

CARBON NEUTRAL BY 2050: ... MYTH OR REALITY?



Global Alliance
for Buildings and
Construction

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Chungha Cha, Cofounder & CTO
Reimagining Cities LLC

Net Zero Buildings

12+ years

Finance & Real Estate Smart, Sustainable Cities

20+ years

Citibank, USA

Yasuda Trust, Tokyo

Asia Merchant Bank, Seoul

Lone Star Real Estate Funds

CEO of Korea

re!maging cities

1992 ...
1987
1985
1979
1963
... 1957

re!maging cities

Who are we?



Reimagining Cities Intro ...

Since 2008, we are a non-profit research firm focused on global trends in smart, resilient cities, innovation districts, digital twins and sustainability. We are now going beyond research to work with cities, real estate developers, investors and large portfolio owners to help decarbonize the built environment.

- **Existing portfolios.** Linking energy optimization solutions to financial KPIs. To help facilitate portfolio-wide strategies for real time monitoring in order to drive down energy consumption and GHG emissions. And, at the same time, increase annual operating income and portfolio valuations.
- **New construction.** Helping develop bankable solutions for landmark decarbonized urban developments. Greener and smarter developments without over spending so that target investment returns can be achieved.

Lakeview Village. A potential showcase C\$6 billion low carbon mixed use development in Ontario. We have been working with the Owner developer and the City of Mississauga since 2018 to help shape the development sustainability objectives and implementation plan.

<https://mylakeviewvillage.com/sweden-canada-smart-cities-workshop/>

RE!MAGINING DECARBONIZED BUILT ENVIRONMENT FOR NET ZERO CITIES

... for the real estate sector, the decarbonization of the built environment requires a two-pronged approach:

1. New community developments must be resilient AND carbon neutral to avoid the “inefficiencies of past practices”
2. Existing stock: collection of real time data across your entire portfolio as the first step; then the journey toward Net Zero can begin.

1.

New Construction

Showcase “Decarbonized” Urban Renewal Projects
Deal Pipeline as of 2021.03

High Priority

Lakeview Village
Mississauga, Canada
71 hectares

C40 Reinventing Cities
Danish Embassy Korea

Early Discussions

Korea Medical Cluster
Approvals pending
46.9 hectares

India Projects
w/ Embassy Group
60 acres

Penang Bay
Malaysia

Low Priority

Konza Technopolis
Kenya

Charles’ Project
Wash, DC area

Michael’s Project
Seattle area

2.

Existing Real Estate

Platform for Enhanced Understanding
on the Portfolio Level

... taking the first few steps 2021-2025

Digital Twins
For Real Estate
Portfolios

Energy & GHG

... to increase NOI
... to drive down GHG

Health & Well Being

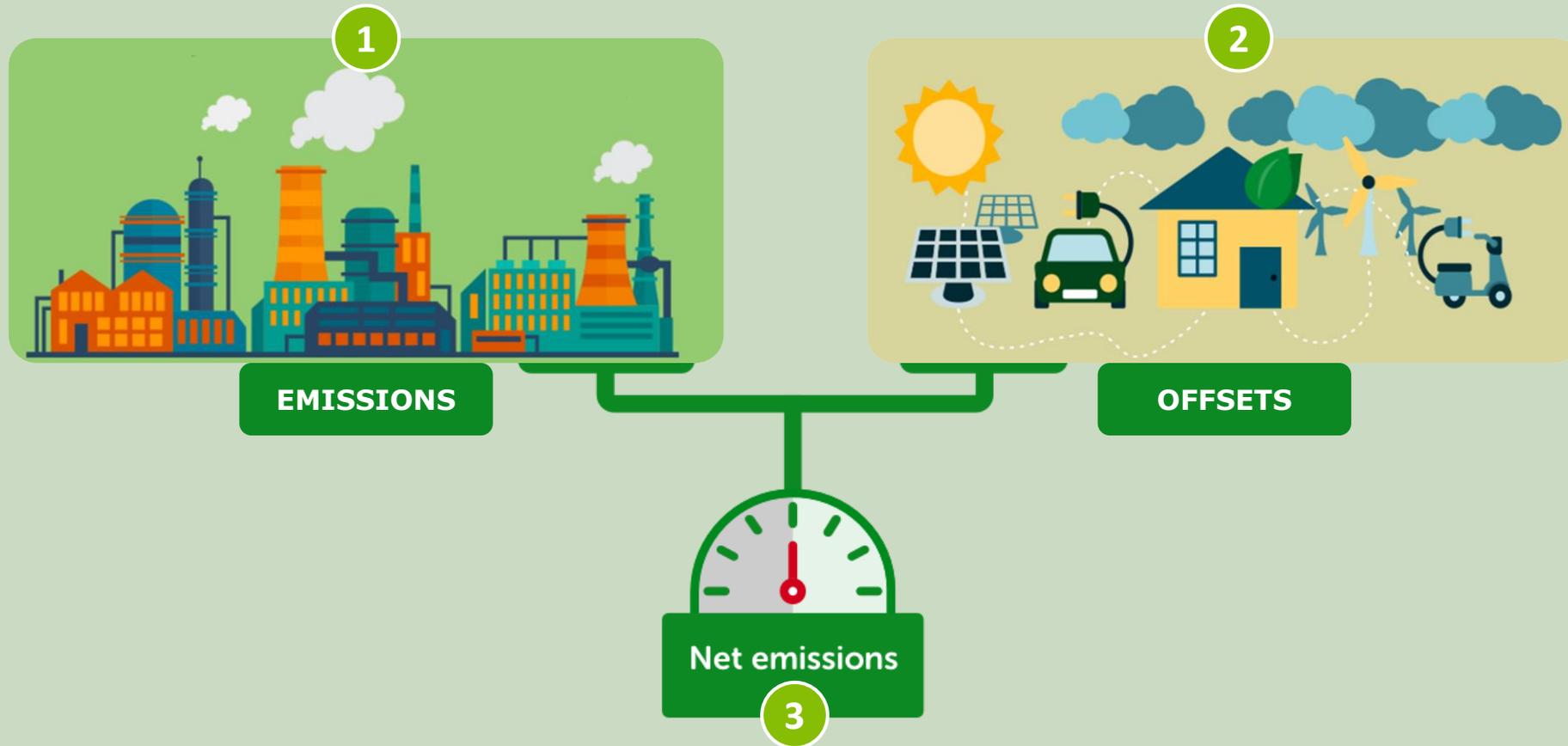
... to attract & retain
tenants

Add solutions when ready, i.e., Space Optimization

... as internal teams gain a better understanding of
portfolio level performance KPIs and pertinent metrics

Is it okay to pollute, if I buy carbon credits?

Let's learn together.

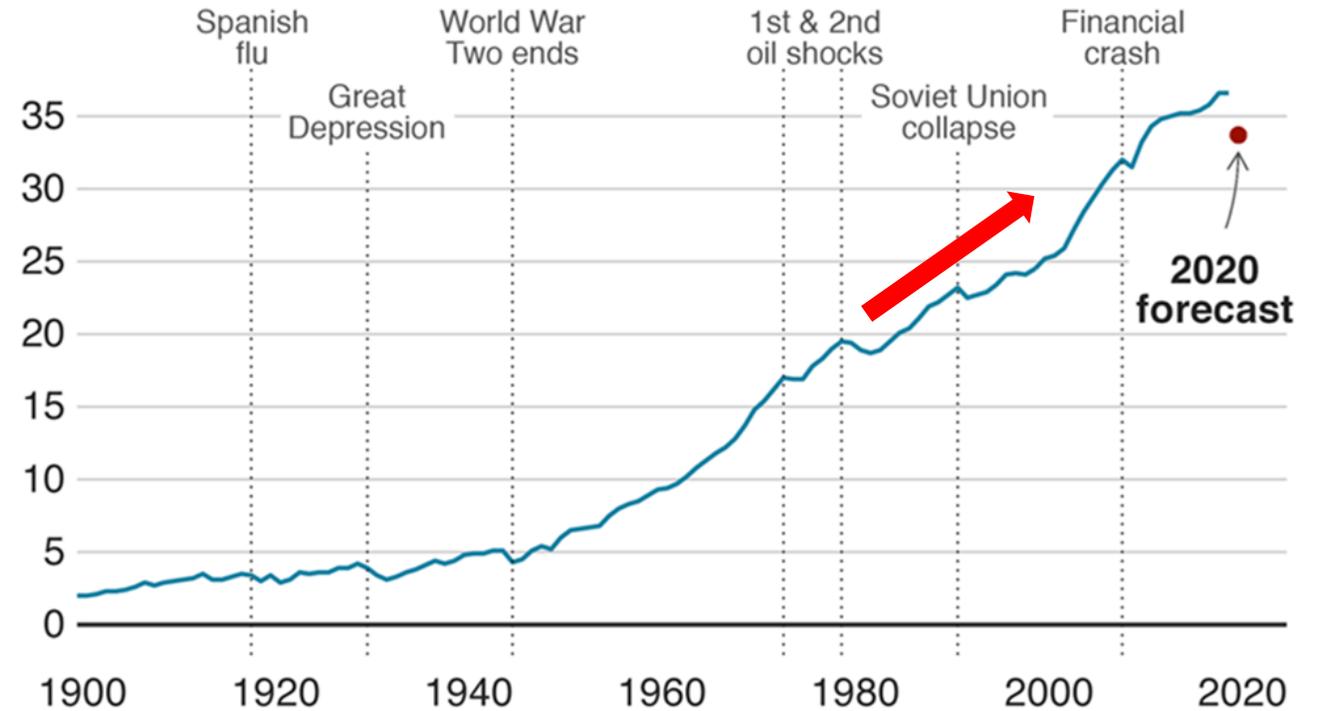


Why?

- Global GHG emissions **continue to climb** despite Paris Accord pledges were signed in 2016.

Global CO2 emissions, 1900-present

Billion tonnes of CO2 per year

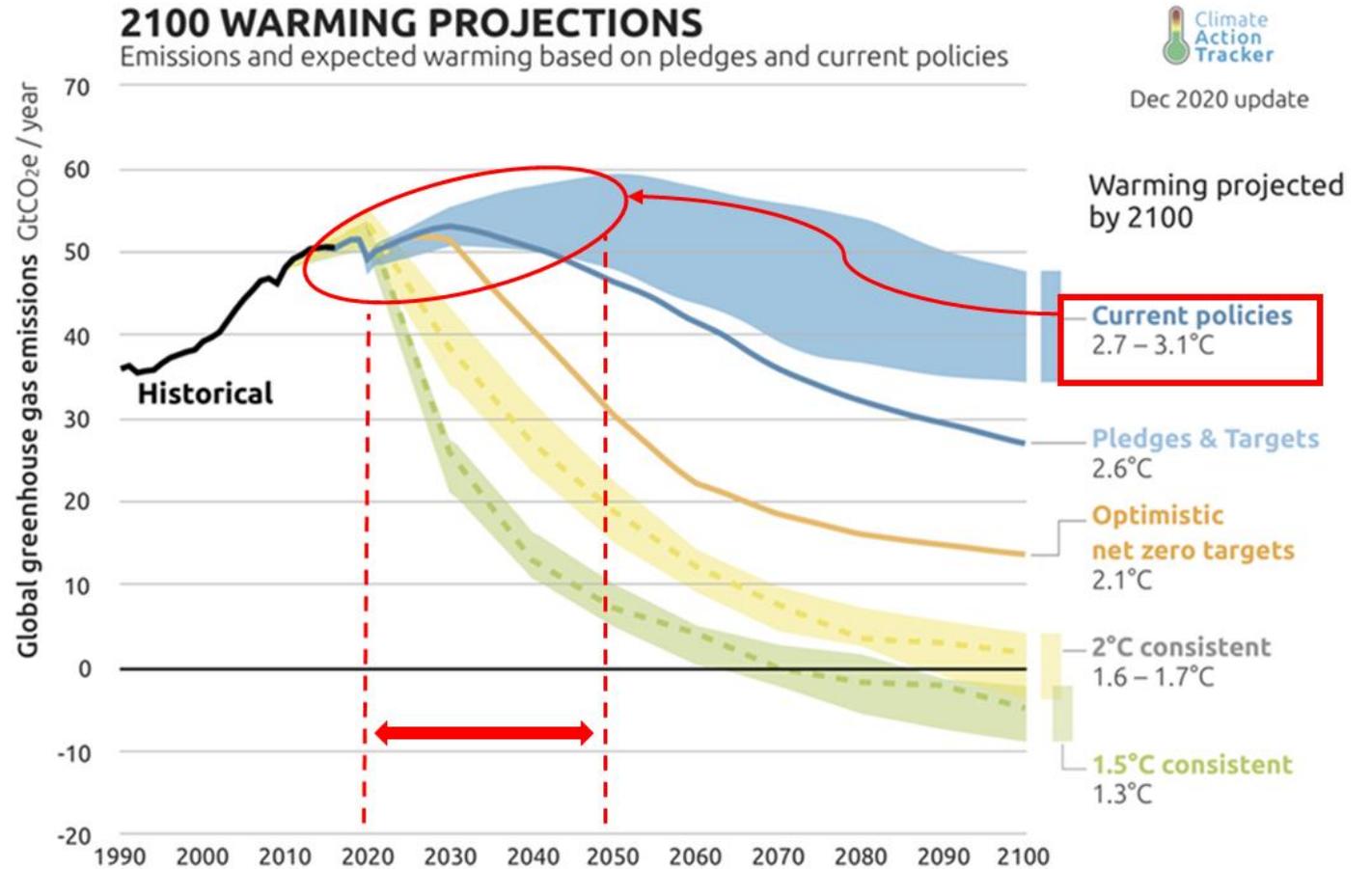


Source: Global Carbon Project, CDIAC & IEA

BBC

Why?

- **Current policies** are not in alignment with the Paris Accord targets of limiting global warming under 1.5-2.0 degrees C!
- **Carbon neutral by 2050?** ... so let's focus on what we can do **NOW**. Let's learn and share our initiatives for 2021 to 2025.

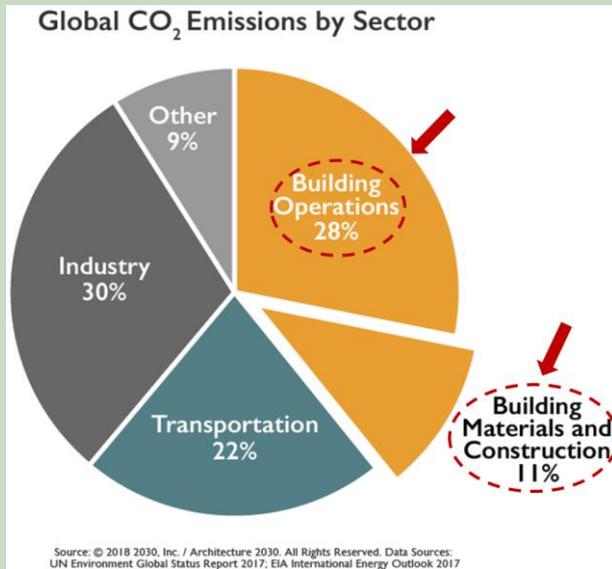


Net Zero Carbon Cities: Myth or Reality?

... let's face the facts together.

Why?

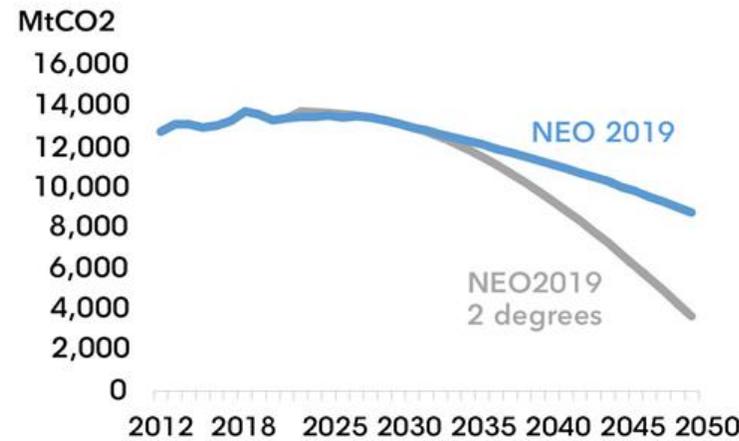
- Almost **40%** of global GHG emissions from the **built environment**.



The road to carbon neutrality in the built environment:

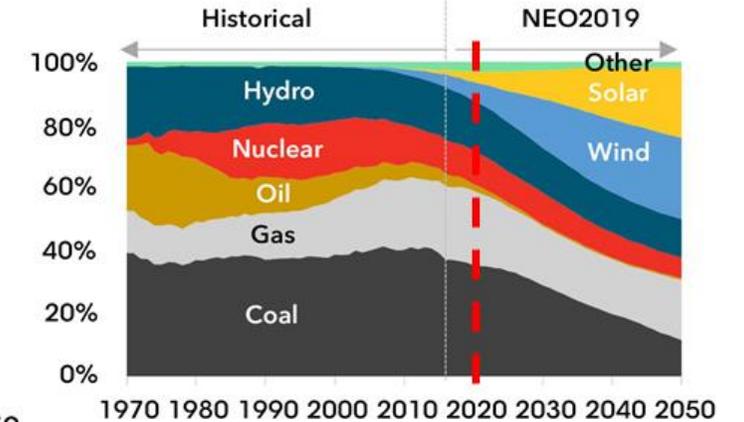
1. **Demand.** Reductions in energy consumption through energy efficiency measures.
2. **Supply.** Transition to clean, renewable energy mix

Figure 1: Global power sector CO₂ emissions

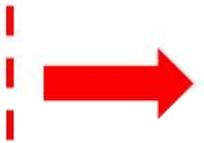


Source: BloombergNEF

Figure 2: Global power generation mix



Source: BloombergNEF



Why?



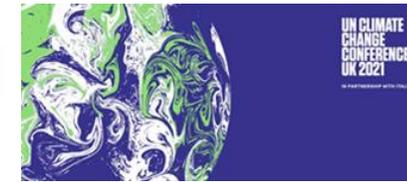
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1. Race to Zero

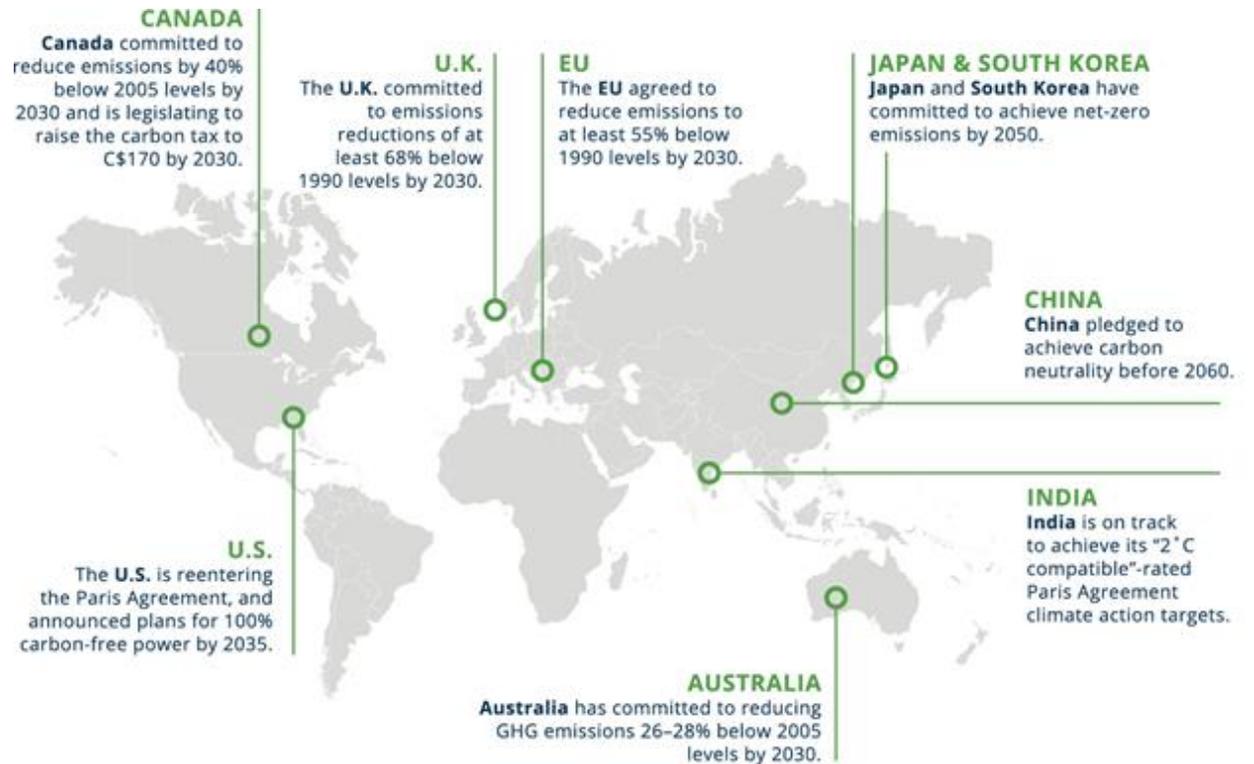
A coalition committed to the same overarching goal: achieving net zero emissions by 2050:

- **1,397** companies
- **454** cities
- **74** investors
- **23** regions
- **569** universities

RACE TO ZERO



Race To Zero is a global campaign to rally leadership and support from businesses, cities, regions, investors for a **healthy, resilient, zero carbon recovery** that prevents future threats, creates decent jobs, and unlocks inclusive, sustainable growth.



Net Zero Carbon Cities: Myth or Reality?

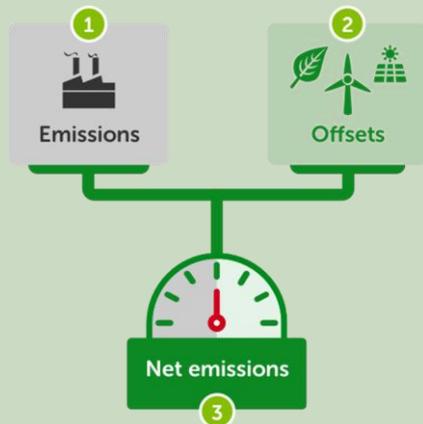
... let's face the facts together.

Net Zero Carbon Cities

... an Integrated Approach

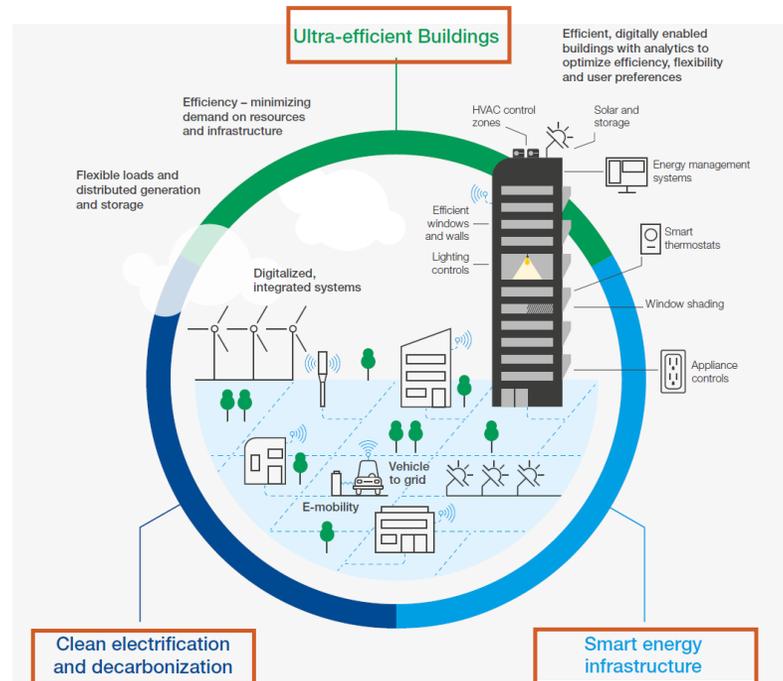
Drive down consumption: Real Estate Owners and Developers (with help from Proptech) have a big role to play!
Measure your EUI or kWh/m²a!

Supply of clean energy toward 100% renewable energy with a smart energy infrastructure is important too!



Net Zero Carbon Cities: An Integrated Approach

INSIGHT REPORT
JANUARY 2021



How can buildings contribute?



Ultra-efficient buildings

Digital integration and management

- Electrified heating and cooling
- Solar rooftop and distributed storage
- Building management systems
- Charging infrastructure

Net Zero Carbon Cities: Myth or Reality?
... let's face the facts together.

2. Net Zero Asset Owners Alliance

The **Net-Zero Asset Owner Alliance**, the \$4trn UN-backed group of asset owners committed to decarbonizing their portfolios ... Announced at the UN Secretary-General's Climate Summit on September 23rd, 2019, the Alliance members **commit to transitioning their investment portfolios to net-zero greenhouse gas emissions by 2050**, consistent with a maximum temperature rise of 1.5°C above pre-industrial temperatures.

In **2020/21**, the alliance plans to advance its commitment through several tracks of work, including **monitoring, reporting and verification; engagement with asset managers and corporates; policy advocacy and investment.**

 **PRI** Principles for Responsible Investment

 **FINANCE INITIATIVE**

THE NET-ZERO ASSET OWNER ALLIANCE

 unepfi.org/net-zero-alliance

#netzerofinance

Net Zero Carbon Cities: Myth or Reality?

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2. Net Zero

Asset Owners Alliance

What are our peers doing?

... **setting 2025 reduction targets within 16-29% range.**

IPE 2021.02.15

The United Nations-convened Net-Zero Asset Owner Alliance has finalised the framework according to which individual members will be publishing their 2025 portfolio decarbonisation targets to support the goal of net-zero emissions by 2050.

- first time major investors set and commit to report on interim targets on the way to the 2050 objective
- 33 Alliance members will be setting **2025 emission reduction targets within a 16-29% range.**

Udo Riese, ESG integration lead at **Allianz Investment Management SE** and **co-chair of the Alliance's working group on methods, reporting and verification**. Members of the alliance should start to publish their 2025 decarbonisation targets over the coming months, if not sooner. "Investors and companies across the globe must follow by publishing their own rigorous, science-based and accountable targets."

"With 2050 most reasonable people say we need to do it, it's far away **but for 2025 you need to take immediate actions to reach the target.**" This has implications for how organisations work, Riese says. "It's a huge change process."

Members of the alliance should also **set sub-portfolio and later portfolio emission targets, sector targets, and "financing transition" targets.**

Net Zero Carbon Cities: Myth or Reality?

... let's face the facts together.

2. Net Zero

Asset Owners Alliance

What are our peers doing?

... **setting targets for 2025.**

Things are due to get more specific and near-term. In January, the NZAOA published the final protocol setting out how members should set targets for 2025, and these targets should soon begin to surface.

- At PGGM, senior strategist Jacco Koopmans suggests there are governance benefits from setting a net-zero goal ... **PGGM is the asset manager for €238bn Dutch pension scheme PFZW**, which is aiming for net-zero portfolio emissions by 2050.
- In 2020, **BT Pension Scheme (BTPS)**, the UK's largest corporate pension fund, received a lot of attention when it announced a 2035 net-zero target. Victoria Barron, head of sustainable investment, says ***deciding to set a net-zero target "wasn't so difficult" ... more challenging part was choosing 2035 as the target date*** and being confident enough to announce the goal. ***The problem is data*** – "not having all the information at our fingertips".

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2. Net Zero

Asset Owners Alliance

What are our peers doing?

... **organizational change**

“The main changes are organizational,” says Pauline Lejay. In July 2020, five months after joining the NZAOA, ERAFP set up a committee of about 10 individuals, including the CEO, the CIO, heads of asset classes, and herself, to steer the work involved in following through with the commitment it made.”

ERAFP, the €37bn French pension fund for civil servants

Pauline Lejay, head of socially responsible investment

- “The goal we have set ourselves is so important we had to modify our way of working,” she says. She also says NZAOA members are confronted with an **imperfect situation in regard to data but that this should not be a reason for inaction.**
- “Not everything is stabilised or settled, but it’s not because this is the case that we should not move ahead,” she says. “The risks are too present.” **The NZAOA is clear that it is out to drive real world change** and says it will pursue this “primarily through engagement with corporates and policymakers as well as contributing capital required to finance the transition”.
- For 2025 individual members are supposed to identify either 20 companies with a focus given to the highest emitters, or those **responsible for 65% of the investors’ portfolio-owned emissions** that do not already have Paris-aligned business transition commitments. **The investors are then required to set either direct, collective, or asset manager action targets to engage the identified companies.**

Net Zero Carbon Cities: Myth or Reality?

... let's face the facts together.

2. Net Zero

Asset Owners Alliance

What are our peers doing?

... Engagement not Divestment

“It’s so easy to reduce the carbon footprint of a portfolio, you just **reduce your exposure to certain sectors**, but that’s **exactly not the way** the members want to do it because exiting those sectors will not reduce any emissions,” says Riese.

- **What about divestment?** Riese says the common understanding of the NZAOA is that it is not pushing for divestment. In certain circumstances it can be the **ultimate consequence of a failed engagement push**, “but the idea is that the investee companies need to move on the 1.5°C pathway themselves”.
- Last December, the **New York State Common Pension Fund**, valued at \$226bn (€186bn), announced a **2040 net-zero carbon emissions target**. As part of this the fund will within four years complete a review of investments in energy sector companies. It said divestment was a last resort, but that “where consistent with fiduciary duty,” it would take that step if energy sector companies failed to meet minimum standards. The pension fund **is not a member of the NZAOA**.

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2. Net Zero

Asset Owners Alliance

What are our peers doing?

... **joining NZAOA to lead.**

... **joining NZAOA to learn.**

Alan Polack, PFA's Group CEO, said:

“With more than 1.3 million clients, PFA has a special obligation to contribute to sustainable development of our society.

... and by signing up to NZAOA, it **had to set five-year targets** outlining its projected progression towards this goal.

Denmark's PFA joins net-zero alliance, citing data exchange as a plus

IPE May, 2020

- Danish DKK688bn (€92.2bn) pension fund PFA has become the latest member of the United Nation's Net-Zero Asset Owner Alliance (NZAOA), citing the **alliance's potential to facilitate knowledge exchange** as a key benefit for it as an investor. And to swap climate investment experiences.
- Kasper Ahrndt Lorenzen, PFA chief investment officer, said: “In some areas, climate-friendly investment is an immature area, and **data quality, for example, can be a challenge.**”
- “By working together as some of the world's largest investors, we can **jointly find better solutions** to those problems than if we work individually,” he added.

<https://www.ipe.com/news/denmarks-pfa-joins-net-zero-alliance-citing-data-exchange-as-a-plus/10045486.article>

Net Zero Carbon Cities: Myth or Reality?

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2. Net Zero

Asset Owners Alliance

What are our peers doing?

... **Ontario Teachers**

... **CDP-Q (NZAOA member)**

Caisse de dépôt et placement du Québec is a member of the UN-convened Net-Zero Asset Owner Alliance and as such has also **committed to net-zero portfolio emissions by 2050.**

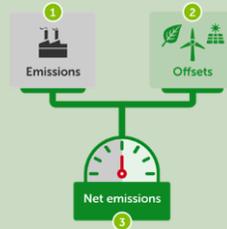
Ontario Teachers announces 2050 net-zero goal

IPE 2021.02.22

- Ontario Teachers' Pension Plan Board (OTPP) is committing to achieve net-zero greenhouse gas emissions by 2050, it announced today. (2021.02.22)
- OTPP said that over the coming months, it would hold itself accountable by **establishing concrete targets for portfolio emissions and its investments in climate solutions.** It will **report annually** on performance against its goals.
- "As a global pension plan, we will leverage our scale and influence to transition to a **low-carbon economy and create a sustainable climate future,**" said Jo Taylor, president and CEO of the C\$205bn (€133bn) fund.

Net Zero Carbon Cities: Myth or Reality?

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3. IIGCC

A new framework for net-zero investing announced earlier this week was developed by the **Institutional Investors Group on Climate Change**. The organization is made up of pension funds and asset managers who manage a combined \$33 trillion, including Pacific Investment Management Co. and Fidelity International.

It takes an important stand in warning against one of the biggest loopholes in net-zero pledges: using carbon offsets as a replacement for cutting emissions. The most common example is planting trees or protecting forests rather than, say, reducing reliance on coal, oil and methane.

The Risk of Letting Big Finance Write Its Own Climate Rules

Bloomberg 2021.03.12

- The six biggest Wall Street banks have now promised to get to net-zero emissions, after Citigroup Inc., Goldman Sachs Group Inc. and Wells Fargo & Co joined the club this month.
- **But what does “net-zero” actually mean?** For the planet, it’s the point at which the levels of greenhouse gases stabilize, ending the sharp increase in heat-trapping emissions that have brought us to dangerous levels of global warming.
- **Financial institutions interpret this in a number of ways.** It could mean continuing to finance carbon-intensive fossil fuel activities while finding ways to absorb carbon dioxide elsewhere, and even using creative accounting to balance its emissions score. Or it could mean actively engaging with companies to ensure they have credible climate plans, using divestment or the withdrawal of its credit and services as a threat to make sure they improve. **The space in between is vast.**
- More recently, **big financial institutions are getting directly involved in developing these standards.** It makes sense that they would want as much say as possible in the rules that will govern their climate policies, especially as pressure grows for them to take stronger action.

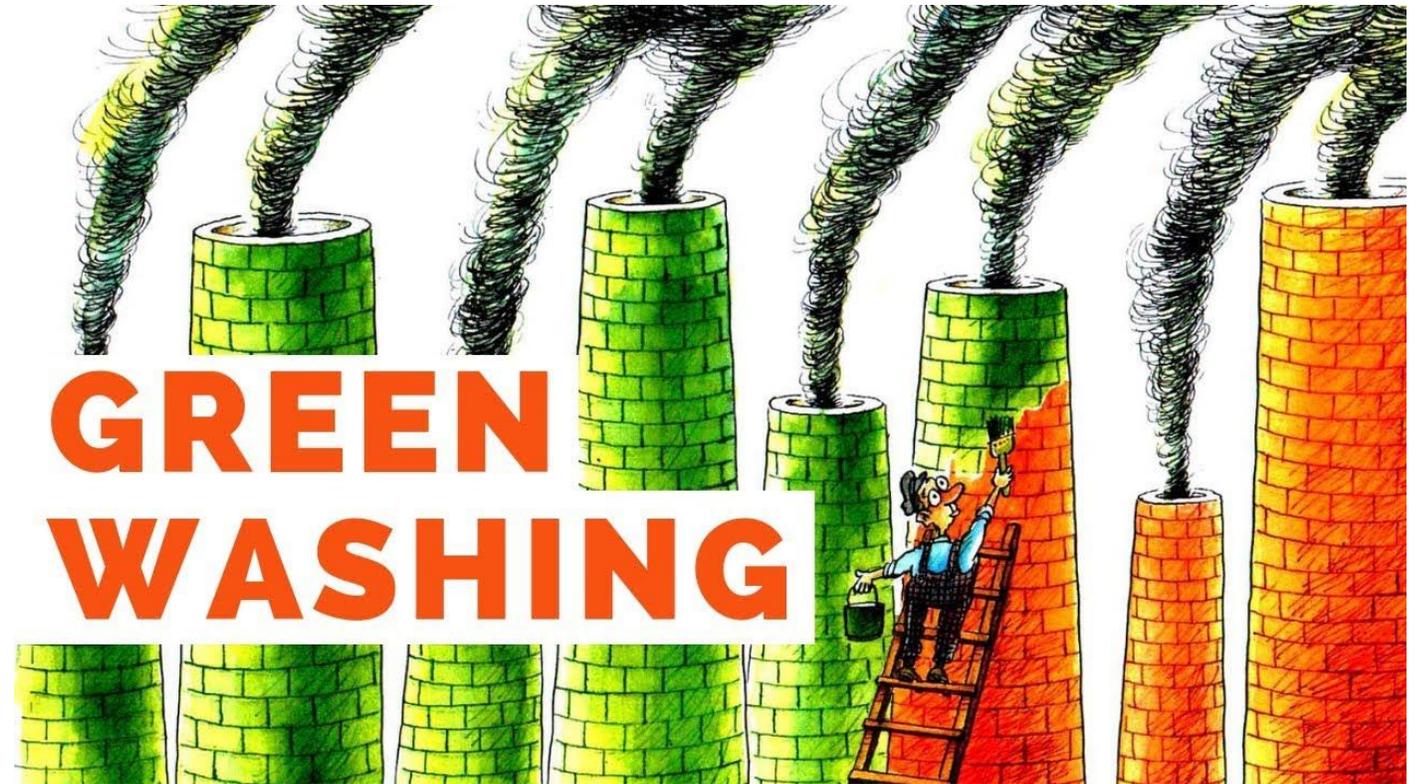
Net Zero Carbon Cities: Myth or Reality?

... let's face the facts together.

4. Greenwashing...

... is our biggest obstacle!

“... if they are in a position to say, **‘We are net zero because we bought offsets but don’t look at our dirty coal issues here,’** then the industry as a whole is potentially abdicating responsibility,” said Emily Kreps, global director of capital markets at CDP, a leading nonprofit climate-disclosure platform.



Net Zero Carbon Cities: Myth or Reality?

... let's face the facts together.

5. Urban Land Institute

... embracing Net Zero goals!

ULI GREENPRINT a worldwide alliance of leading real estate owners, investors, and strategic partners committed to reduce GHG by 50 percent by 2030.

Greenprint members portfolio account for:

- **220 million sq. m** of office, multifamily, industrial, retail, and hotel properties.
- **10,190 +** properties
- **32** countries
- **\$1.18+** trillion USD AUM



Decarbonizing the Built Environment

10 Principles for Climate Mitigation Policies



BUILT ENVIRONMENT NET ZERO ROADMAP

... for Real Estate Owners & Developers.



Help cities achieve carbon neutral goals while building better communities ...

Beginners

- Mostly “code-compliant” building
- LEED; Green Building Certifications
- Sustainability discussions but lack actions taken toward key metrics
- Occasional energy audits

Intermediate

- Chief Sustainability Officer (CSO) on board but primarily PR campaigns and communications.
- Increased level of awareness of global issues & challenges
- But lack strategic roadmap and portfolio level metrics on EUI, air quality, water, waste & other key performance metrics

Advanced

- CSO and executive team driving organizational change.
- Net Zero carbon commitments
- **Existing portfolios:** Transparent metrics on EUI across entire portfolio. Digital Twins to collect/ manage data real-time
- **New construction:** “design, build, operate” showcase resilient, carbon neutral communities.

Net Zero Carbon Cities: Myth or Reality?

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How? **Keep it Simple** ... for the real estate sector

1. Existing Stock

... measure your **kWh/m²a** or EUI over your entire portfolio

2. New Construction

... measure your **kWh/m²a** or EUI early in your conceptual design stage with energy modeling & simulation tools before construction!

If you cannot **measure it...**

... you cannot **manage it.**

... so, what is your **kWh/m²a** or energy use intensity over your entire real estate portfolio?



... only if you measure it, can you identify the **“low hanging fruits”**



How?

... Existing Real Estate Portfolios

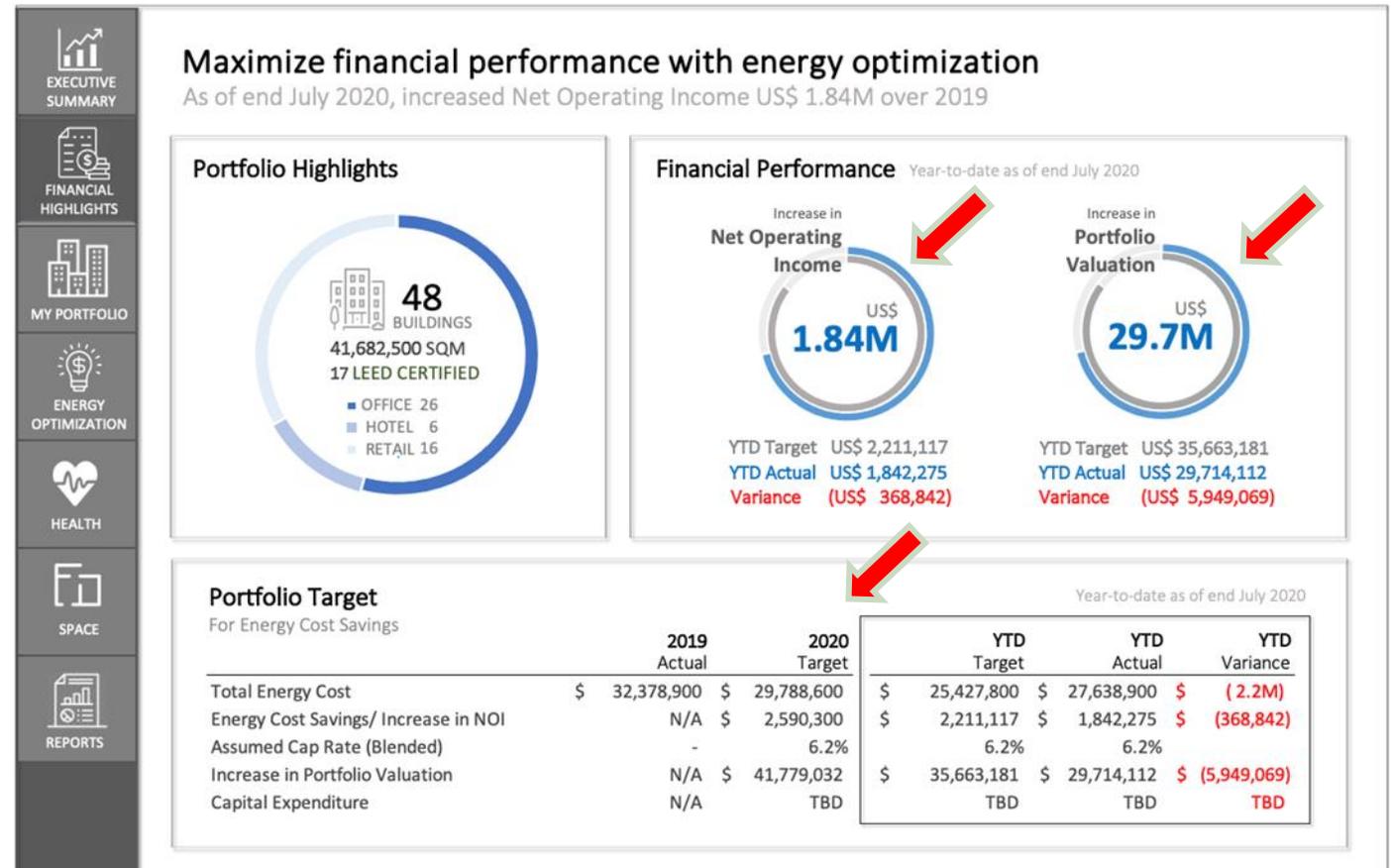
... Linking to Key Financial KPIs

Taking the first steps is important

1. Linking FM metrics to key financial KPI metrics
2. real time data on kWh/m2a for entire portfolio is key!

Energy Optimization

1. To increase profits
2. To increase portfolio valuation
3. To drive down carbon emissions toward carbon neutral goals.



How?

... Existing Real Estate Portfolios

Taking the first steps to understand portfolio wide performance on one common platform is key!

- Energy first.** Quickly identify worst performers; carbon neutral roadmap
- IAQ** add to attract and retain tenants
- Space utilization** tools later on.

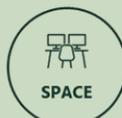
THREE INITIAL AREAS OF FOCUS:



ENERGY



HEALTH



SPACE

- Maximize Asset Values through increase in NOI
- Maximize Annual Profits by driving down energy and maintenance costs
- Lowering carbon emissions/mitigating regulatory risk
- Tenant Demand: Gain Competitive Edge in Attracting and retaining tenants
- Improve employees' health & productivity
- Tenant Retention
- Cost saving for CRE users
- Workplace Strategy & Design
- Enhance Collaboration
- Added service for tenants

- EXECUTIVE SUMMARY
- FINANCIAL HIGHLIGHTS
- MY PORTFOLIO
- ENERGY OPTIMIZATION
- HEALTH
- SPACE UTILIZATION
- REPORTS

My Portfolio

48 BUILDINGS

OFFICE	26	1,428,000 m2
HOTEL	6	155,000 m2
RETAIL	16	99,500 m2
TOTAL	48	1,682,500 m2

INCREASE IN NOI

US\$ 66,228

YTD TARGET US\$ 104,381
YTD ACTUAL US\$ 66,228
VARIANCE (US\$ 38,153)

INCREASE IN ASSET VALUE

US\$ 1.32M

YTD TARGET US\$ 1,683,564
YTD ACTUAL US\$ 1,068,194
VARIANCE (US\$ 615,371)

Office 9

Property Type: Office

Address: _____

Year Built: 2005

Floor Area: 90,000

Occupancy: 90%

Floors: 15

WHOLE PORTFOLIO

Building	Asset Grade	GFA (m2)	12-month Occupancy	2019			2020 TARGET (-8%)		
				Total Consumption (kWh)	Total Energy Cost	EUI (kWh/m2a)	Potential Increase in NOI	Cap Rate (%)	Potential Asset Value Increase
Hotel 2	*****	50,000	89%	25,772,958	\$ 2,290,958	515	\$ 183,277	7%	\$ 2,618,238
Office 4	AA	100,000	95%	23,274,997	\$ 2,211,125	233	\$ 176,890	5%	\$ 3,537,800
Hotel 3	*****	40,000	67%	32,040,952	\$ 2,157,958	801	\$ 172,637	7%	\$ 2,466,238
Office 8	AA	125,000	75%	25,531,244	\$ 1,914,843	204	\$ 153,187	5%	\$ 3,063,749
Office 9	A	90,000	90%	21,010,664	\$ 1,890,960	233	\$ 151,277	5%	\$ 3,025,536
Office 16	B	100,000	93%	16,384,152	\$ 1,526,839	164	\$ 122,147	7%	\$ 1,744,959
Office 26	AA	80,000	63%	18,791,536	\$ 1,191,195	235	\$ 95,296	5%	\$ 1,905,913
Office 20	AA	60,000	85%	13,709,811	\$ 1,167,116	228	\$ 93,369	5%	\$ 1,867,386
Retail 14	AA	30,000	68%	16,948,433	\$ 1,149,443	565	\$ 91,955	5%	\$ 1,839,108
Office 15	B	80,000	65%	14,645,423	\$ 957,371	183	\$ 76,590	7%	\$ 1,094,139
Hotel 5	*****+	15,000	90%	9,801,373	\$ 884,672	653	\$ 70,774	5%	\$ 1,415,475
Office 11	A	50,000	83%	10,357,732	\$ 858,035	207	\$ 68,643	5%	\$ 1,372,855
Office 22	B	65,000	92%	8,750,830	\$ 808,752	135	\$ 64,700	7%	\$ 924,288
Office 12	A	40,000	94%	8,508,335	\$ 798,082	213	\$ 63,847	6%	\$ 1,064,109
Hotel 1	***	20,000	77%	10,322,277	\$ 791,306	516	\$ 63,304	6%	\$ 1,055,074

How?

... New Construction

Performance Based Design-Build:

1. Minimize increase in CAPEX!
2. Drive down OPEX
3. Optimize risk adjusted IRRs



Controlling Capital Costs in High-Performance Buildings Using a Performance Based Design-Build Process



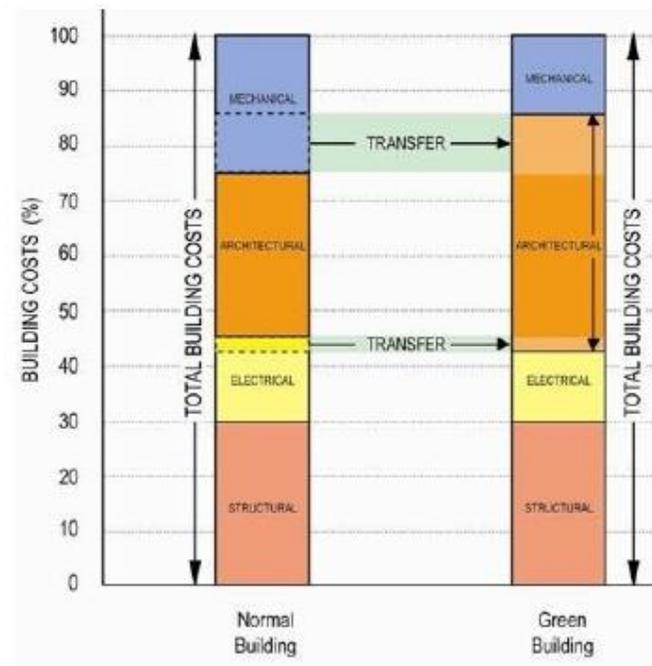
Shanti Pless, LEED AP
Senior Research Engineer
NREL Advanced Commercial Buildings Research Group

www.nrel.gov/rsf

NREL is a national laboratory of the U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, operated by the Alliance for Sustainable Energy, LLC.



Integrated Design



Cost Transfer

- Total cost same
- Engineering costs less
- Invest in Architecture
- Active to passive
- Fragile to robust
- Longer life
- Less cost over life
- Simpler

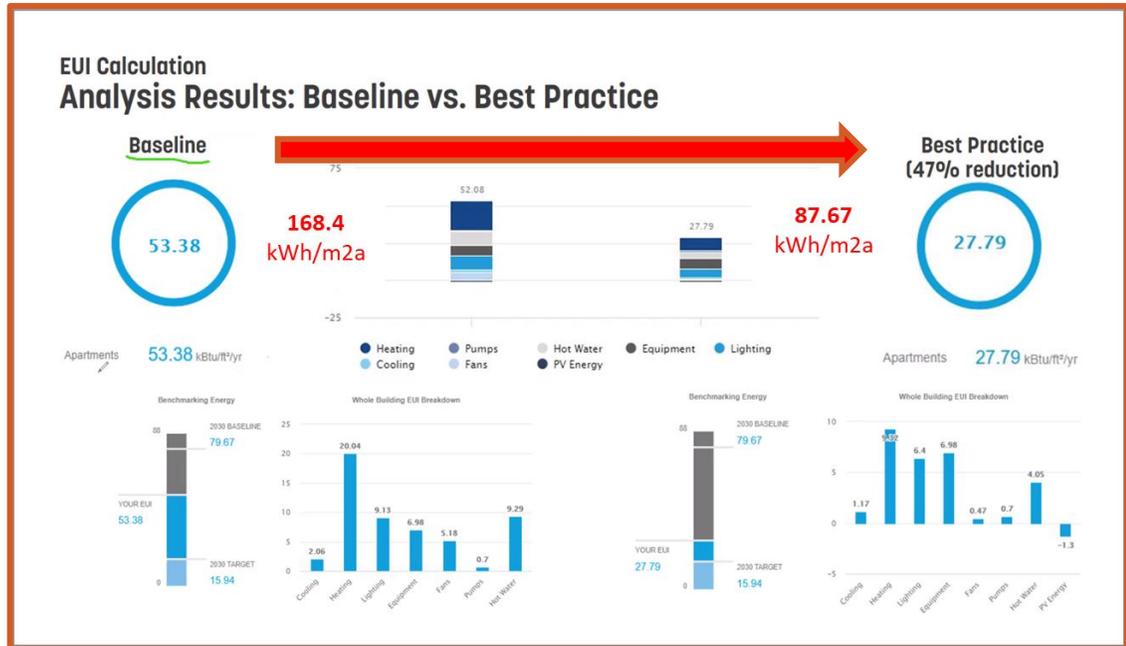
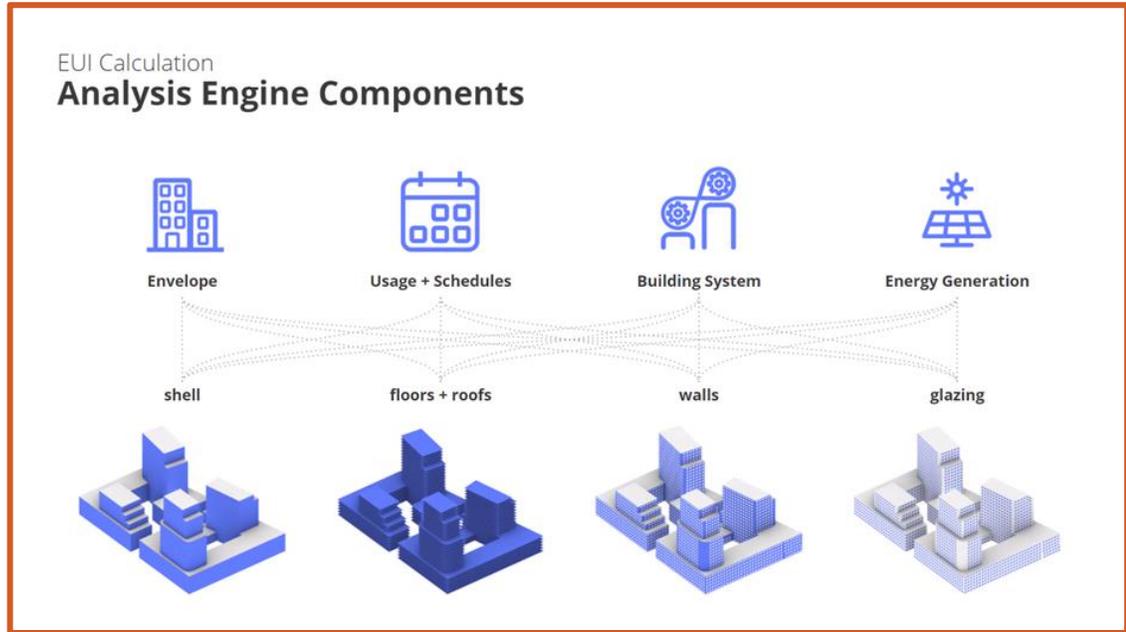
How?

... New Construction

Performance Based Design-Build

- Annual Savings C\$8 Million (NOI)
- Increased Valuation C\$133 Million
- How much CAPEX needed?

Assumptions	
Baseline	168 kWh/m2a
Target	88 kWh/m2a
Energy Savings	80 kWh/m2a
Assumed total GFA	1,000,000 m2
Cost per kWh	C\$0.10/kWh
Annual Savings (NOI)	C\$8,000,000
Increased Valuation (6%)	C\$133 Million



How?

New Construction of “Decarbonized Urban Developments”

Taking the first steps ... district level energy modeling to drive down energy loads is key!

Energy Demand

Segment	kWh	%
Heating	000	00
Cooling	000	00
Lighting	000	00
• Indoors	000	00
• Outdoors	000	00
Hot water	000	00
Ventilation	000	00
EV charging	000	00
ETC (i.e. Plug load)	000	00
Total	0000	100

Map Mapping Visualization of each information on the latest map
 * Please click each item on tables or each building on the map to see details



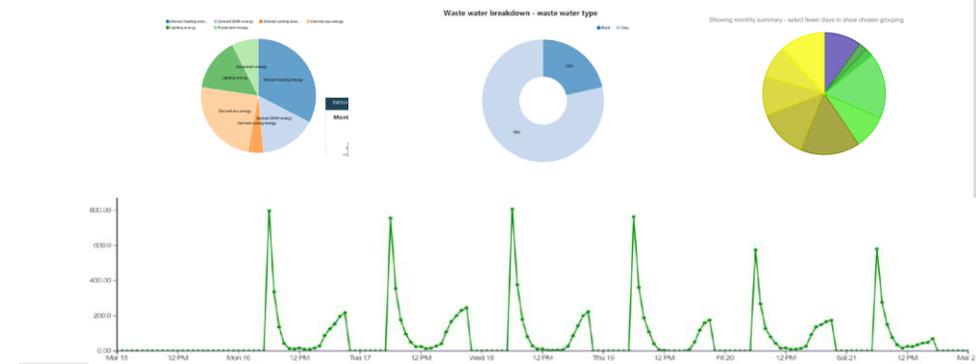
Energy Supply

	Segment	Unit	%
Fossil Fuel	Electricity (?)	000	00
	Natural Gas	000	00
	District Energy	000	00
	Sub Total	0000	00
Clean Energy	Solar / ESS	000	00
	Waste energy	000	00
	Fuel Cell	000	00
	Others	000	00
	Sub Total	0000	00
	Total	0000	100

Health & Well Being

CO (ppm)	000
SO2 (ppm)	000
No2 (ppm)	000
O3 (ozone, ppm)	000
PM2.5 (µg/m³)	000
PM10 (µg/m³)	000

Real-time graphs & Detailed Visualization



CARBON NEUTRAL BY 2050 : Myth or Reality?

LET'S RE!MAGINE THE FUTURE OF SMART, NET ZERO CITIES

*For more detailed discussions,
please email us to schedule a virtual meeting*



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