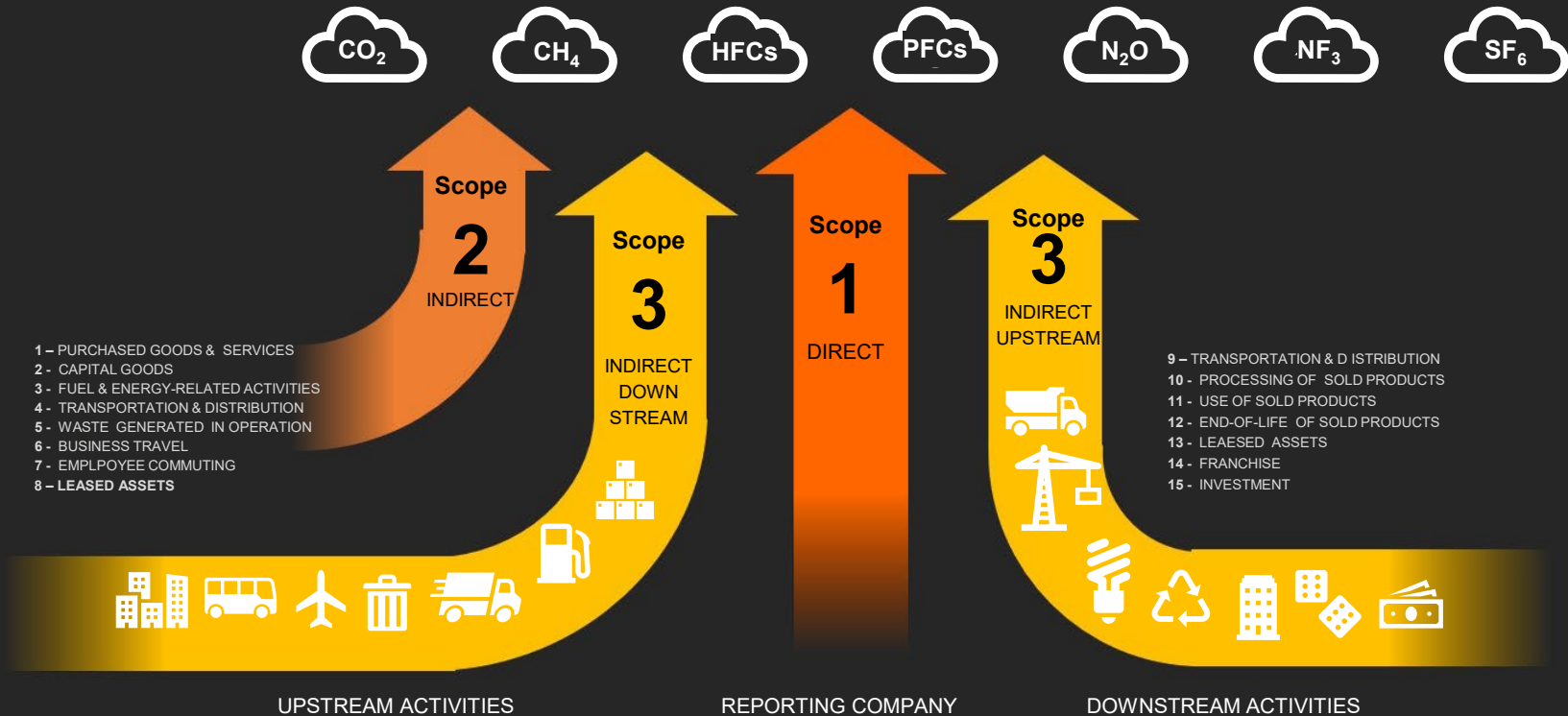
GHG Protocol Scope 1 & 2

Carbon Accounting



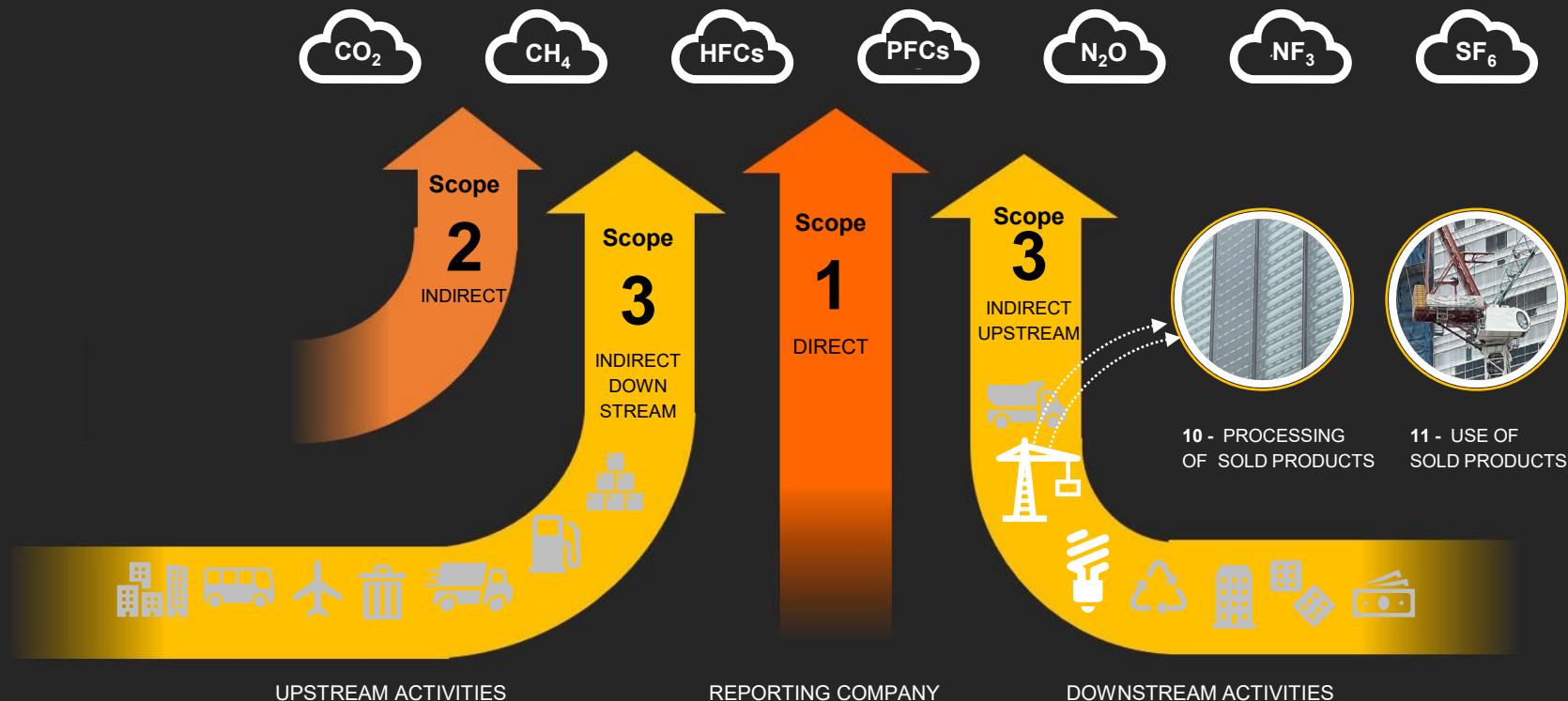
GHG Protocol Scope 3 Value Chain

Carbon Accounting



GHG Protocol Scope 3 Building Impact

Carbon Accounting



Building Emissions

Operational Carbon

BS EN 15978

Sustainability of construction works.
Assessment of environmental performance
of buildings. Calculation method



[A1 - A3]
Product
Stage



[A4 - A5]
Construction
Stage



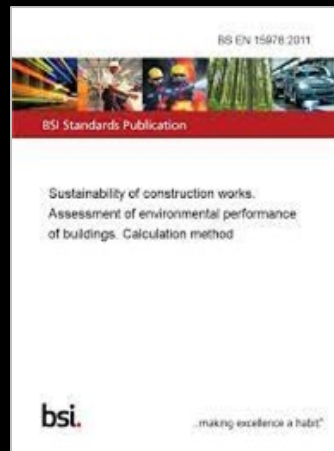
[B]
Use Stage



[C]
End of Life



[D]
Beyond
Life Cycle



Embodied Impact



Circularity

Operational Impact

B6 Operational Energy

B7 Operational Water

Building Emissions

Operational Carbon

BS EN 15978

Sustainability of construction works.
Assessment of environmental performance
of buildings. Calculation method



[A1 - A3]
Product
Stage



[A4 - A5]
Construction
Stage



[B]
Use Stage



[C]
End of Life



[D]
Beyond
Life Cycle

Embodied Impact

A1

Raw Materials
Supply

A2

Transport

A3

Manufacturing

A4

Transport

A5

Construction &
Installation Process

B1

Use

B2

Maintenance

B3

Repair

B4

Replacement

B5

Refurbishment

C1

Deconstruction
/ Demolition

C2

Transport

C3

Waste Processing

C4

Disposal

Reuse, Recovery

Recycling Potential

Circularity

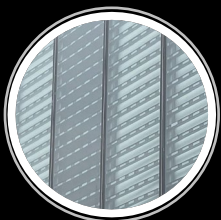
Operational Impact

B6

Operational Energy

B7

Operational Water

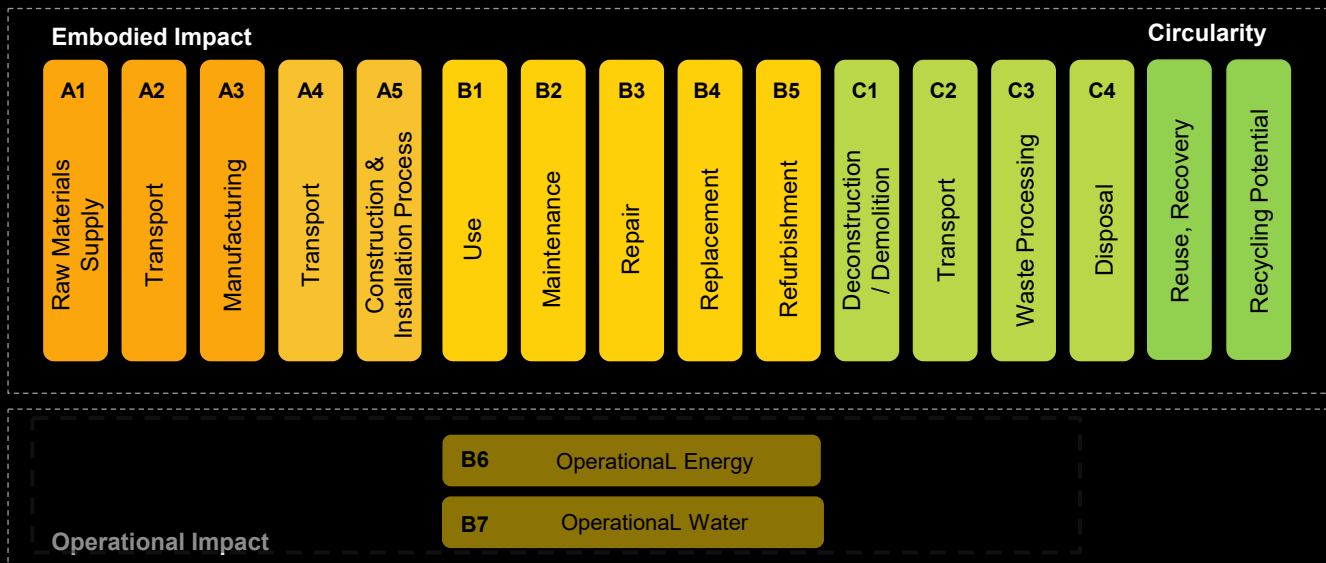
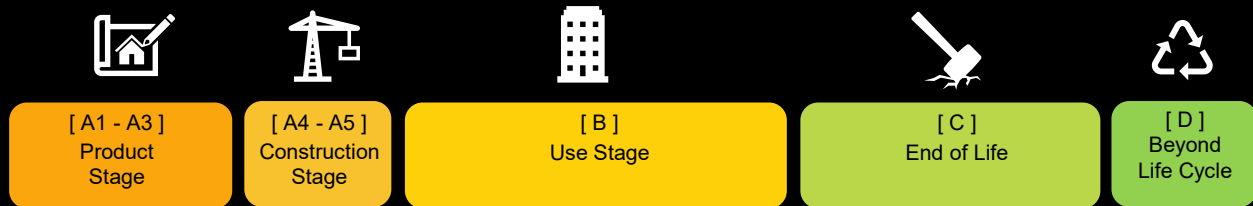


Building Emissions

Embodied Carbon

BS EN 15978

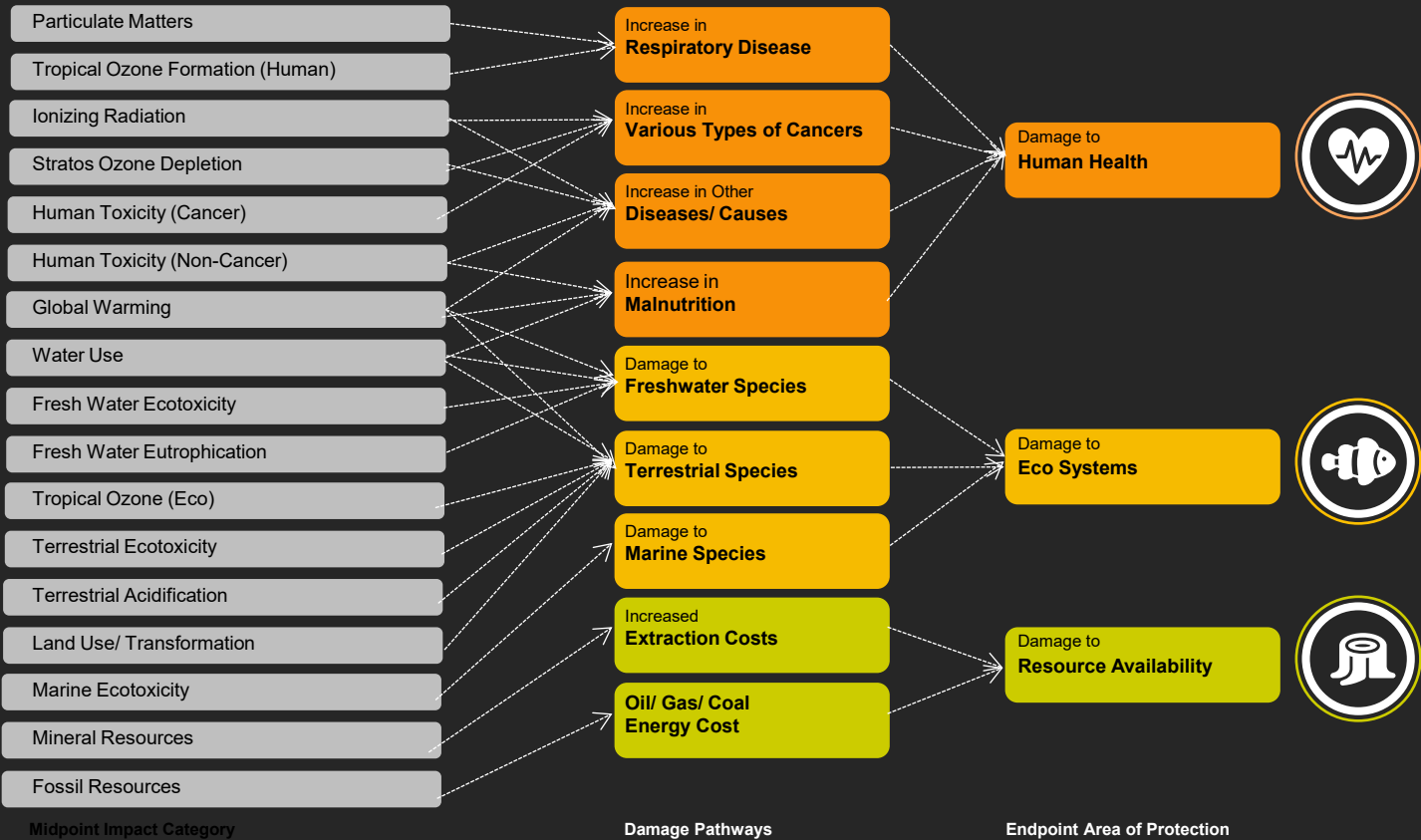
Sustainability of construction works.
Assessment of environmental performance
of buildings. Calculation method



Life Cycle Assessment

Impact Assessment

ReCiPe Life Cycle Impact Assessment Framework

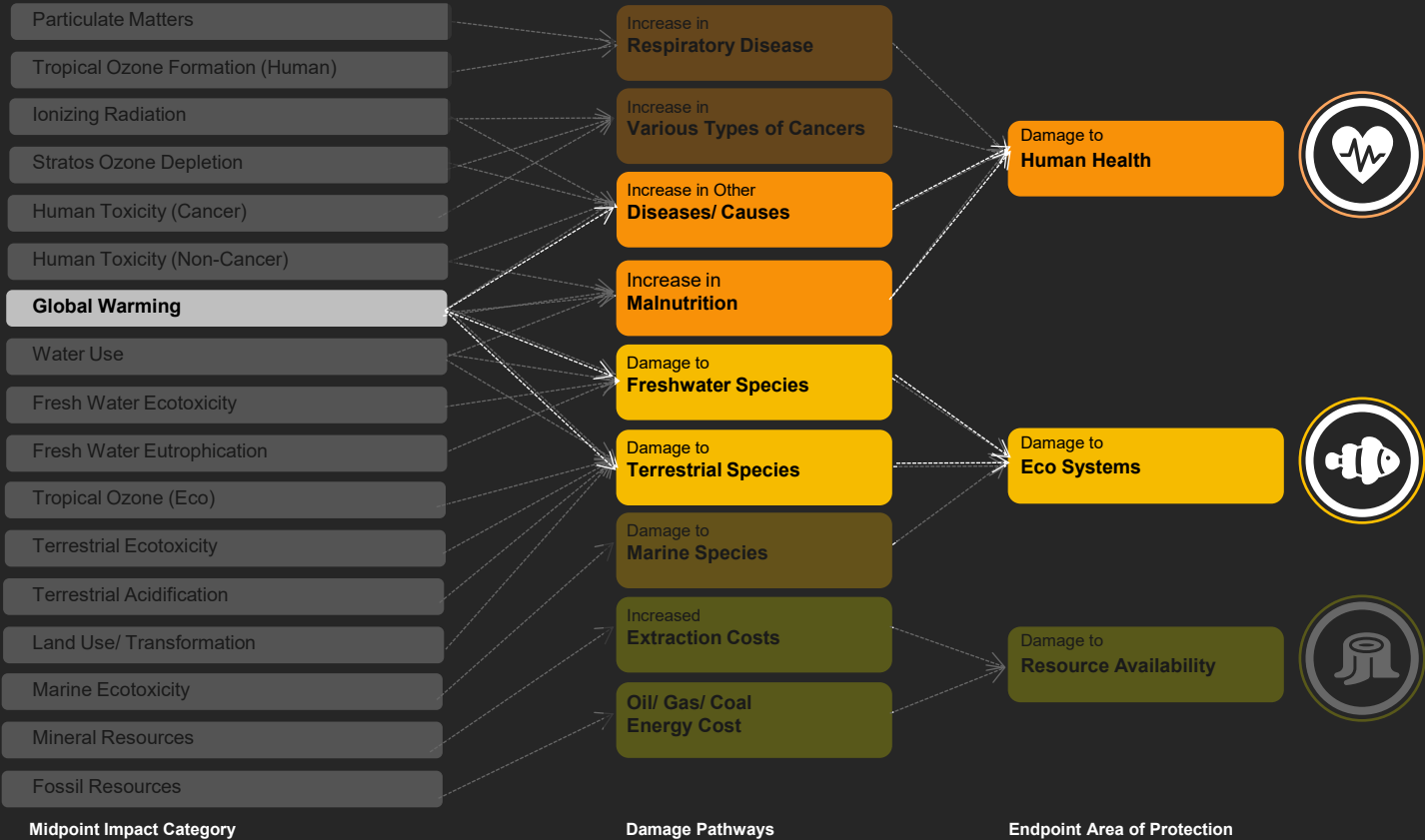


Life Cycle Assessment

Impact Assessment



Measurement unit
Global Warming Potential
GWP



Life Cycle Assessment

Impact Assessment



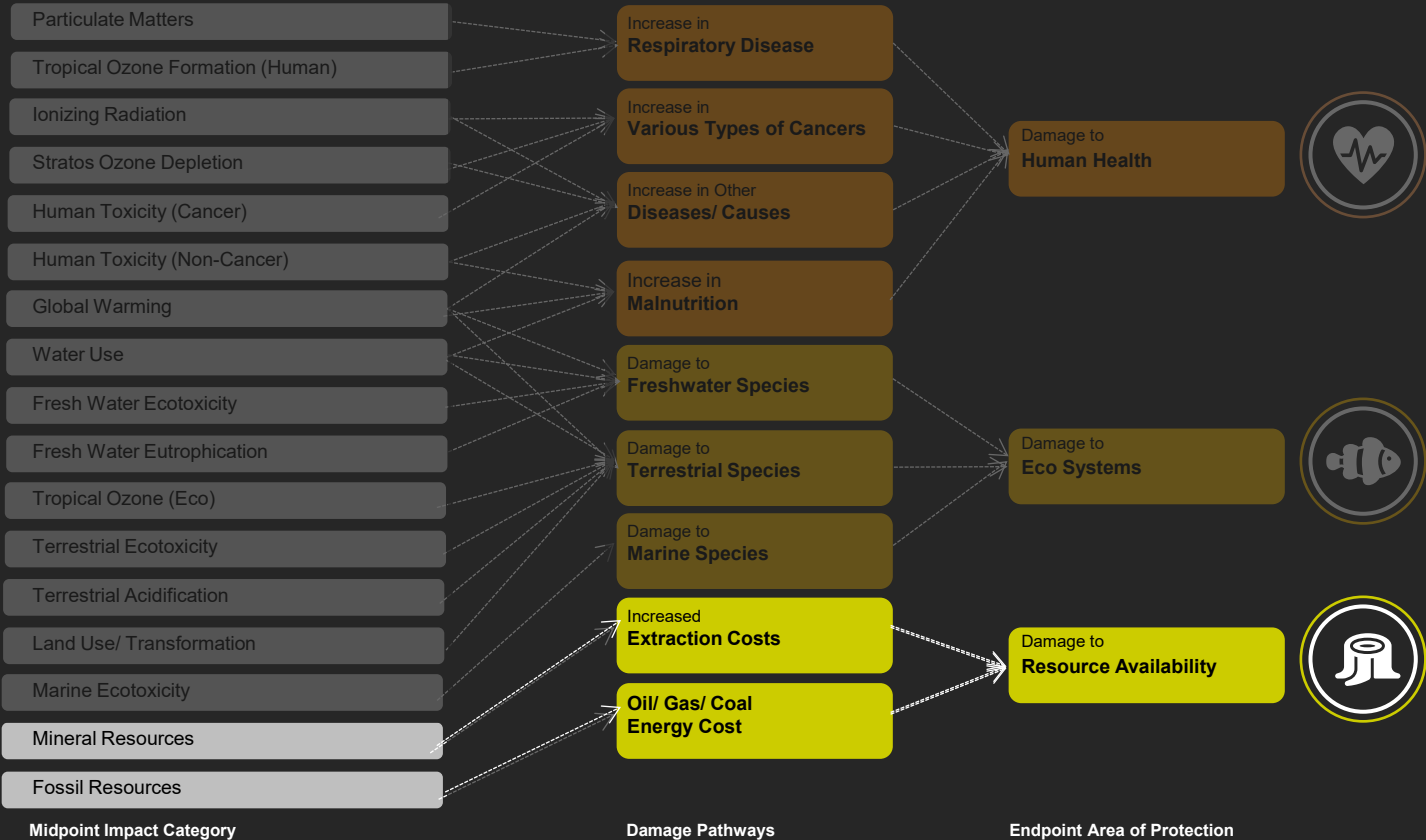
Measurement unit

Mineral Resources
kg Fe eq.



Measurement unit

Fossil Resources
kg oil eq.



Life Cycle Assessment
Impact Assessment



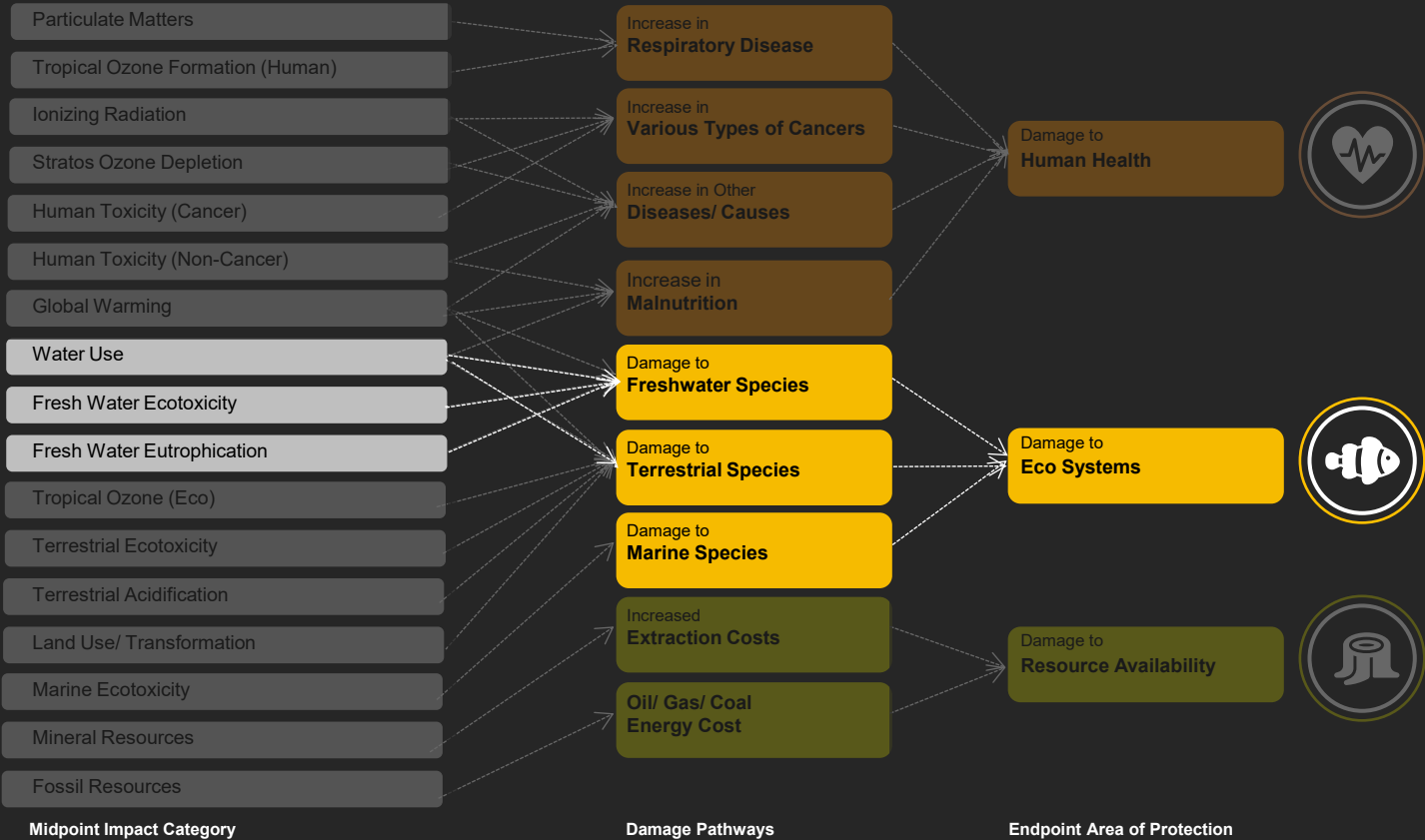
Measurement unit
Water Use
cu.m.



Measurement unit
Fresh Water Ecotoxicity
Kg 1,4-DB e



Measurement unit
Fresh Water Eutrophication
Kg P eq.



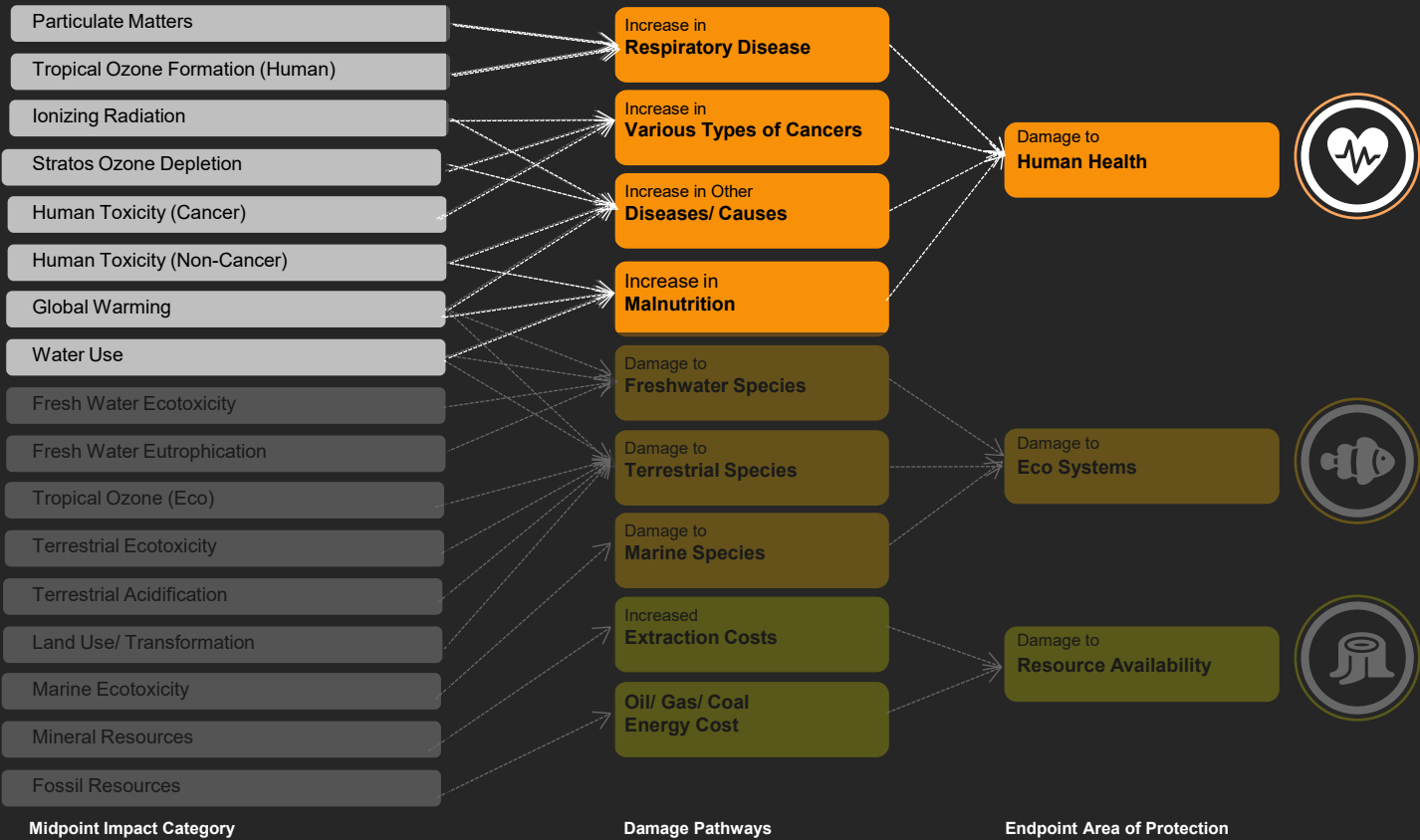
Life Cycle Assessment
Impact Assessment



Measurement unit
Particulate Matters
kg PM 10 eq.



Measurement unit
Tropical Ozone Formation
Kg CFC-11 eq.



Without Weighting



Life Cycle Assessment
Impact Category



With Weighting



Human Health Criteria



Water Intake



Human Health Cancerous



Ecotoxicity



Resource Depletion



Climate Change



Indoor Environmental Quality



Eutrophication



Habitat Alteration



Human Health
Noncancerous



Smog Formation



Ozone Depletion



Acidification

Life Cycle Assessment

LEED Evolution



Transport



Site
Selection



Water
Efficiency



Indoor
Environment



Material &
Resources



Energy &
Atmosphere



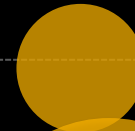
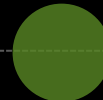
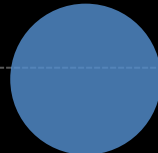
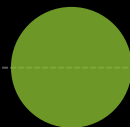
Innovation



Regional
Priority

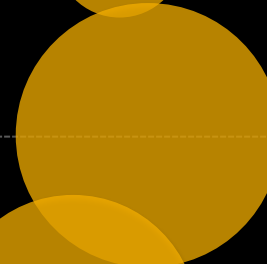
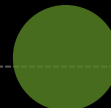
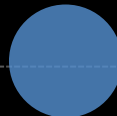
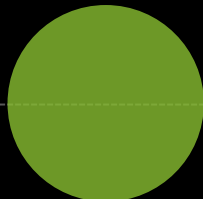
LEED v2.2

2004 / Before LCA
69 points



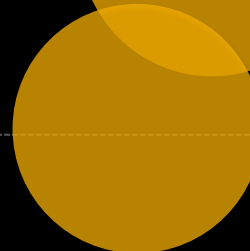
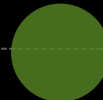
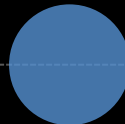
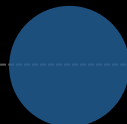
LEED v3

2009 / LCA Weighted
110 points



LEED v4

2017 / LCA Credits
110 Points



Operational Impact

ESG & The Built Environment

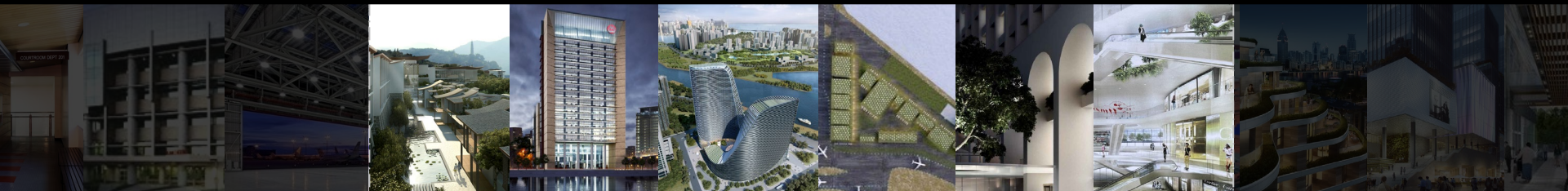


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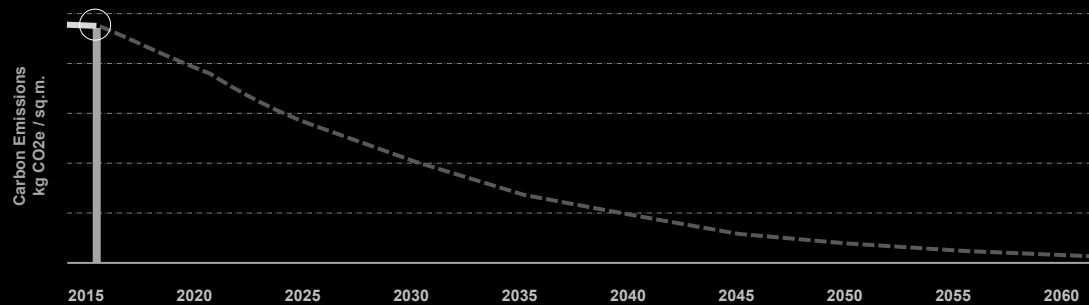


Baseline Year

Measuring Progress



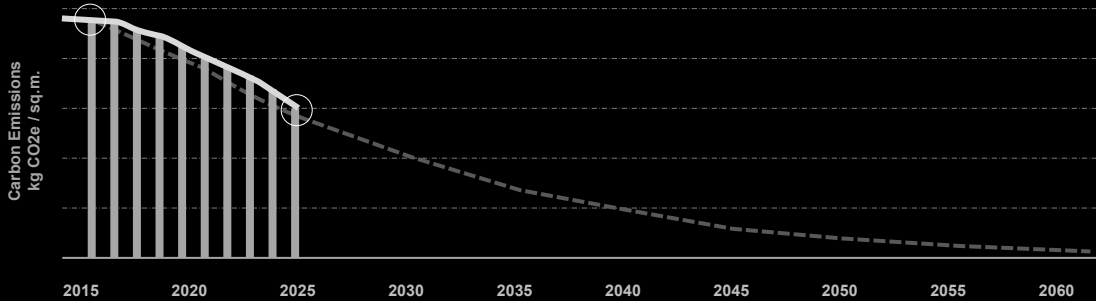
Baseline Year



Reporting Year
Measuring Progress

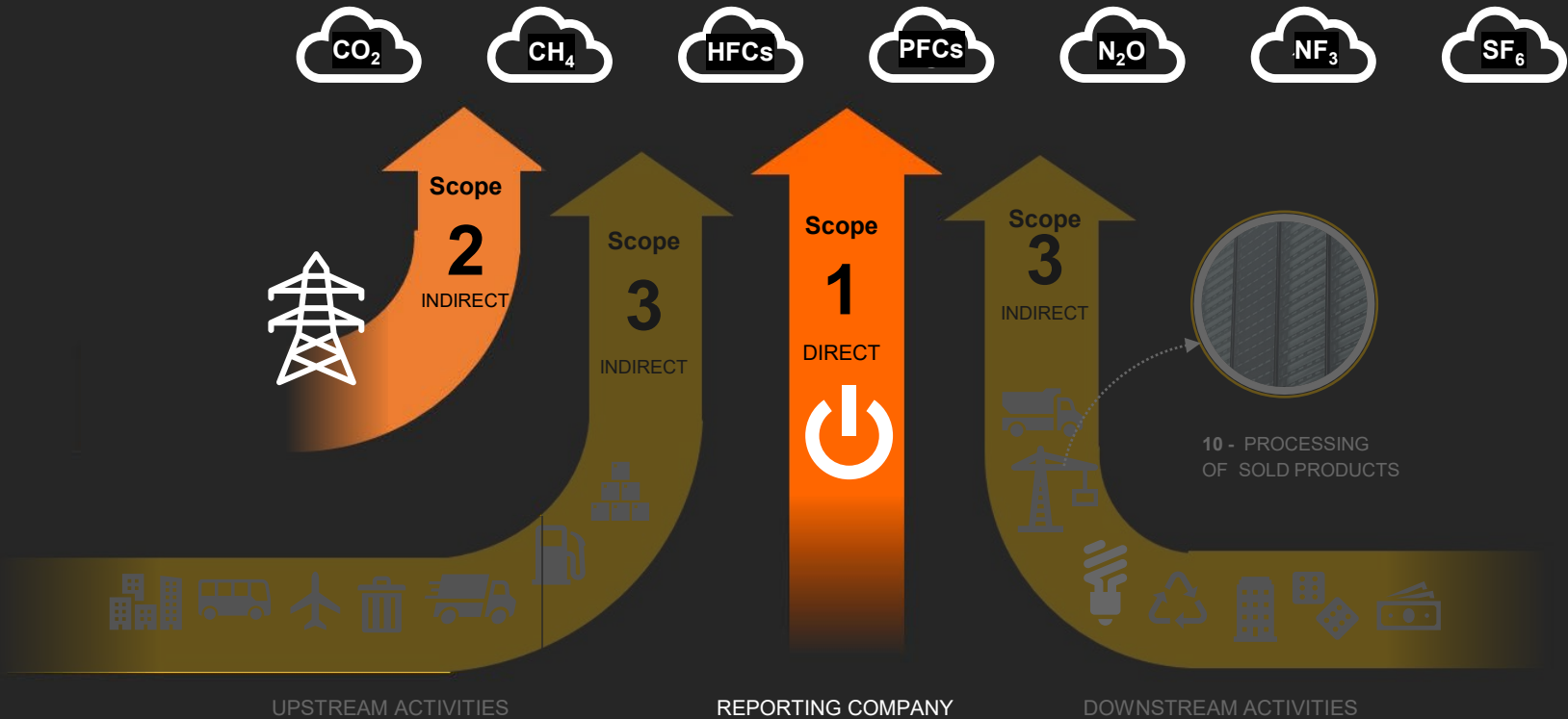


Reporting Year



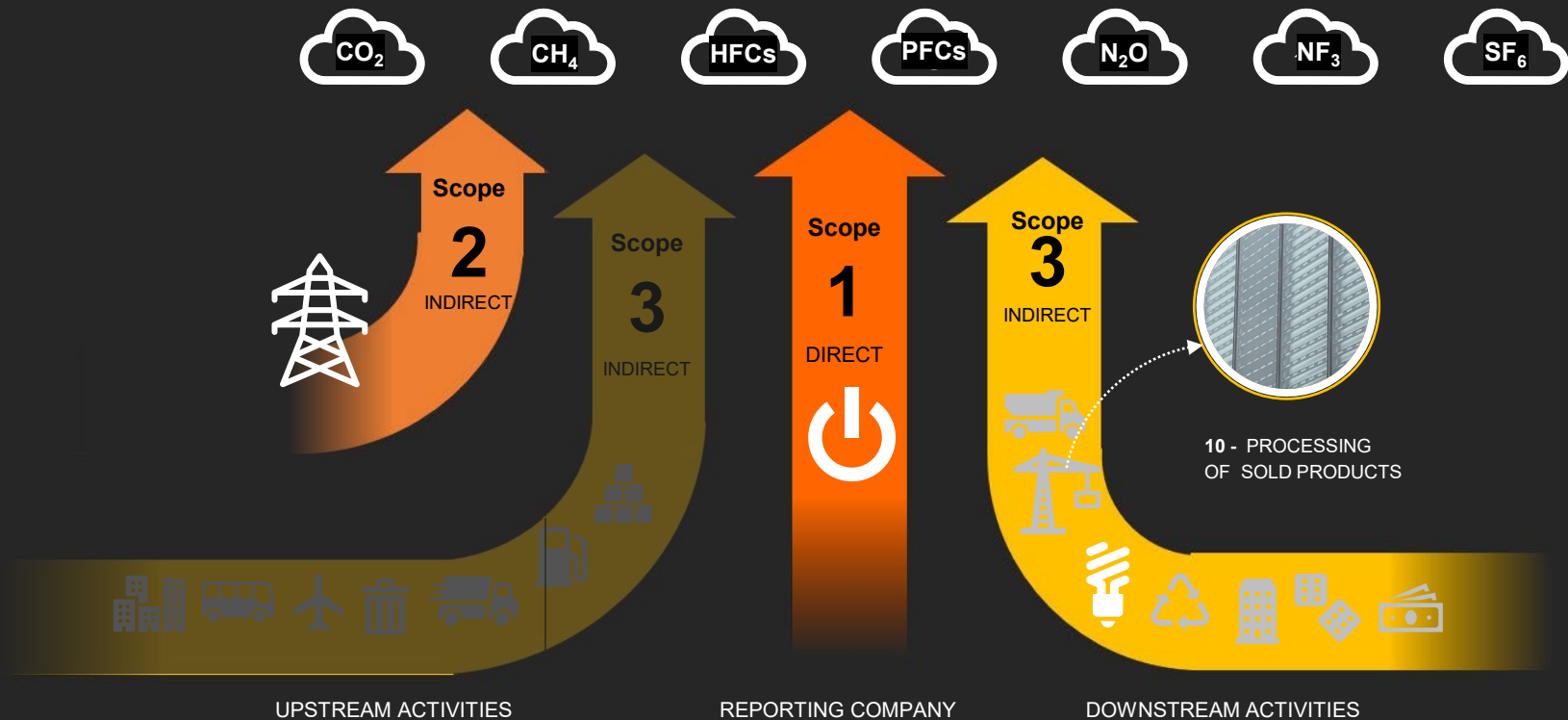
Greenhouse Gas Protocol

Scope 1 & 2



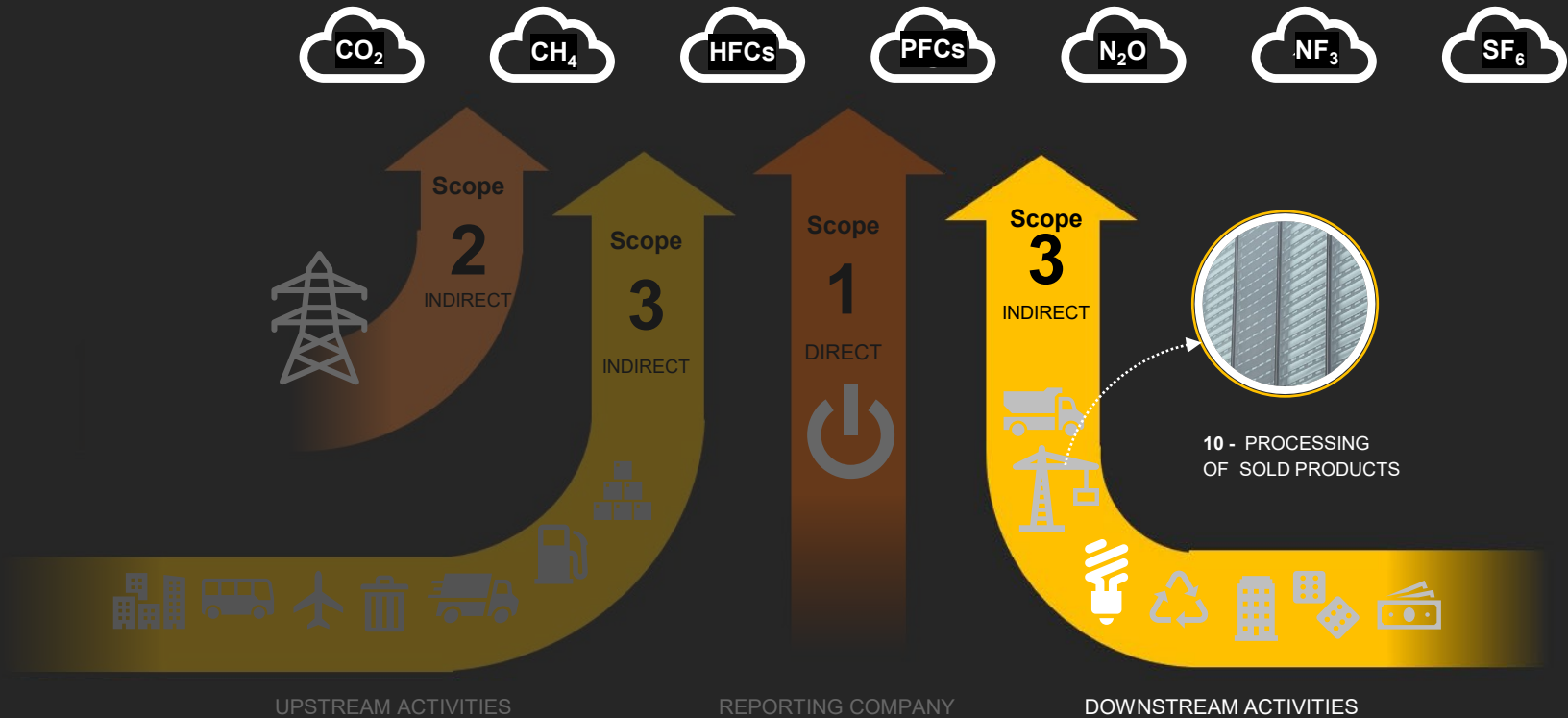
Greenhouse Gas Protocol

Scope 1 & 2



Greenhouse Gas Protocol

Scope 3



From Projects to Portfolio

Measuring Progress



Building types
Logistic Hub

Sector
Transportation & Logistics

Building types
Mixed-Use

Sector
Real Estate

Building types
Housing

Sector
Real Estate

Building types
Stadium

Sector
Sports & Entertainment

Building types
Hotel

Sector
Hospitality, Real Estate

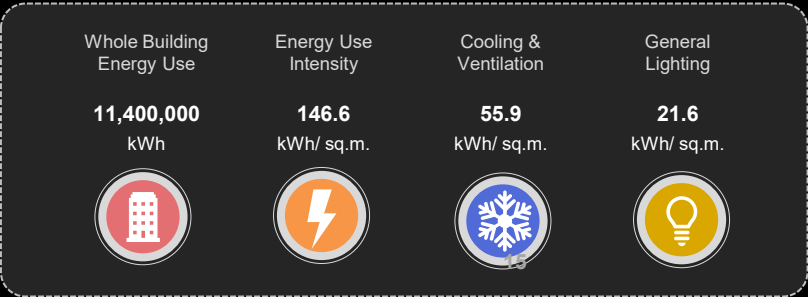
Building types
Data Centre

Sector
Real Estate, Technology

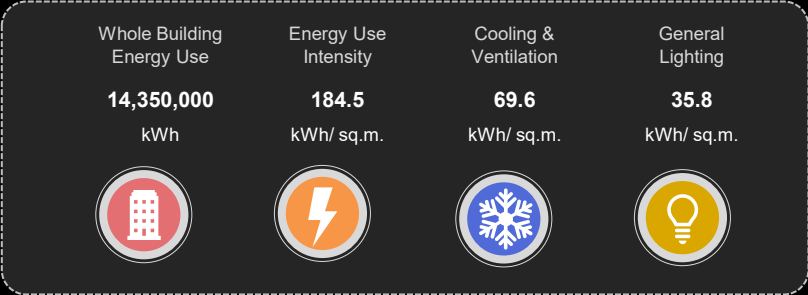
Energy Impact

Energy Modeling

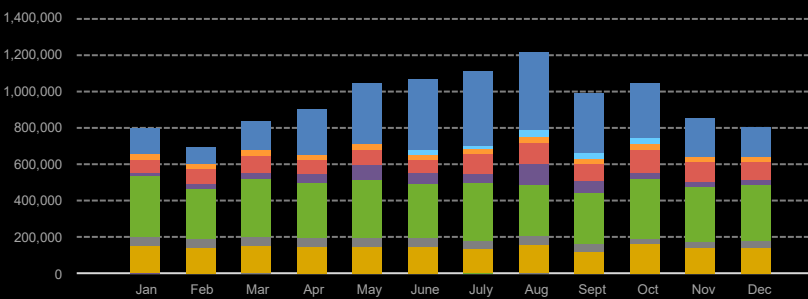
Project Case Façade Associated Energy Use



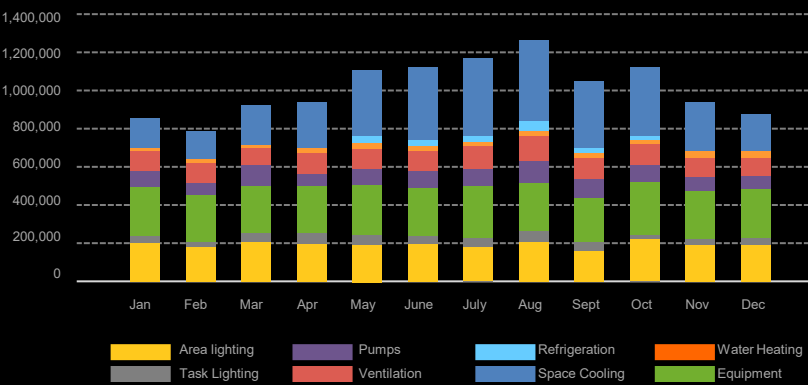
Baseline Case Façade Associated Energy Use



Project Case Whole Building Energy Use



Baseline Case Whole Building Energy Use



Energy Impact

Local Fuel Mix

PROJECT CASE

Whole Building
Energy Use

11,400,000
kWh



Energy Use
Intensity

146.6
kWh/ sq.m.



Cooling &
Ventilation

55.9
kWh/ sq.m.



General
Lighting

21.6
kWh/ sq.m.



LOCAL FUEL MIX

Hydro



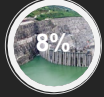
Nuclear



Solar



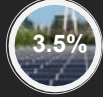
Hydro



Nuclear



Solar



Wind etc.



Passive Design & Technologies

Energy Impact



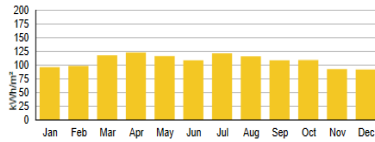
1000mm Louver
750mm Louver
500mm Louver



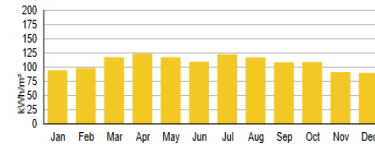
Passive Design & Technologies

Energy Impact

Initial Simulation | Solar Radiation

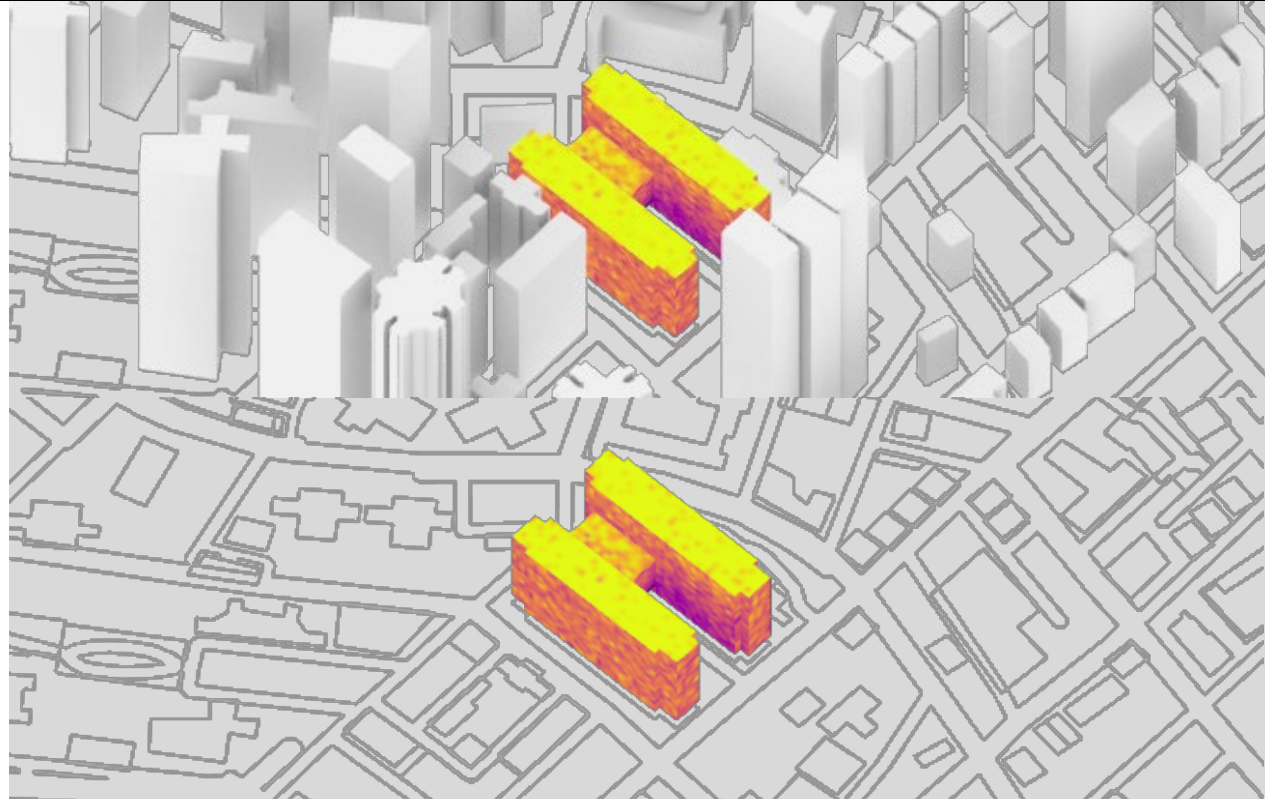


Avg 1,240 kWh/sq.m.



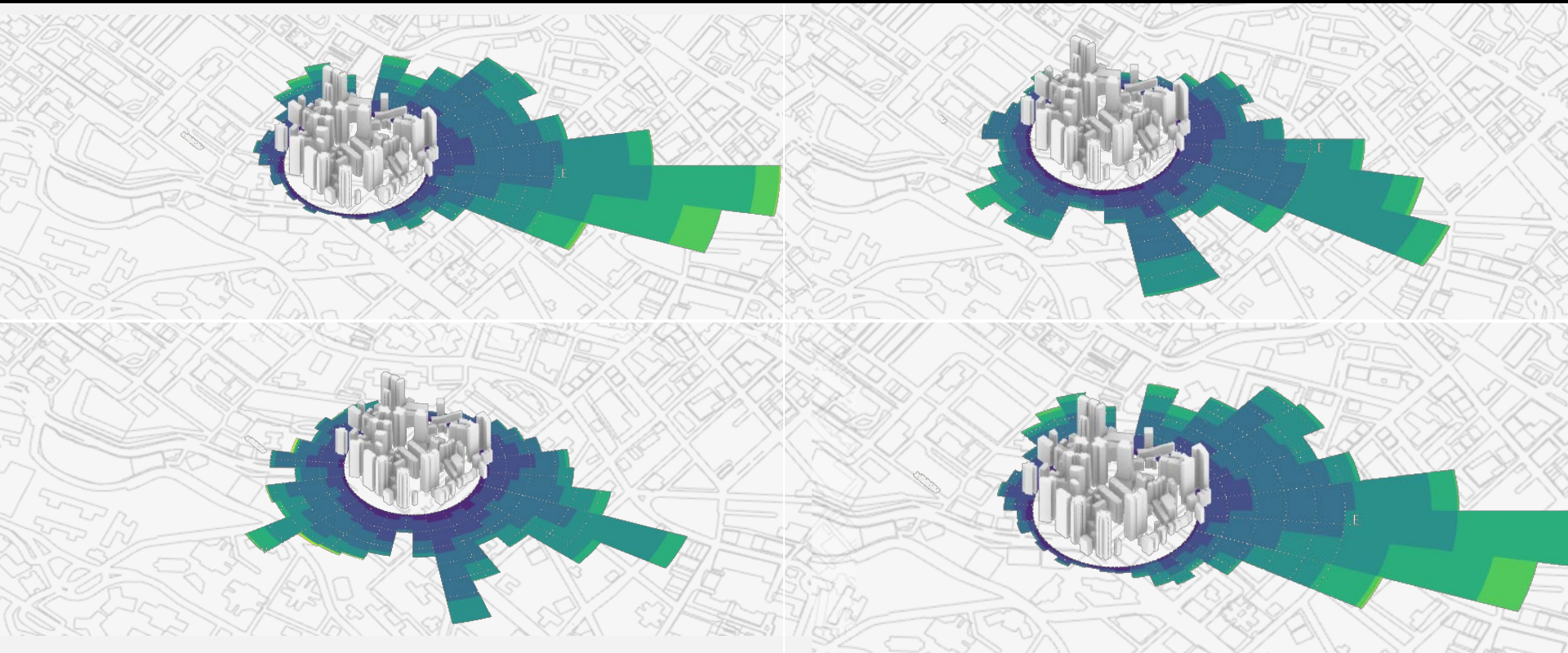
Avg 1,290 kWh/sq.m.

Surface solar Radiation kWh/sq.m.



Passive Design & Technologies

Energy Impact



Life Cycle Assessment

Impact Quantification



Agricultural Land

m² a

2.160 x 10 e4



Climate Change

Kg CO₂ eq.

18.981 x 10 e6



Fossil Depletion

Kg oil eq.

3.458 x 10 e6



Freshwater Ecotoxicity

Kg 1,4-DB e

1.616 x 10 e4



Freshwater Eutrophication

kg P eq.

499.184



Human Toxicity

Kg 1,4-DB e

4.819 x 10 e5



Ionizing Radiation

kBq U-235 bq

2.160 x 10 e4



Marine Ecotoxicity

Kg 1,4-DB e

2.630 x 10 e4



Marine Eutrophication

N eq.

419.759



Metal Depletion

Kg Fe eq.

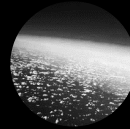
7.873 x 10 e4



Natural Land Transformation

m² a

7.4.694 x 10 e3



Ozone Depletion

Kg CFC-11 eq.

1.40



Particulate Matter

Kg PM₁₀ eq.

4.794 x 10 3



Photochemical Oxidant

kg NMVOC eq.

1.160 x 10 e4



Terrestrial Acidification

Kg SO₂ eq.

1.168 x 10 e4



Terrestrial Ecotoxicity

Kg 1,4-DB e

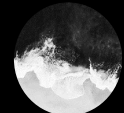
104.227



Urban Land Occupation

m² a

7.4.694 x 10 e4



Water Depletion

m³

5.517 x 10 e3



Life Cycle Assessment

Impact Quantification

CLIMATE CHANGE



baseline case

1.131×10^7
kg CO₂ eq.

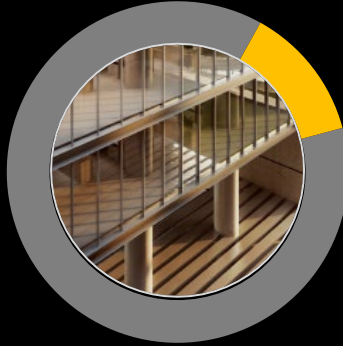
project case

8.981×10^6
kg CO₂ eq.

impact damage pathways

Diseases, malnutrition
Freshwater & terrestrial species

FOSSIL DEPLETION



baseline case

4.353×10^6
Kg oil eq.

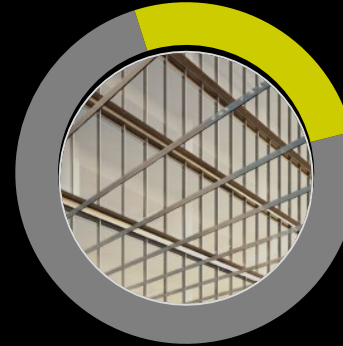
project case

3.458×10^6
Kg oil eq.

Impact damage pathways

Oil, gas, coal
Energy price

PARTICULATE MATTERS



baseline case

5.909×10^3
kg PM₁₀ eq.

project case

4.694×10^3
kg PM₁₀ eq.

Impact damage pathways

Respiratory disease



ESG & The Built Environment

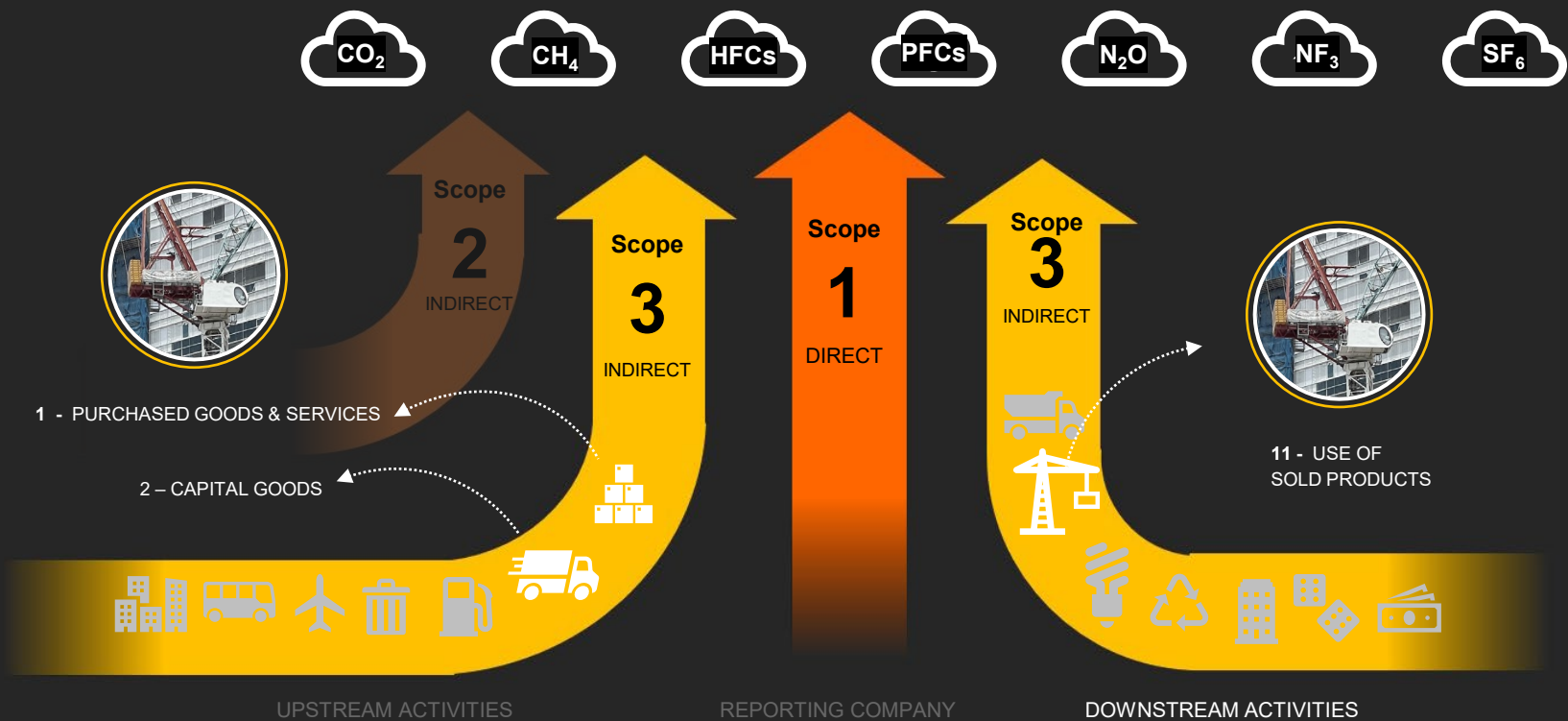


AIA
Leadership Summit



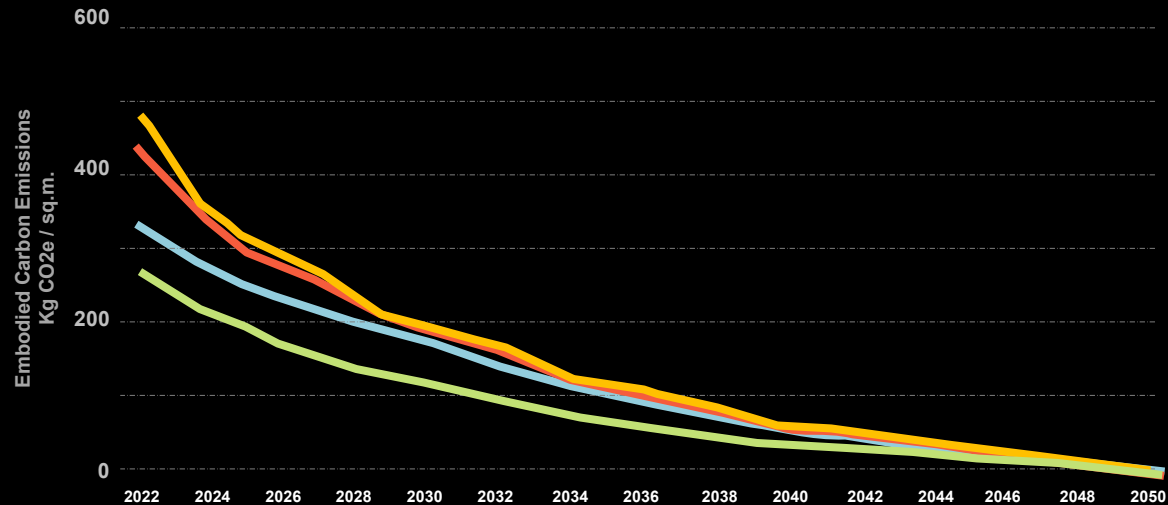
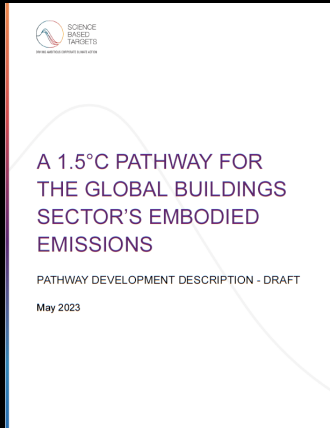
Scope 3 Emissions

Embodied Carbon



Science Based Targets

Embodied Carbon



Decarbonization pathway for upfront embodied GHG emissions in buildings
Scenario AR6: IPCC C1, equal per capita and utilitarian, corrected for renovation

Typology	2025	2030	2035	2040	2045	2050
Residential	400.7	256.1	147.2	79.1	45.3	10.3
Office	589.6	397.7	236.0	122.1	65.0	13.0
Retail	628.5	402.4	228.4	114.3	59.4	11.8
Other	496.4	340.0	219.9	116.5	64.2	13.5

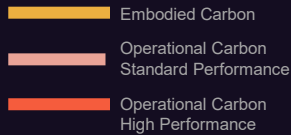
Upfront embodied GHG emission intensities (kg CO2-eq/m2)
using an equal per capita and utilitarian downscaling approach, corrected for renovation

Whole Life Carbon Perspective

Embodied Carbon

Embodied Carbon Lifetime Emissions

- Assumptions
- A medium-sized commercial office building.
 - Gradual grid decarbonization to zero by 2050

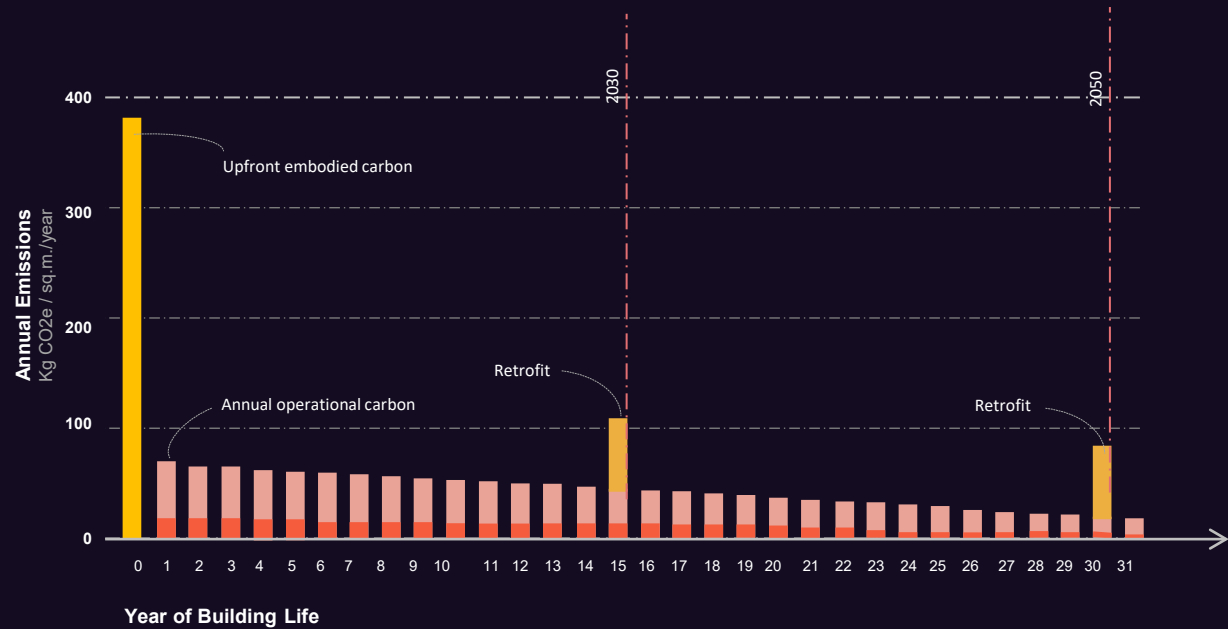


Data Sources

Embodied Carbon Benchmark Study and Commercial Buildings Energy Consumption Survey (CBECS)

Reference:

AIA-CLF Embodied Carbon Toolkit, Part 1



Material Credits

Embodied Carbon

LEED

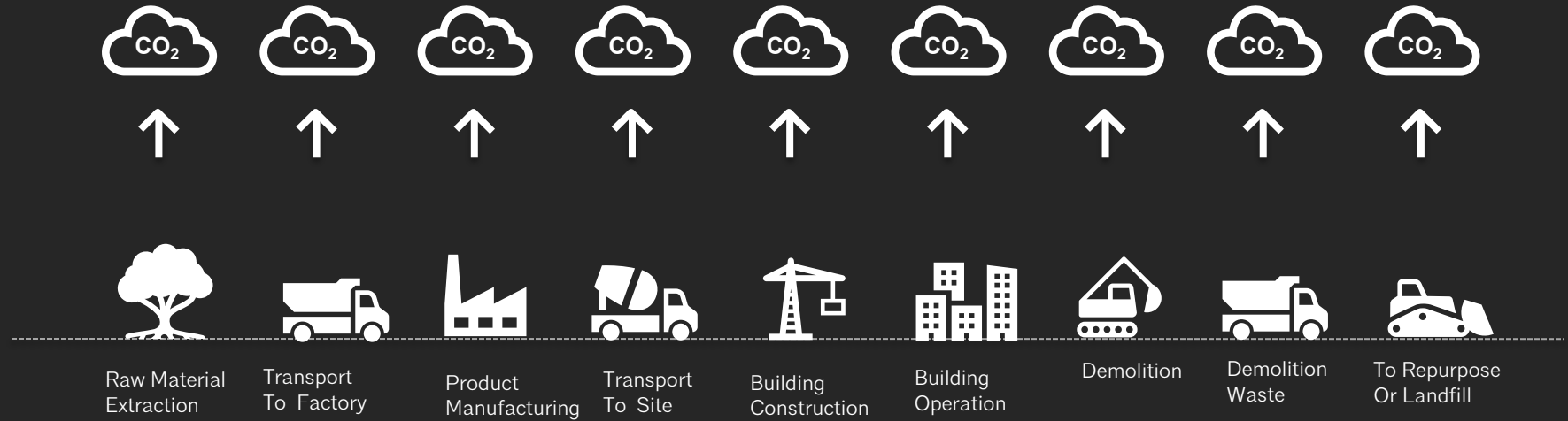
- Pr 1 Planning for Zero Waste Operation
- Pr 2 Assess and Quantify Embodied Carbon
- MR1 Building and Material Reuse
- MR2 Reduce Embodied Carbon
- MR3 Low-emitting Materials
- MR4 Building Products and Optimization
- MR5 Construction and Demolition Waste Diversion

BREEAM

- Mat 01 Environmental Impacts from Construction Products – Building LCA
- Mat 02 Environmental Impacts from Construction Products – EPD
- Mat 03 Responsible Sourcing of construction products
- Mat 05 Designing for durability and resilience
- Mat 06 Material efficiency

Life Cycle Assessment

Material Impact

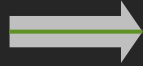


Life Cycle Assessment

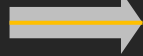
Material Impact - Product



Raw
Materials



Energy



Material Acquisition



Manufacturing



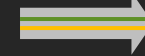
Use/ Maintenance



Recycle/ Waste



Atmospheric
Emission



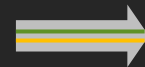
Waterborne
Wastes



Solid Wastes



Byproducts



Other
Releases

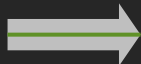


Life Cycle Assessment

Material Impact – Building System



Raw
Materials



Energy



Materials

Glazing
Cladding
Interior Shading
Exterior Shading



Raw
Materials



Energy

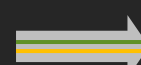


Energy

Lighting
Cooling
Heating
Ventilation



Atmospheric
Emission



Waterborne
Wastes



Solid Wastes



Byproducts

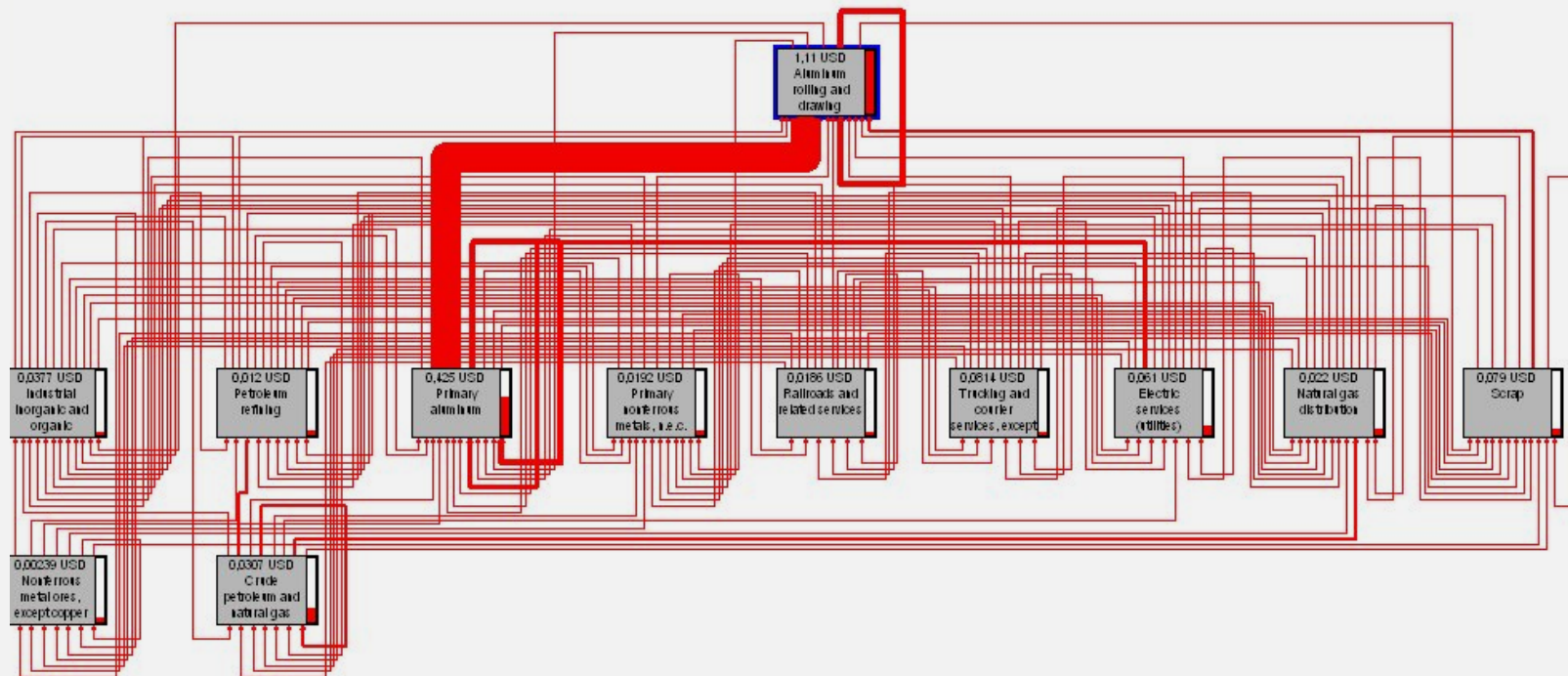


Other
Releases



Life Cycle Assessment

Scientist's Tool



Life Cycle Assessment Designer's Tool



Structure



Facade

1. Foundations and substructure 2 Tons CO₂e - 20 %

Materials in the foundations will never be replaced, no matter assessment period length. For BREEAM UK Mat 1 IMPACT equivalent provide the data for site excavation fuel use here, choose re

Foundation, sub-surface, basement and retaining walls Move materials Add to compare

Resource	Quantity	Comment	Transport, miles (A4)	Wastage
Reinforcement steel (rebar), generi ?	476 kg	0.017 kg / cu.m.	370 Trailer combination, 40	4.85 %
Ready-mix concrete, normal strength ?	28000 m2 x 12 in	placeholder	60 Concrete mixer truck	4 %

2. Vertical structures and facade 5 Tons CO₂e - 54 %

External walls and facade Move materials Add to compare

Resource	Quantity	Comment	Transport, miles (A4)	Wastage
Insulating Glass Unit (IGU), double ?	768768 kg	Facade, 12+10+12 mm	380 Concrete mixer truck	None
Processed glass, non low-e coating, ?	2460 m2 x 0.25 in	Assume 40% of IGU area	380 Concrete mixer truck	None
Dried timber, conifer (Canadian Woo ?	740 m3	facade, balustrade	220 Trailer combination, 40	17.9 %
Thermally improved aluminum extrusi ?	27750 kg	facade mullion, horizontal +	470 Trailer combination, 40	7.5 %

Columns and load-bearing vertical structures Move materials Add to compare

Resource	Quantity	Comment	Transport, miles (A4)	Wastage
Reinforcement steel (rebar), generi ?	373 kg	Shear wall, structural bay,	370 Trailer combination, 40	4.85 %
Ready-mix concrete, normal strength ?	3840 m2 x 20 in	structural bay	60 Concrete mixer truck	4 %
Ready-mix concrete, normal strength ?	15800 m2 x 20 in	shear wall	60 Concrete mixer truck	4 %

Internal walls and non-bearing structures Move materials Add to compare

Life Cycle Assessment Designer's Tool



Interior Finishes



Building Services



Partitions

3. Horizontal structures: beams, floors and roofs ⓘ ☁ 2 Tons CO₂e - 20 %

Floor slabs, ceilings, roofing decks, beams and roof ⓘ Move materials ⓘ Add to compare

Resource ⓘ	Quantity ⓘ	Comment ⓘ	Transport, miles (A4) ⓘ ⓘ	Wastage ⓘ
Reinforcement steel (rebar), generi ⓘ	250 kg ⓘ	Floor rebar, assume ⓘ	370 Trailer combination, 40	4.85 %
Ready-mix concrete, normal strength ⓘ	26000 m2 ⓘ x 12 in	Floor slab ⓘ	60 Concrete mixer truck	4 %

4. Other structures and materials ⓘ ☁ 0.64 Tons CO₂e - 6 %

Other structures and materials ⓘ ⓘ Move materials ⓘ Add to compare

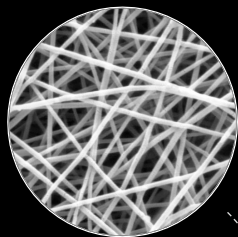
Resource ⓘ	Quantity ⓘ	Comment ⓘ	Transport, miles (A4) ⓘ ⓘ	Wastage ⓘ
Hardwood flooring, prefinished ⓘ	6045 kg ⓘ	0.015m thk x 31,000 sqm x ⓘ	220 Trailer combination, 40	17.9 %
Plywood, generic, 4-50 mm (0.16-1.9) ⓘ	31000 m2 ⓘ x 0.5 in	Interior floor finishes ⓘ	340 Trailer combination, 40	16.7 %
Vitreous ceramic sanitaryware, flus ⓘ	380 unit ⓘ	1/unit, bathroom ⓘ	320 Large delivery truck, 9	None
Vitreous ceramic sanitaryware, wall ⓘ	380 unit ⓘ	1/unit, bathroom ⓘ	320 Large delivery truck, 9	None
Vitreous ceramic sanitaryware, unde ⓘ	380 unit ⓘ	1/unit, kitchen ⓘ	320 Large delivery truck, 9	None
Ventilation ducting, per m linear, ⓘ	3800 m ⓘ	10m/unit ⓘ	320 Large delivery truck, 9	1 %
Elevator, 1588 kg capacity (12 floo ⓘ	12 unit ⓘ	8 passenger, 4 fire ⓘ	320 Large delivery truck, 9	None
Terrazzo slabs and tiles, 1-1/4 inc ⓘ	760 m2 ⓘ x 1 in	Interior, assume 2 sqm/unit ⓘ	320 Trailer combination, 40	10 %
Concrete masonry unit (CMU), 1732.4 ⓘ	190 m3 ⓘ	interior wall, assume 5 sqm ⓘ	60 Trailer combination, 40	5 %

Windows and doors ⓘ ⓘ Move materials ⓘ Add to compare

Resource ⓘ	Quantity ⓘ	Comment ⓘ	Transport, miles (A4) ⓘ ⓘ	Wastage ⓘ
Interior MDF door leaf, 45 kg/unit ⓘ	1512 unit ⓘ	ⓘ	350 Trailer combination, 40	None Char

Life Cycle Assessment EPD & Data

Raw Materials



Global Warming Potential
Carbon Intensity



Ready-mix concrete, 0-2500 psi (0-17.24 MPa), 20-29% Fly Ash, 2500-20-FA (NRMCA industry-average)



Add to input

Add to compare

Download EPD

Show empty rows

General information

Country	North America
Manufacturer	NRMCA industry-average
Commercial name	2500-20-FA
Material type	Ready-mix concrete for lightweight applications (domestic and auxiliary)

Datapoint background information

EPD number	EPD10294
EPD program	NSF
Year	2019
Product Category Rules (PCR)	NSF PCR for Concrete Version 1 (February 22, 2019)
Standard	ISO14040
Data source	NRMCA Member Industry-wide EPD for Ready Mixed Concrete, NRMCA 2019
Verification	Third-party verified (as per ISO 14025)
Upstream database	ecoinvent

Technical characteristics

Technical specification	0-2500 psi (0-17.24 MPa), 20-29% Fly Ash
Density	2400.0 kg/m ³
Mass per unit	2400.0 kg/m ³
Default thickness	203.2 mm
Available units	m ³ , kg, ton, m ²



Insulating Glass Unit (IGU), double pane, 15.6 kg/m², 3 mm per pane (Cardinal Glass Industries)



Add to input

Add to compare

Download EPD

Show empty rows

General information

Country	United States
Manufacturer	Cardinal Glass Industries
Material type	Glass facades and glazing

Datapoint background information

EPD number	EPD-148
EPD program	ASTM
Year	2020
Product Category Rules (PCR)	PCR for Building-Related Products and Services - Part A: Calculation Rules for the LCA and Requirements Project Report (V1.3, 06.19.2014).
Standard	ISO14040
Data source	EPD INSULATING GLASS PRODUCTS CARDINAL GLASS INDUSTRIES
Verification	Third-party verified (as per ISO 14025)
Upstream database	GaBi

Description

Technical characteristics

Technical specification	15.6 kg/m ² , 3 mm per pane
Mass per unit	15.6 kg/m ²
Available units	m ² , kg, ton

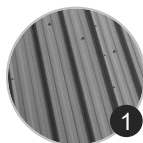
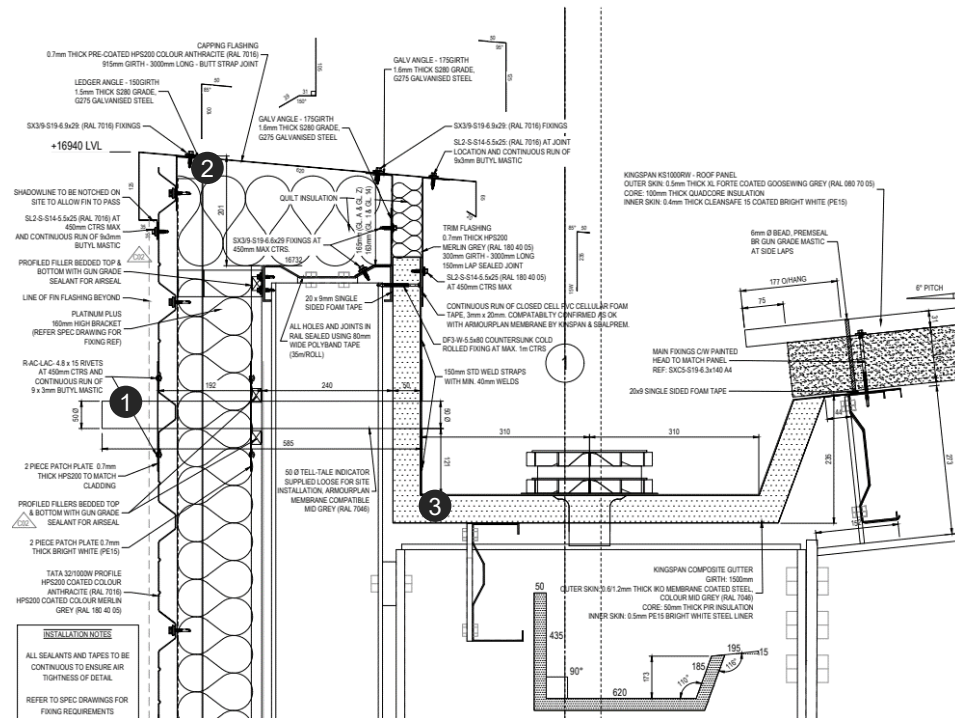
Environmental profile

Global warming potential (A1-A3)	2.54 kg CO ₂ e / kg 39.6 kg CO ₂ e / m ²
Performance in group	Glass facades and glazing
Performance ranking	CO ₂ TRACI: 6 / 28 See full ranking

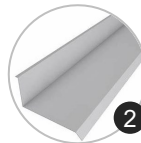
Life Cycle Assessment EPD & Data



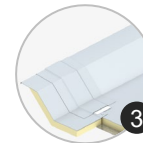
Data Center Project



Metal Insulated wall panel
35.6 kgCO₂e / sq.m.



Aluminium Flashing
6.83 kgCO₂e / sq.m.



Insulated Gutter
5.87 kgCO₂e / sq.m.

Construction Stage

Embodied Carbon



Site Vehicles



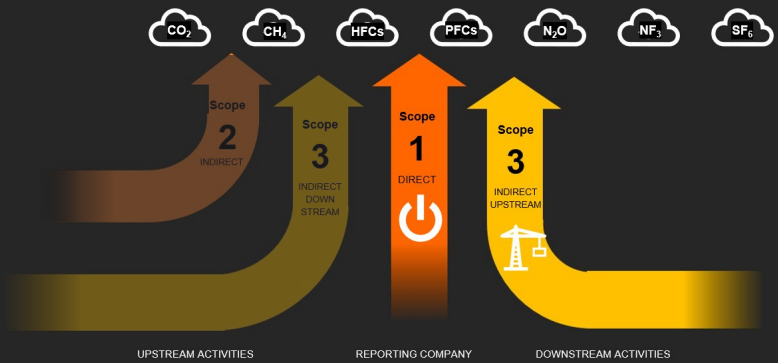
Heavy Equipment



Site Office



Hand Tools



Construction Stage

Embodied Carbon



Data Capture



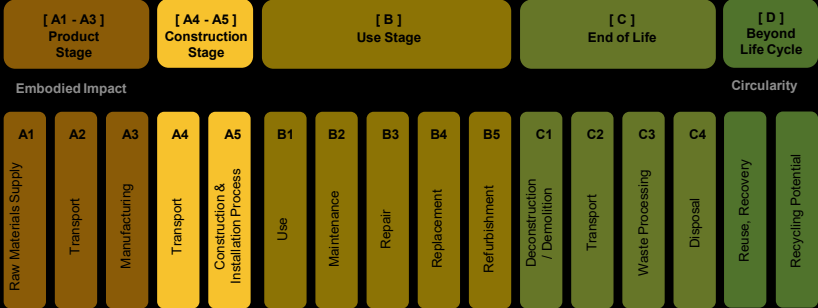
Worker transport



Fuel efficiency



Regular Review



Material Impact

Impact Quantification



Agricultural Land

m2 a
4563



Climate Change

Kg CO2 eq.
6.588 x 10 e4



Fossil Depletion

Kg oil eq.
1.695



Freshwater Ecotoxicity

Kg 1,4-DB e
475



Freshwater Eutrophication

kg P eq.
13.28



Human Toxicity

Kg 1,4-DB e
0.403



Ionizing Radiation

kBq U-235 eq
3007



Marine Ecotoxicity

Kg 1,4-DB e
419.88



Marine Eutrophication

N eq.
16.295



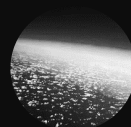
Metal Depletion

Kg Fe eq
5638



Natural Land Transformation

m2 a
12.116



Ozone Depletion

Kg CFC-11 eq.
0.005



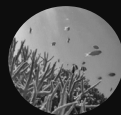
Particulate Matter

Kg PM10 eq.
188.45



Photochemical Oxidant

kg NMVOC eq.
290.18



Terrestrial Acidification

Kg SO2 eq.
8.660 x 10 e-3



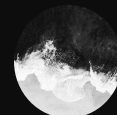
Terrestrial Ecotoxicity

Kg 1,4-DB e
2.99



Urban Land Occupation

m2 a
441



Water Depletion

m3
1.569



Material Impact

Impact Quantification

CLIMATE CHANGE



6.588 x 10 e4
kg CO2 eq.

Impact damage pathways
Diseases, malnutrition
Freshwater & terrestrial species

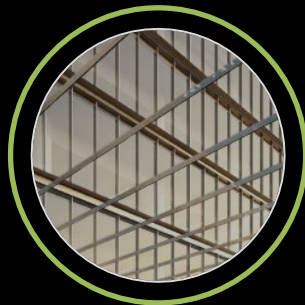
FOSSIL DEPLETION



1.695
Kg oil eq.

Impact damage pathways
Oil, gas, coal
Energy price

PARTICULATE MATTERS



188.45
kg PM10 eq.

Impact damage pathways
Respiratory disease

Social Impact

ESG & The Built Environment



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Leadership Summit



Job Creation

Social Impact

Employment Opportunities

Number of jobs created within the company as well as jobs created through supply chains and partnerships

Local Hires

Helps stimulate the local economy and provides job opportunities to residents.

Training and Development

Initiatives to provide training and apprenticeship programs underrepresented groups are often highlighted.

Community Impact

How job creation initiatives have positively impacted local communities, such as reducing unemployment rates.



Modern Slavery

Social Impact

Employment Opportunities

Number of jobs created within the company as well as jobs created through supply chains and partnerships

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Community Impact

How job creation initiatives have positively impacted local communities, such as reducing unemployment rates.



Community Impact

Social Impact

How companies contribute to the economic development of the communities where

Local Procurement

Sourcing goods and services from local suppliers, which helps support local businesses and economies.

Community Investment

Investments made in local infrastructure, education, healthcare, and other community projects

Job Creation

Number of jobs created locally, including full-time, part-time, and temporary positions

Supplier Diversity

Promoting diversity among suppliers by working with minority-owned, women-owned, and small businesses



Organizational ESG



ESG & The Built Environment

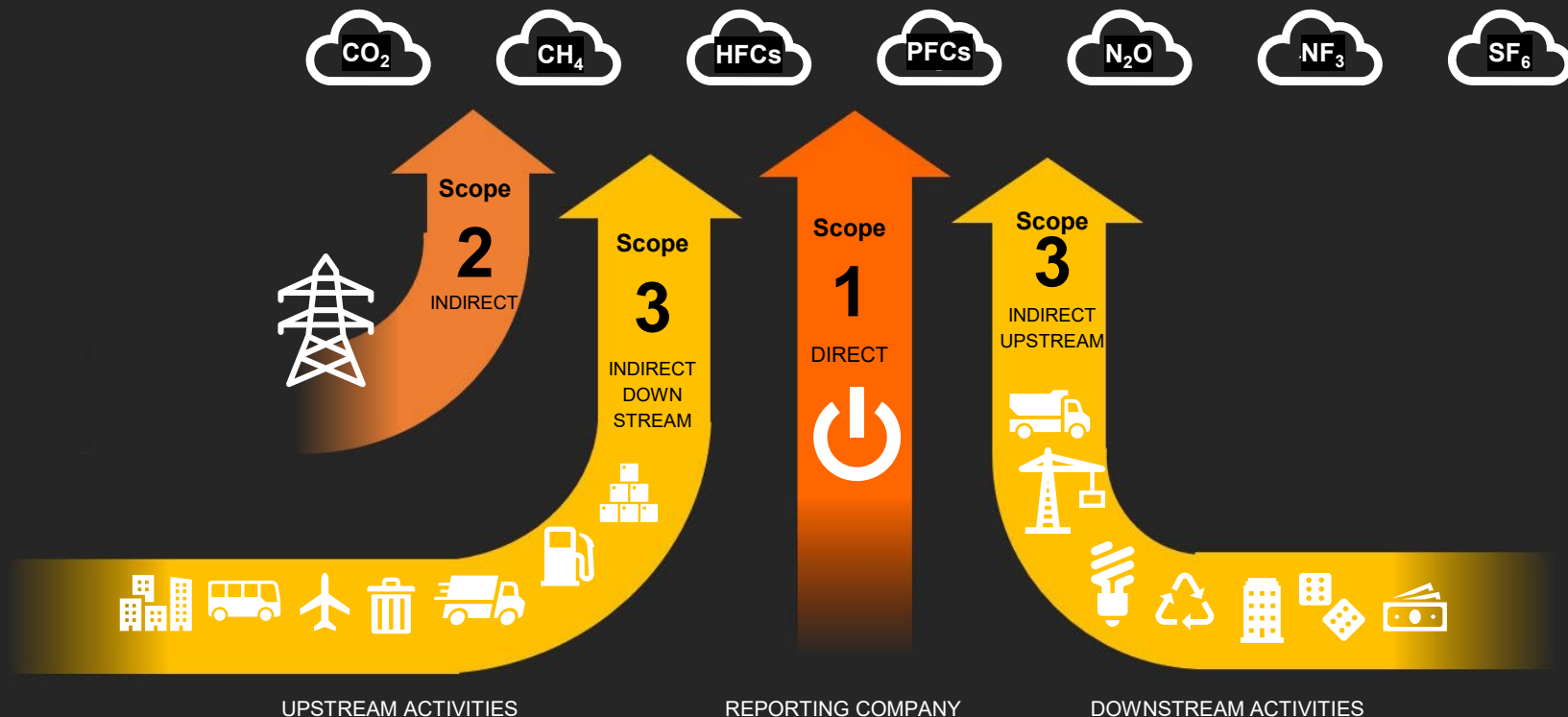


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Leadership Summit



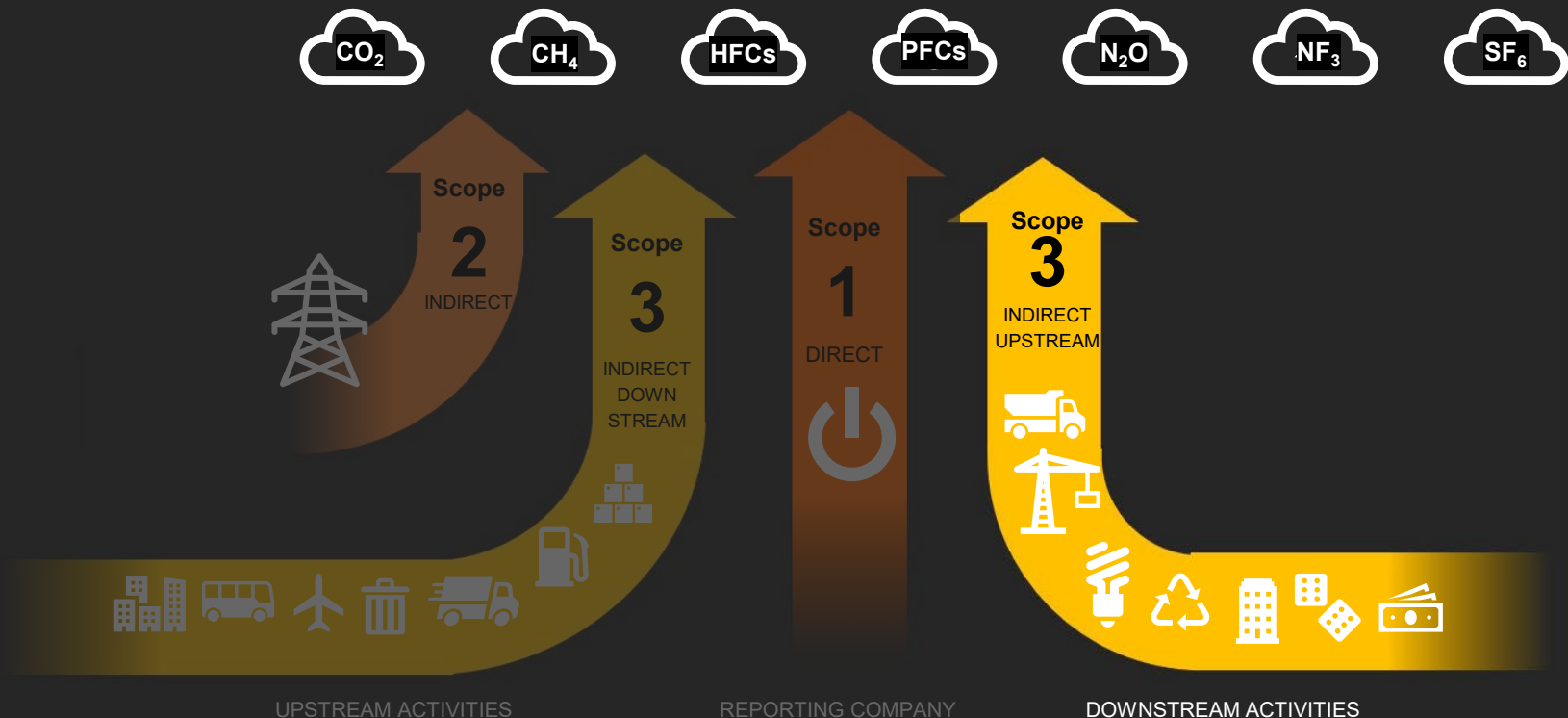
GHG Protocol Scope 3 Value Chain

Carbon Accounting



GHG Protocol Scope 3 Value Chain

Carbon Accounting



Boundaries & Uncertainties

Organizational Reporting



Organizational Boundary

This defines which entities are included in the ESG report. can include subsidiaries, joint ventures, and associates.

Operational Boundary

identifying which operations and activities are included in the ESG report
Covers direct operations as well as those within the value chain

Temporal Boundary

specifies the time period covered by the ESG report
ensuring consistency and comparability over time

Value Chain Boundary:

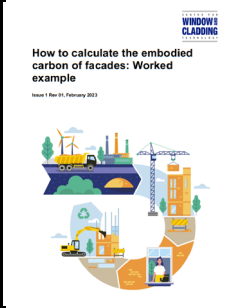
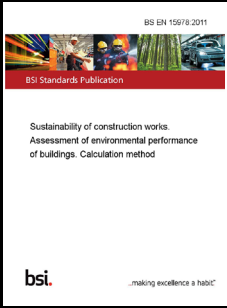
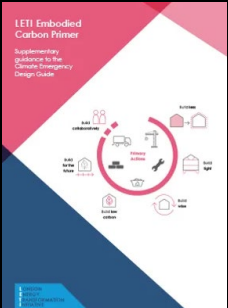
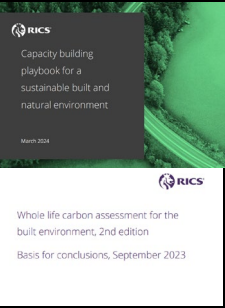
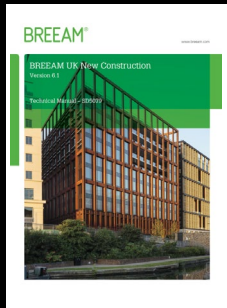
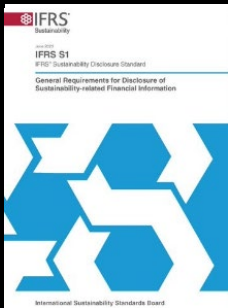
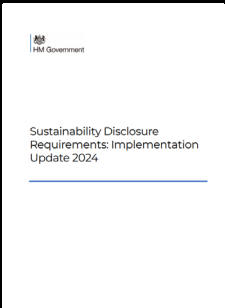
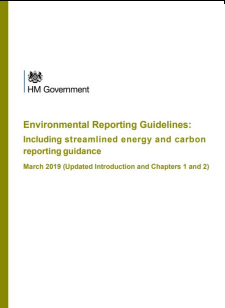
beyond the immediate operations to include the entire value chain
ESG impacts of suppliers, distributors, and other business partners

Materiality Boundary

all material ESG issues included in the report
could influence the decision-making of stakeholders,

ESG Regulations & Standards

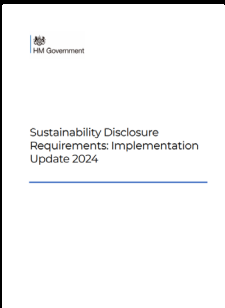
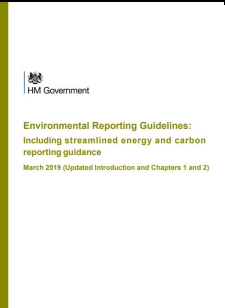
Organizational Strategy



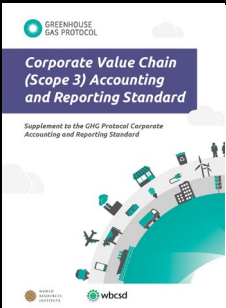
ESG Regulations & Standards

Organizational Strategy

Government Regulations



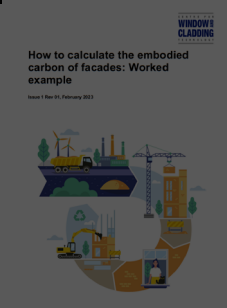
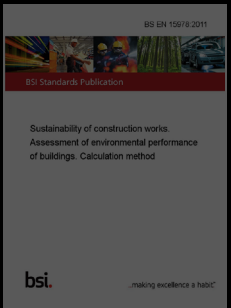
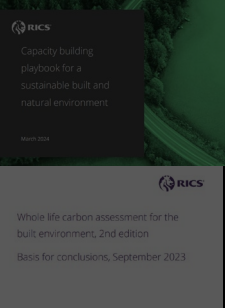
Reference Standards



Voluntary Standard



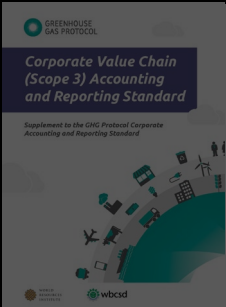
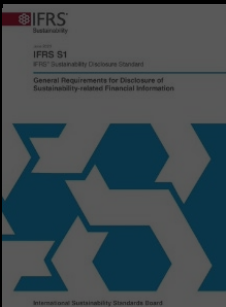
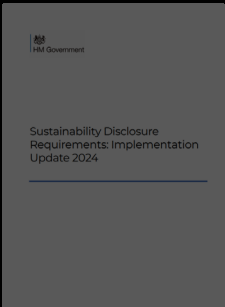
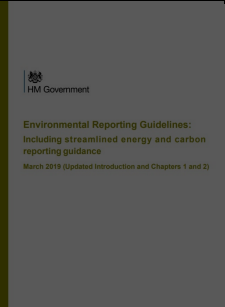
Project Accreditation



Organization Accreditation

ESG Regulations & Standards

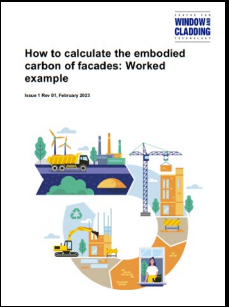
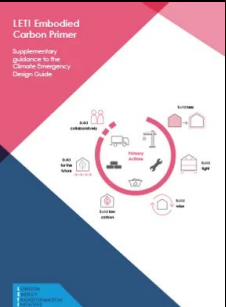
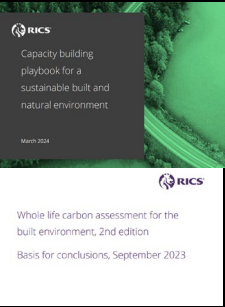
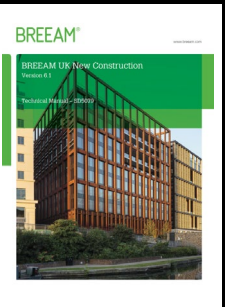
Organizational Strategy



Voluntary Standard



Project Accreditation



Whole Building Carbon

Façade Carbon

Organization Accreditation

Organizational Strategy

Potential & Timeline



Design for Impact

**SUSTAINABLE
DEVELOPMENT
GOALS**



ESG & The Built Environment



**AIA
Leadership Summit**



UN Sustainable Development Goals

Climate Actions



UN Sustainable Development Goals

Climate Actions



UN Sustainable Development Goals

Climate Actions



SDG 5
gender equality and
empower all women and girls



UN Sustainable Development Goals

Climate Actions



SDG 6
water and sanitation



AIA Framework for Design Excellence

Climate Actions

Design for **INTEGRATION**

What is purpose of this Project? How can the **design** provide multiple benefits?



Design for **EQUITABLE COMMUNITY**

How can the **design** support health and wellbeing of the users, or even the community?



Design for **WELL-BEING**

How can the **design** promote wellbeing of the users? How can the design connect people with nature?



Design for **RESOURCES**

Are there alternative to reduce **façade upfront carbon**? Can the **design** be built efficiently with local **supply chain**?



Design for **ENERGY**

How can **design** contribute to the **building performance**? How can the **design** exceed local code to approach **net zero**?



Design for **ECOSYSTEM**

How can the **design** support ecological health? How can the design support habitat restoration?



Design for **WATER**

How does the **design** material choice reduce water use in production? Can the **design** be **integrated** with rain collection system?



Design for **ECONOMY**

How will the **design** balance cost with long-term value? How do we enhance economic and experiential resources?



Design for **CHANGE**

How does the **design** address future risks and vulnerabilities from social economic and environmental change?



Design for **DISCOVERY**

How are **building performance** data and experiential stories shared, even if the findings fall short of the vision?



AIA Framework for Design Excellence

Climate Actions

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AIA Framework for Design Excellence

SDG Mapping



AIA Framework for Design Excellence

SDG Mapping



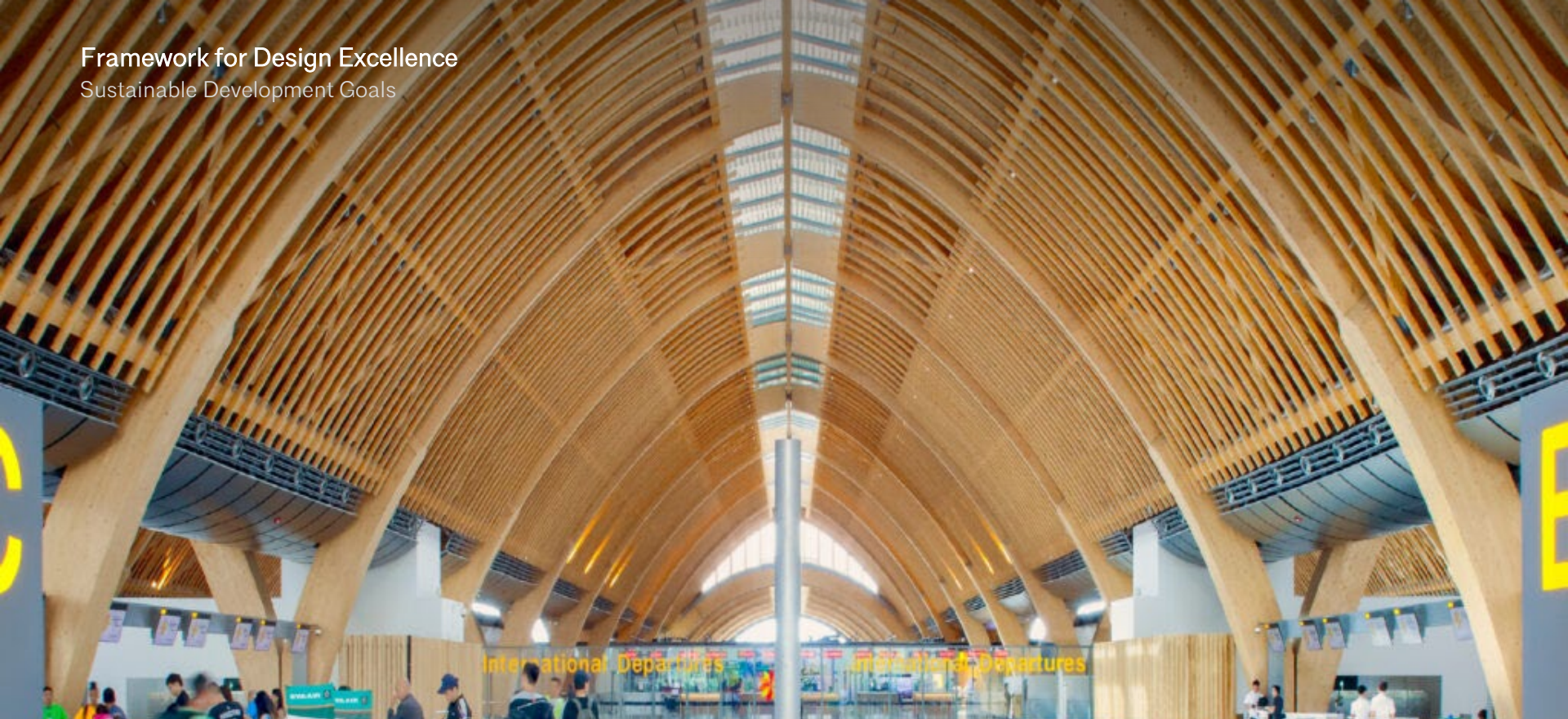
AIA Framework for Design Excellence

SDG Mapping



Framework for Design Excellence

Sustainable Development Goals



Design for INTERATION



8 DECENT WORK AND ECONOMIC GROWTH



9 INDUSTRY, INNOVATION AND INFRASTRUCTURE



11 SUSTAINABLE CITIES AND COMMUNITIES



12 RESPONSIBLE CONSUMPTION AND PRODUCTION



13 CLIMATE ACTION



17 PARTNERSHIPS FOR THE GOALS

Mactan Cebu International Airport
Terminal 2
Integrated Design Associates

*AIA Hong Kong
Honor Award for Interior Architecture*

Framework for Design Excellence

Sustainable Development Goals



Design for WELL BEING



Ng Teng Fong General Hospital
HOK International

AIA Hong Kong
Honor Award for Architecture

Framework for Design Excellence
Sustainable Development Goals



**Design for
EQUITABLE COMMUNITY**



Pak Tsz Lane Park
Ronald Lu & Partners

AIA Hong Kong
Merit Award for Urban Design

Framework for Design Excellence

Sustainable Development Goals



Design for EQUITABLE COMMUNITY



King George V School
Performing Arts Block
Ronald Lu & Partners

AIA Hong Kong
Honor Award for Architecture

Framework for Design Excellence

Sustainable Development Goals



Design for RESOURCES



HKFYG Leadership Institute
Revitalization of the Former Fanling Magistracy

*Architecture Commons
AIA Hong Kong
Merit Award for Interior Architecture*

Framework for Design Excellence

Sustainable Development Goals



Design for ECONOMY

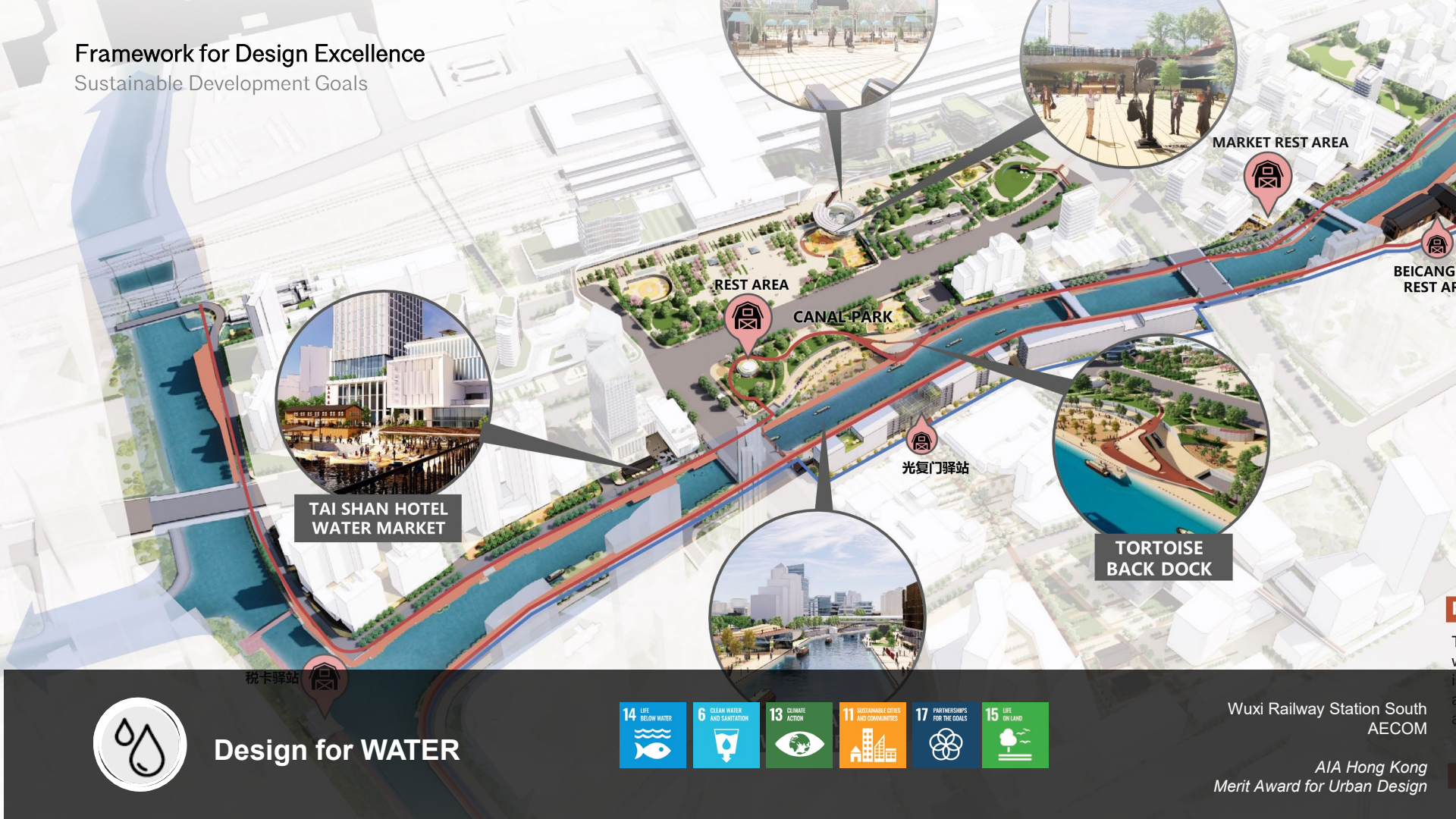


Ring of Life, Xihu Road North
CallisonRTKL Asia

AIA Hong Kong
Merit Award for Urban Design

Framework for Design Excellence

Sustainable Development Goals



Design for WATER



Wuxi Railway Station South
AECOM

AIA Hong Kong
Merit Award for Urban Design

Framework for Design Excellence

Sustainable Development Goals



Design for Discovery



HKFYG Jockey Club
Stanley Outdoor Training Camp
Architecture Commons

AIA Hong Kong
Merit Award for Architecture

Framework for Design Excellence

Sustainable Development Goals



Design for Change



Lee Shau Kee Peace Education Centre
M Moser Associates, Design Architect
Modus Architecture, Executive Architect
Honor Award for Interior Architecture
Honor Award for Sustainability

Framework for Design Excellence

Sustainable Development Goals



Design for Ecosystem



15 LIFE ON LAND



10 REDUCED INEQUALITIES



11 SUSTAINABLE CITIES AND COMMUNITIES



13 CLIMATE ACTION



3 GOOD HEALTH AND WELL-BEING

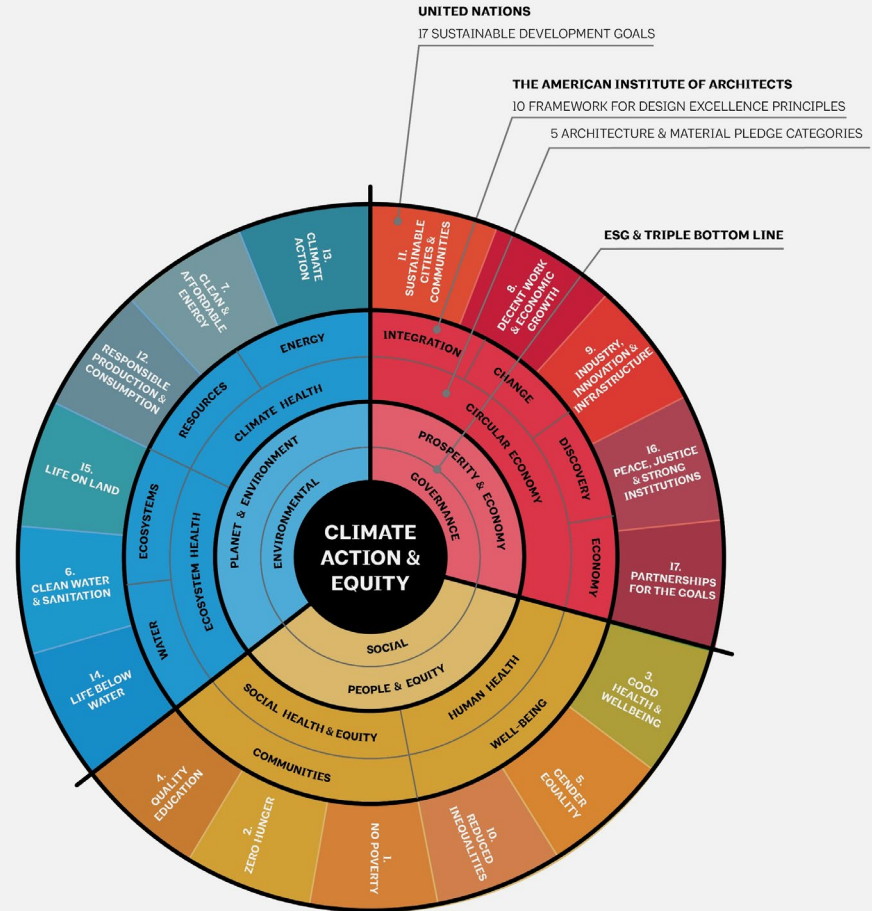
Growing Up
New Office Work

AIA Hong Kong
Merit Award in Architecture

Framework for Design Excellence

Crosswalk: ESG + SDG

- 17 Sustainable Development Goals, SDG's
- 10 Principles of Framework for Design Excellence
- 5 Categories of A&D Materials Pledge
- 3 Triple bottom line
- 3 **ESG** - Environment, Social, and Governance
- 1 **Shared goal of Climate Action and Equity**



Change Agent

ESG & The Built Environment



AIA
Leadership Summit



Climate Actions

Component Advocacy



Climate Actions | Chapter Program

AIA Hong Kong | AIA International



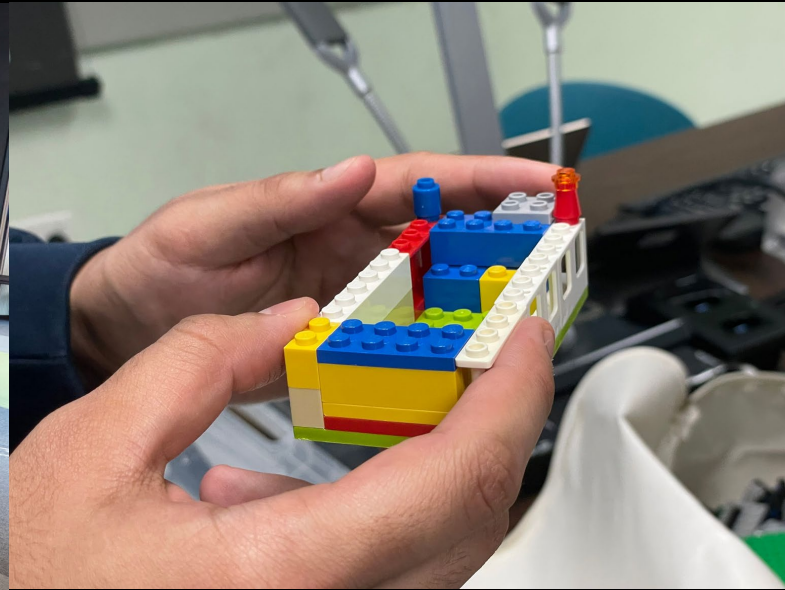
Climate Actions | Materials

AIA Hong Kong | AIA International



Climate Actions | Partnership

AIA Hong Kong | AIA International



Climate Actions | Circularity

AIA Hong Kong | AIA International



Repurposed Chairs

*Sustainable Office Solution (SOS)
AIA Hong Kong Young Architects Group;*

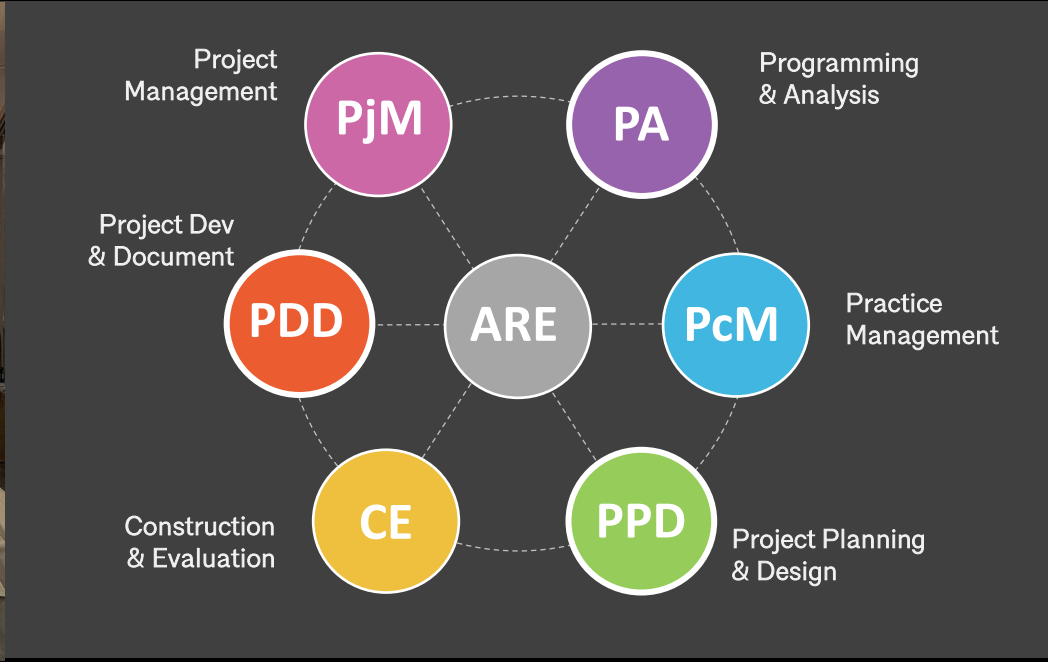
Climate Actions | Chapter Office

AIA Hong Kong | AIA International



Climate Actions | Licensure & Young Architects

AIA Hong Kong | AIA International



Climate Actions | Inter-Chapter Collaboration

AIA Hong Kong | AIA International

Academic support
+ This Seminar
AIA CELU: 2 HS

In this critical program we have brought together **hospitality experts** from all perspectives: an **operator**, an **interior designer**, and an **architect**.

Stephen Luk
Hyatt Hotels Corporation
Regional Vice President
凱悅酒店集團 - 設計服務統籌總監

Zhu Peidong
Co-Founder & Head Architect, line+
line+建築事務所 聯合創始人及主持建築師

Vincent de Graaf
AIM Co-Founder & Principal Architect
AIM 聯合創始人兼主持建築師

Wellness, Wellbeing, and Sustainability in Hospitality Design
酒店设计的健康、福祉和可持续性

AIA International

AIA International - Taipei

ESG AND ARCHITECTURE
THE ARCHITECT'S ROLE

CES CREDITS - 2 LU FOR AIA MEMBERS

Tzen-Ying (Jenny) Ling
Associate Professor, Department of Architecture, Tamkang University;
Principal of A.L.S. Architects;
Co-Founder, Origo Workshop
Topic: The Modularity Thinking in the Darker Ages

Morris Lin
Digital Twin Manager of Taiwan Architecture & Building Center
Topic: Policy Implementation and Decarbonization

Richard Lee
Partner of CLEE Office
Topic: Four Dishes + Soup: Overview of Sustainability Requirements and Systems in Taiwan

2022 OCT 28 PM 7:00

KOHLER EXPERIENCE CENTER
348 SONGLIANG ROAD, TAIPEI

RSVP: YU-WEN CHOU
0975 323 838 | ywchou122@gmail.com

To Join Online

AIA Taipei • AIA Hong Kong

Building a Sustainable Future Together
Exploring design strategies that foster sustainability

7:00 PM TAIPEI TIME • • • MAR 5, 2024

HOSTED BY	Taipei Guest	HK Guest	Location
 RICHARD LEE Partner of CLEE Office Register Now for on-site or online	 CHRIS CHAO Partner of Ho-architects International	 VIKKI LEW Chair, Committee on the Environment, AIA Hong Kong	 Q-SALON 台北南港安寧 聯合廣場二樓 182 室 5 樓

Sustainability in ARE
Online Seminar

COTE | Young Architects Group (YAG)

AIA Hong Kong

A Local Perspective in Vietnam
Practicing Sustainability
June 13 - 15, Ho Chi Minh City

Emerging Trends

ESG & The Built Environment



AIA
Leadership Summit





Jan 29, 2025 --

Corporate 'Irritation' Over ESG Fueled by Significant Costs

Feb 11, 2025 --

SEC Moved to Kill Climate Disclosure Rule

Jan 27, 2025 --

Sustainable Funds Market Inflows Halve as ESG Falls Out of Favour

Feb 19, 2025 --

SEC Rule Change Creates New Barriers for Shareholder Proposals

Jan 3, 2025 --

*ESG in 2025: Significant Adaptation in Sustainability
Emerges as Business-as-Usual*

1. Bloomberg
2. New York Times
3. Reuters
4. Financial Times
5. Reuters



Jan 29, 2025 --

Investors Push for stronger climate actions

Feb 19, 2025 --

ESG Isn't Passive Anymore

Jan 27, 2025 --

ISSB support for ISSP reporting new resources for assisting reporting

Feb 20, 2025 --

How Financial Firms' ESG Backlash Could Soon Backfire

Feb 20, 2025 --

Markes are Winning the Climate Battle, Irrespective of Federal Policy

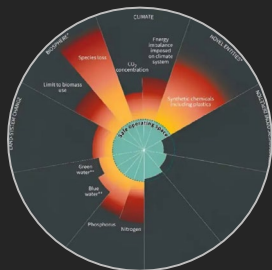
1. Bloomberg
2. New York Times
3. Reuters
4. Business Green
5. Forbes

ESG Standards

Emerging Trends

Accounting for Nature

TNFD
IFRS
Biodiversity Net Gain



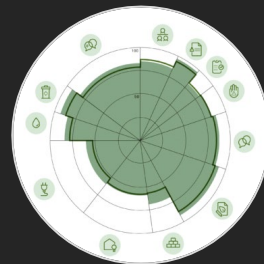
Organizational Sustainability

SBTi
CDP
MSCI



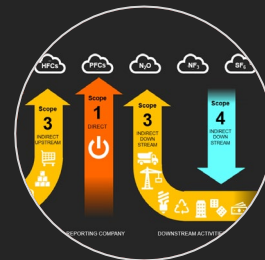
Sectoral Standards

GRSBE
CRREM



Scope 4

Avoided Emissions



Nature Disclosure

Emerging Trends



ENVIRONMENTAL

Climate Change

Natural
Resources

Pollution
& Waste

Environmental
Opportunity

Greenhouse Gas
Emissions

Water
Stress

Toxic Emission
& Waste

Opportunities in
Clean Tech

Product Carbon
Footprint

Biodiversity &
Land Use

Packaging
Material
& Waste

Opportunities in
Green Building

Financing
Environmental
Impact

Raw Material
Sources

Electronic
Waste

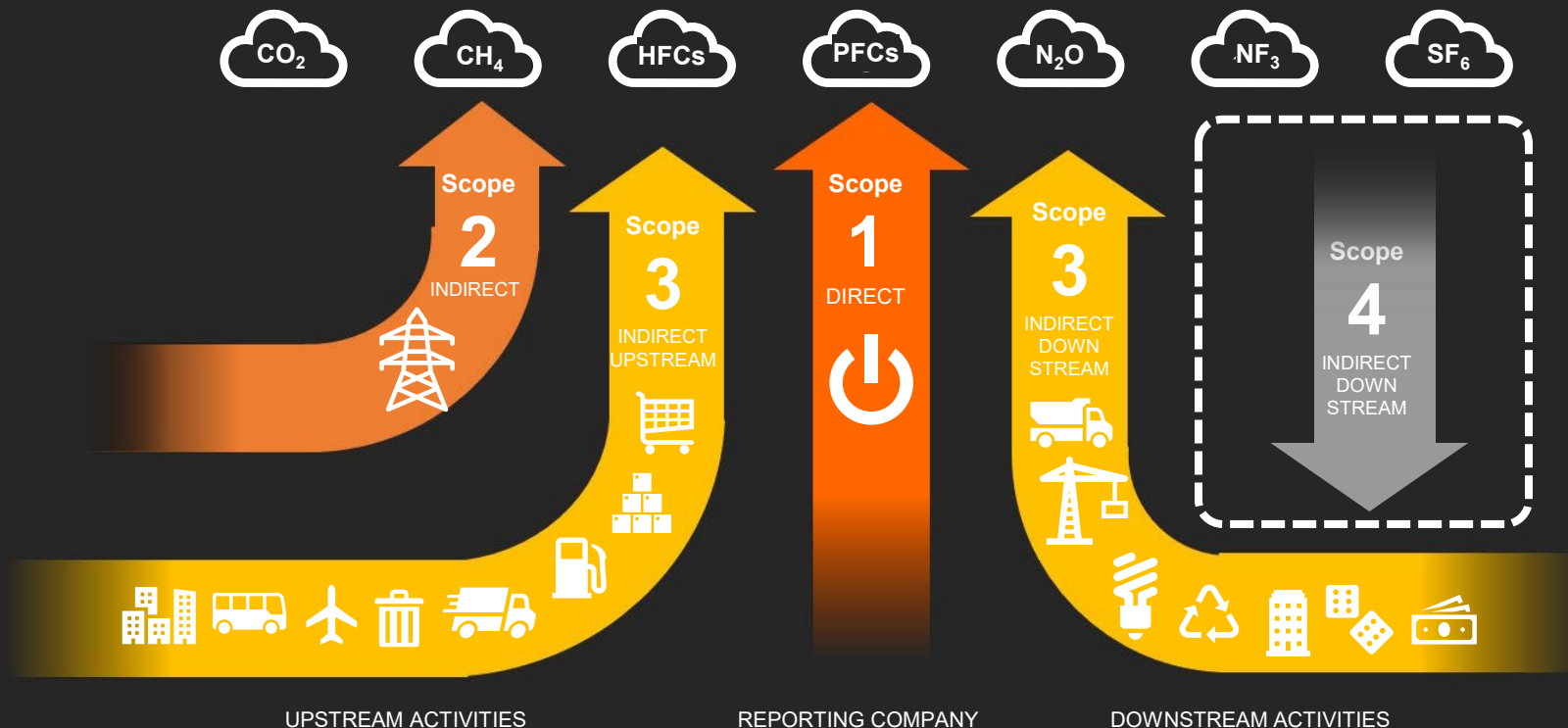
Opportunities in
Renewable
Energy

Climate Change
Vulnerability



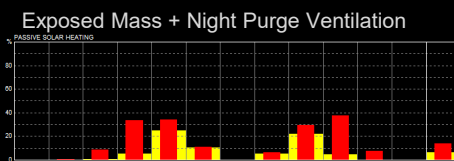
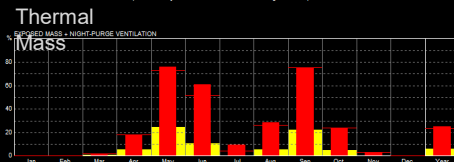
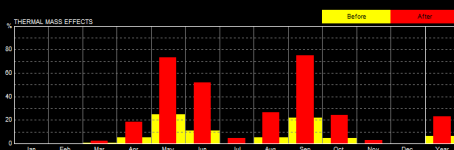
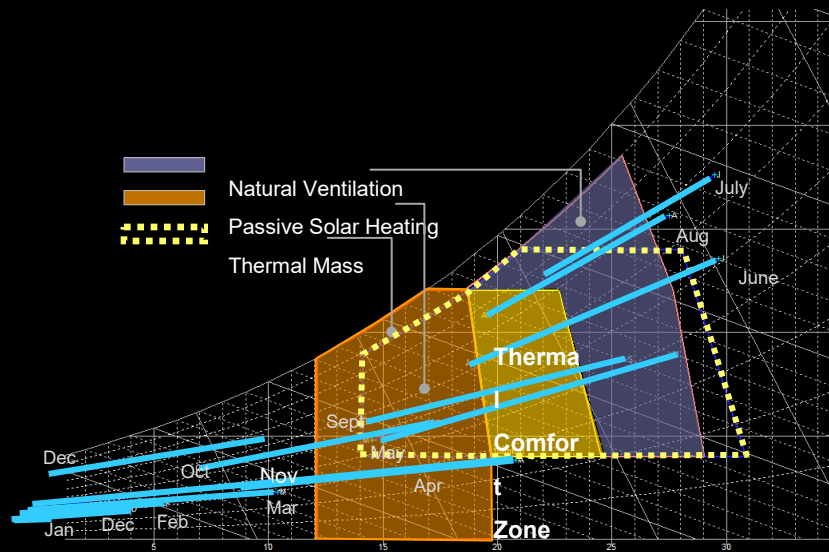
Scope 4 Avoided Emissions

Emerging Trends

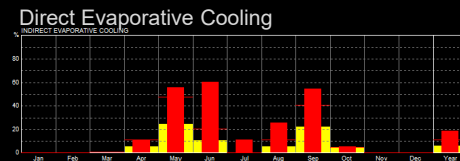
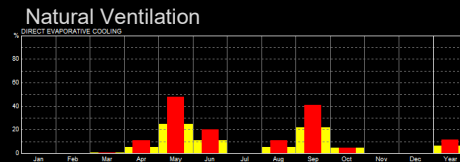
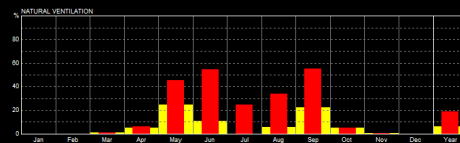


Data-Driven Design

Emerging Trends



Passive solar heating

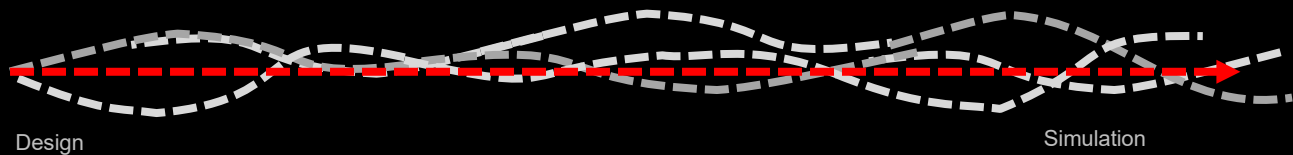


Indirect Evaporative Cooling

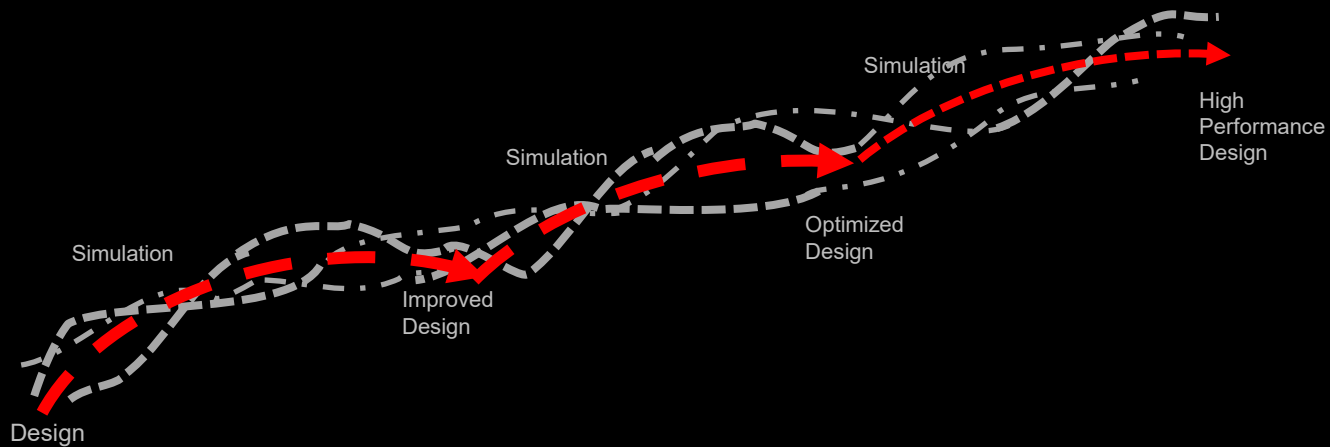
Iterative Process

Emerging Trends

Linear Process

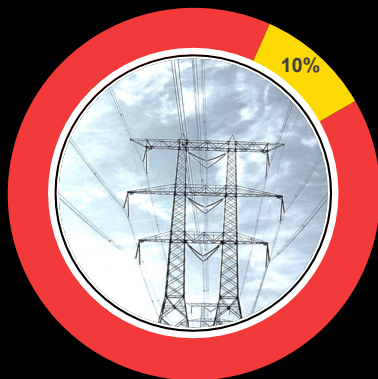


Iterative Process



Emerging Economies

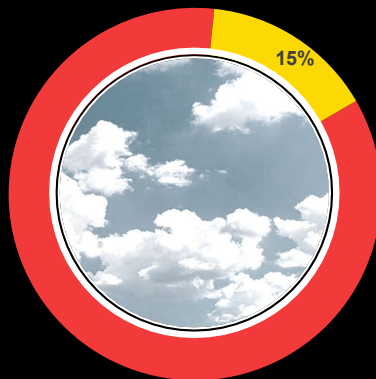
Emerging Trends



Energy Use

Footprint
15,608,000 kWh/yr

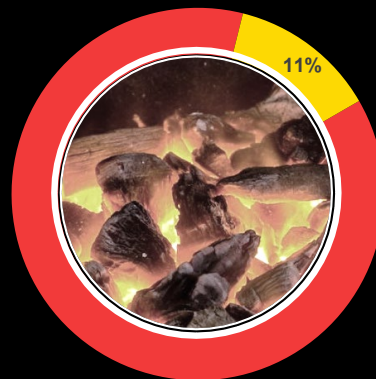
Handprint
1,560,800 kWh/yr



Climate Change

Footprint
11,900,000 kg CO₂-eq

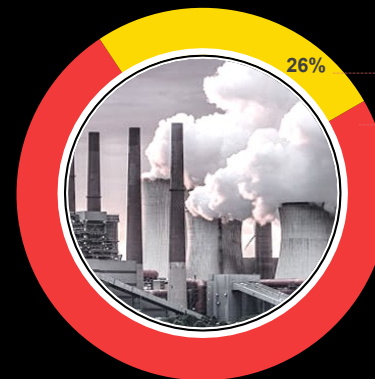
Handprint
1,810,000 kg CO₂-eq



Fossil Fuel Depletion

Footprint
3,350,000 kg oil- eq

Handprint
378,000 kg oil- eq



Particulate Matters

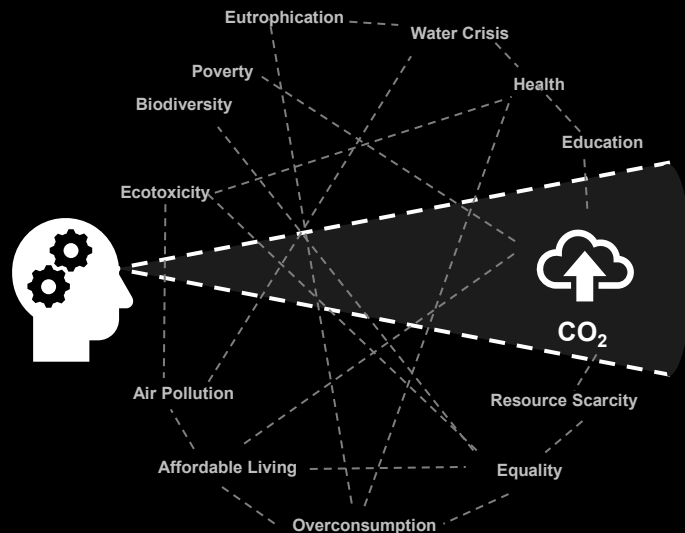
Footprint
18,884 sq.m.a

Handprint
4,925 sq.m.a

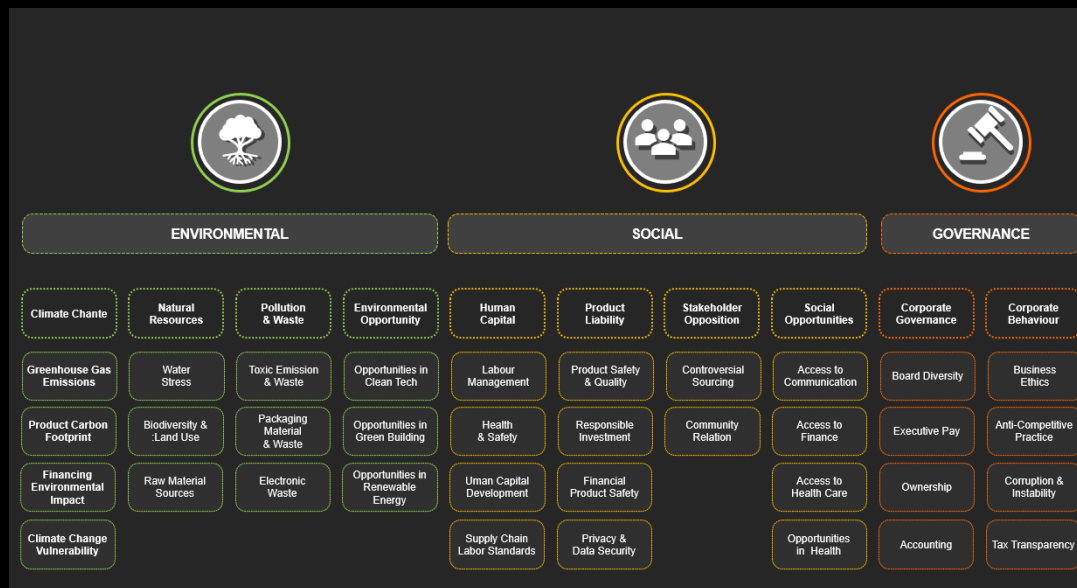


Beyond Tunnel Vision

Emerging Trends



Carbon Tunnel Vision

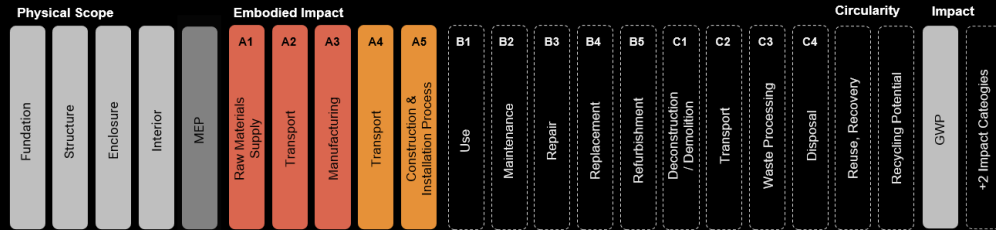
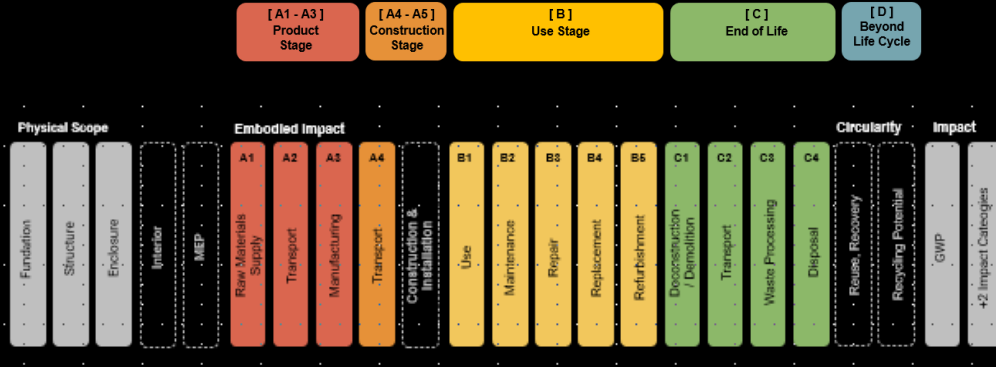


ESG Multi-Attribute Disclosure



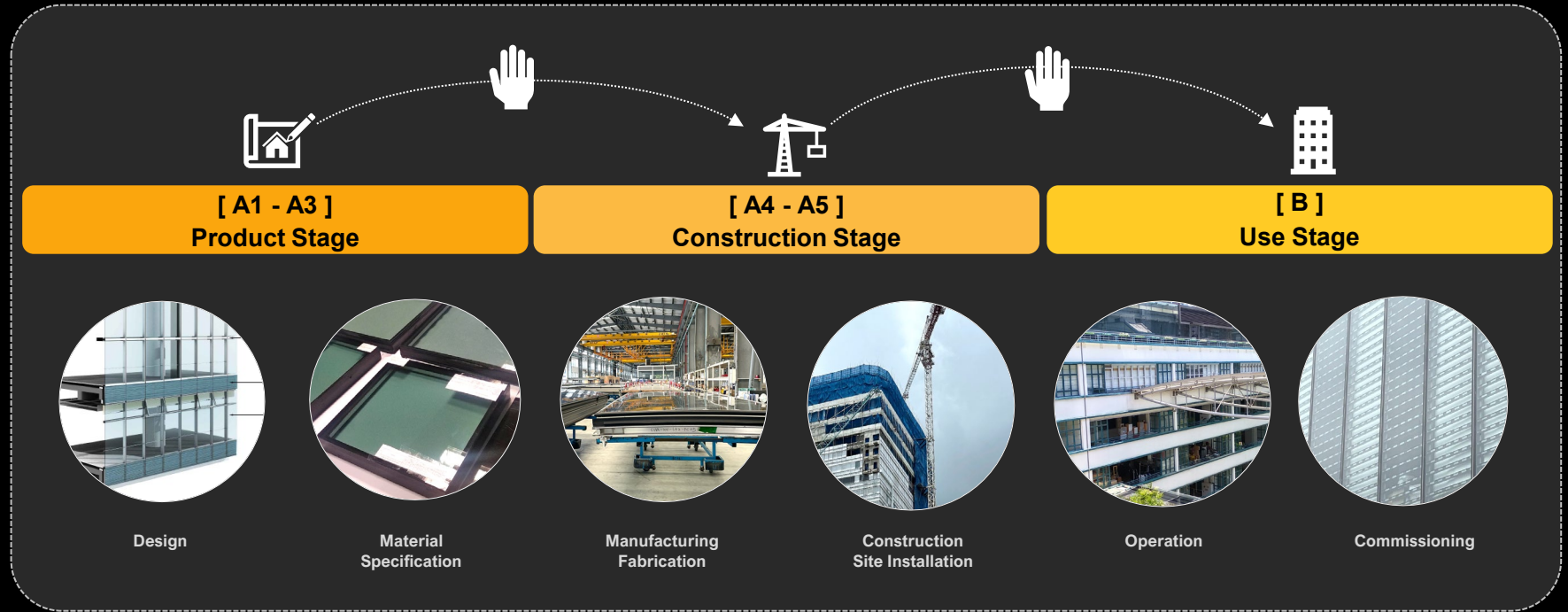
Whole Life Carbon

Emerging Trends



Value Chain

Emerging Trends



Industry Ecosystem

Emerging Trends



Climate Actions

Emerging Trends



ESG & The Built Environment

What Does it Mean for Practitioners?.

VIKKI LEW *AIA RIBA LEED AP WELL AP EDAC CFAESG*
Chair, Sustainability Committee | AIA International
Chair, COTE | AIA Hong Kong

A photograph of a woman with long dark hair, wearing a black turtleneck and glasses on her head, smiling and resting her chin on her hand. She is sitting at a table with a man in a checkered shirt and tie, who is leaning over and looking at a document. The background shows other people in a conference room setting. A yellow starburst graphic is in the top right corner.

AIA

Leadership Summit

February 24–26, 2025
Washington, DC