Build4Asia Conference 2020

12 Nov 2020

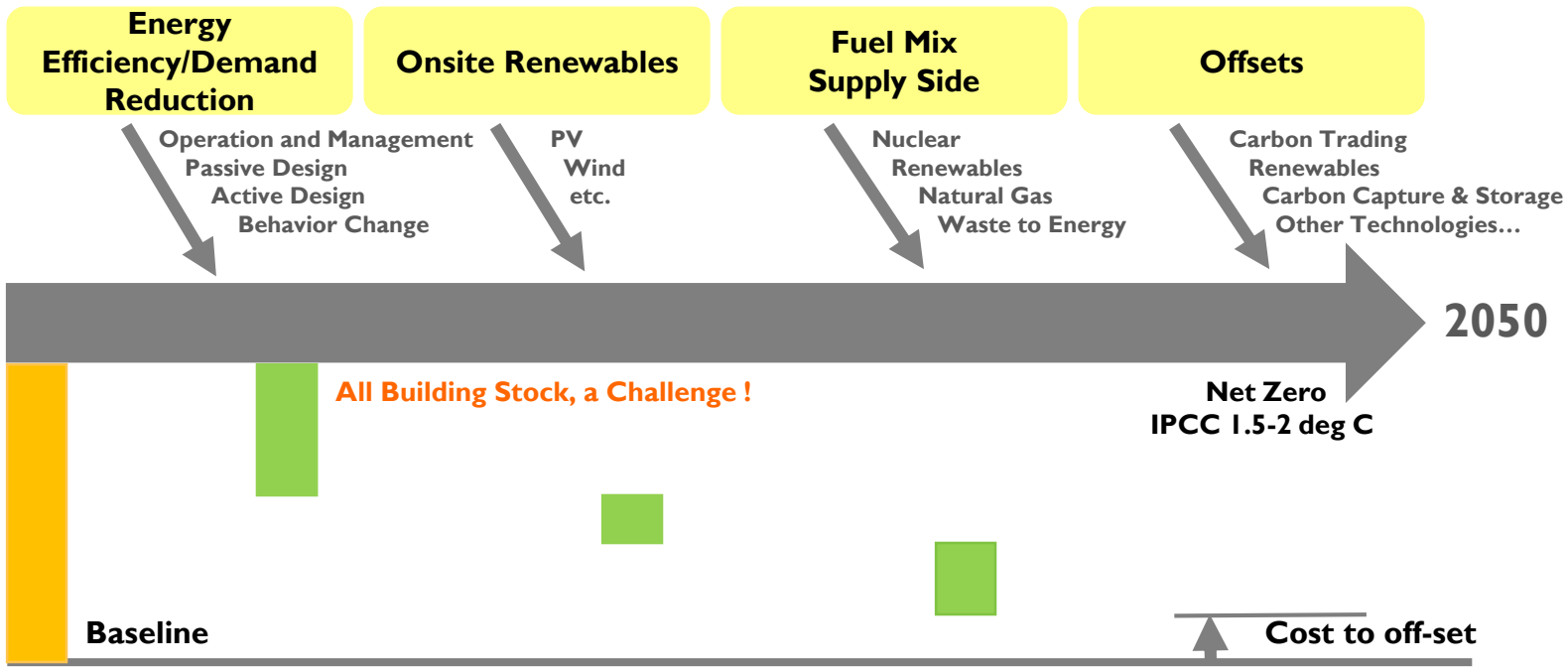
Closing remarks & keynote

Ir Dr. Cary Chan , JP
Executive Director
HKGBC
香港綠色建築議會

"Carbon neutral by 2050"

Feasible for the building sector in HK ?

Carbon neutral – what's in it



Not to scale

If

Energy intensity reduced by 70%

&

Carbon intensity of electricity supply reduced by 70%

Carbon intensity will be reduced by 90 %

A lot of buildings have reduced by 20-50% with proven technologies and we have 30 more years to go …

Opportunities

Technology advancements

- PV
- HVAC equipment
- Façade
- Carbon capture and storage

Innovative retro-fitting (MEP)

- Radiant cooling
- Valve less chilled water system
- De-centralize systems

Innovative retro-fitting (Bldg.)

- Facade
- External shading

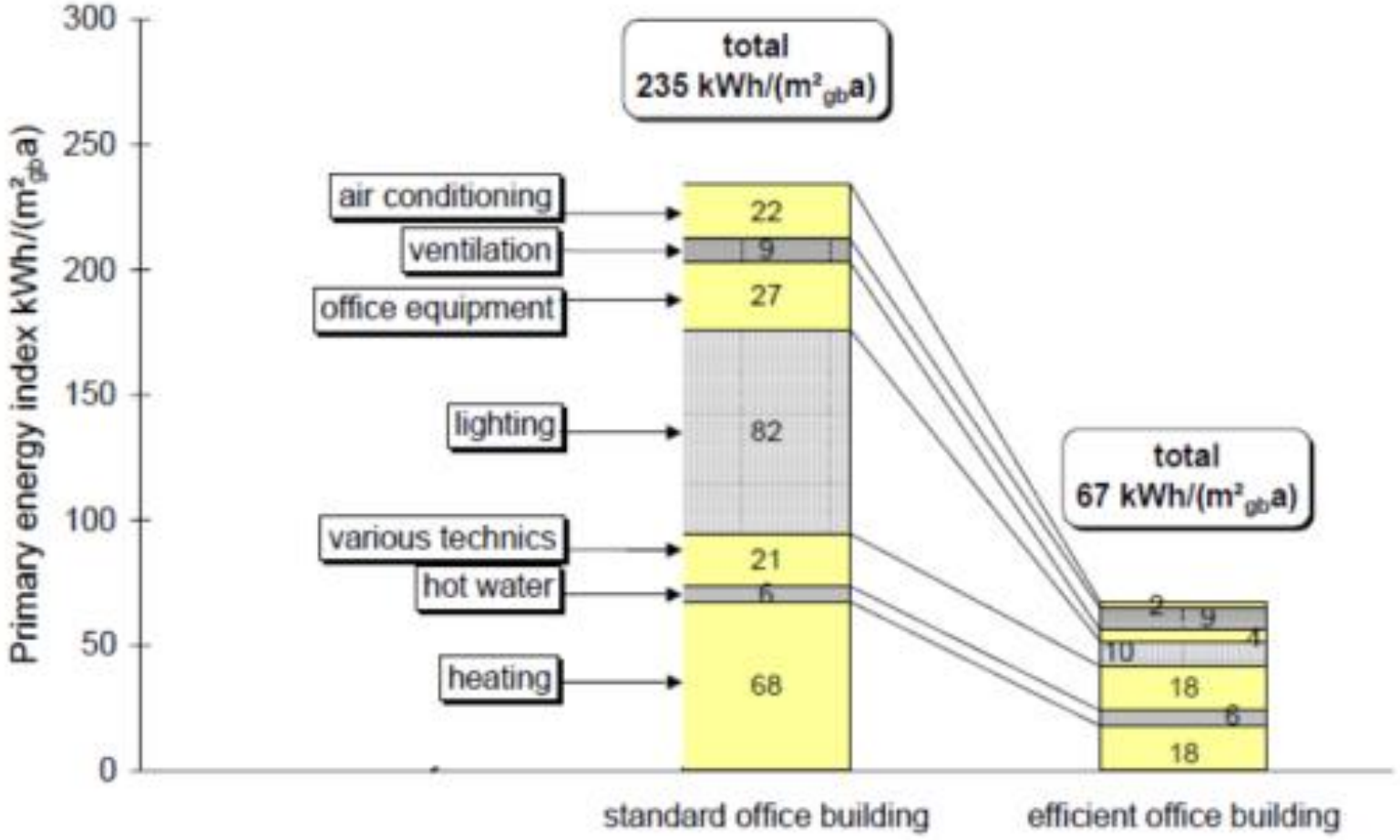
Policies and regulations

Behavior change

…….

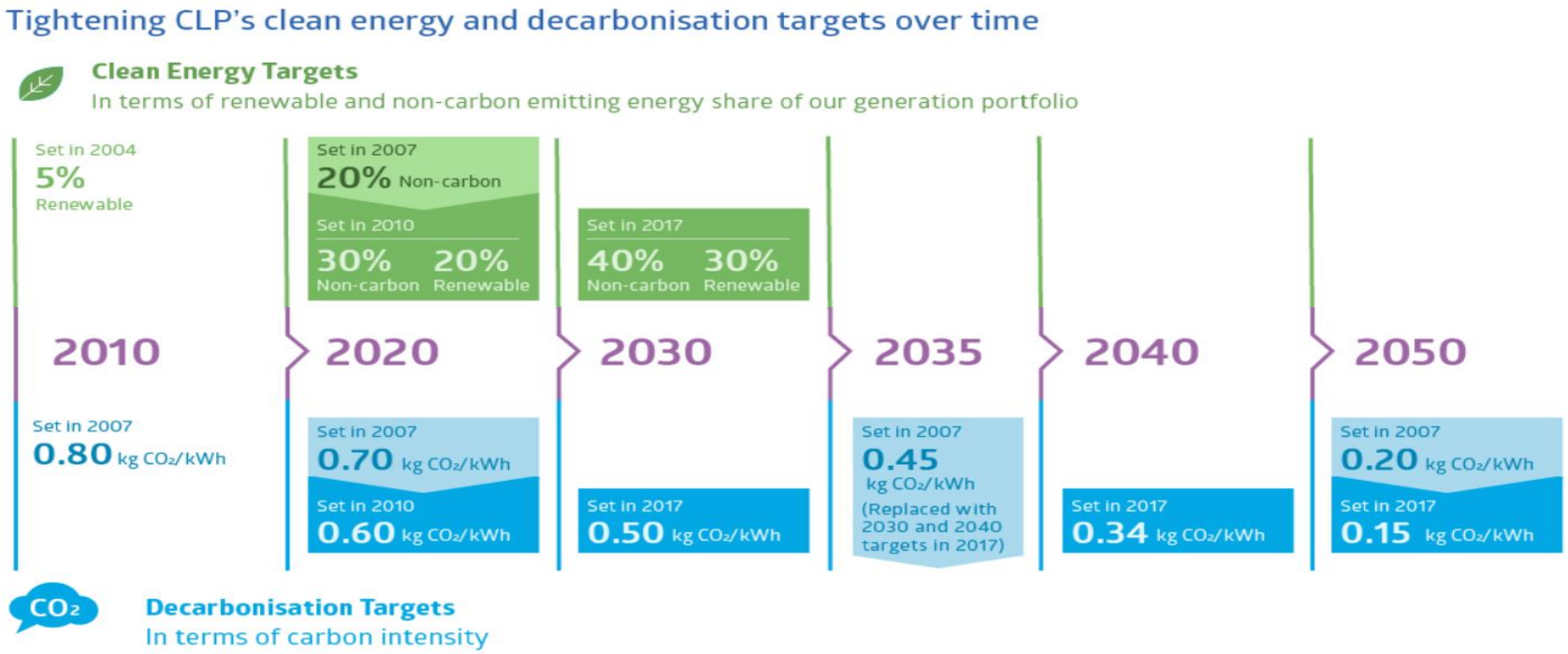
70% difference !!

With today's practices and technologies



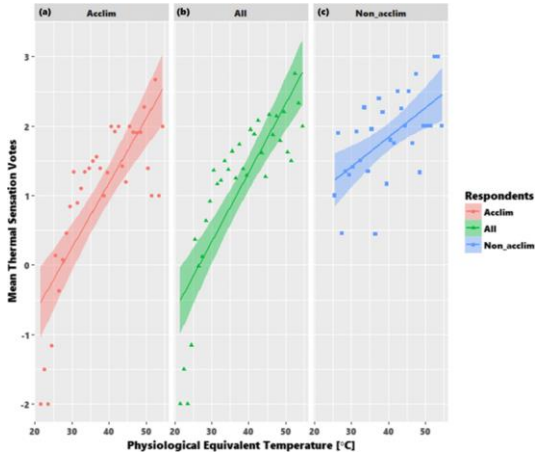
Decarbonize electricity supply

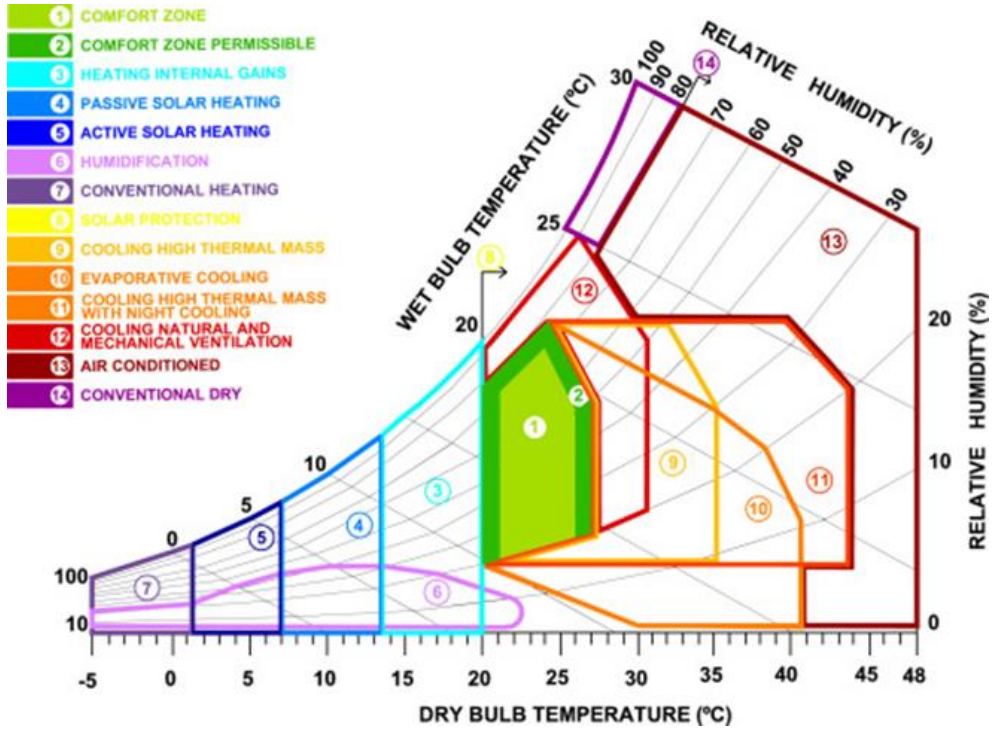
CLP targeted for 80% reduction



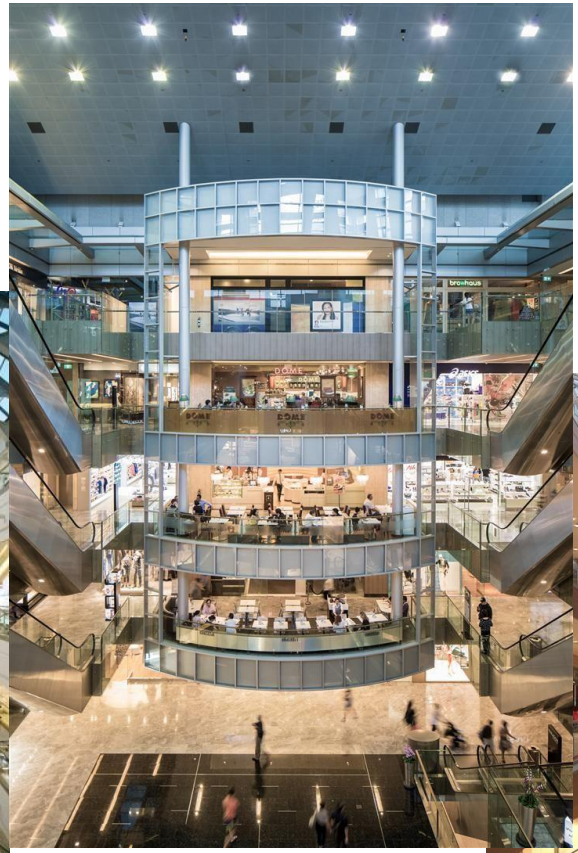
Say thermal-comfort …

Need to be controlled to a set temperature everywhere in a building ?
Have we optimize thermal-comfort by properly balancing velocity, humidity , radiant temperature and energy ?
Thermal Adaptation ?
…



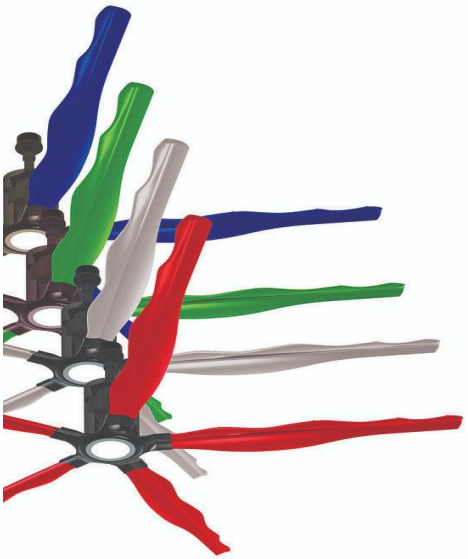


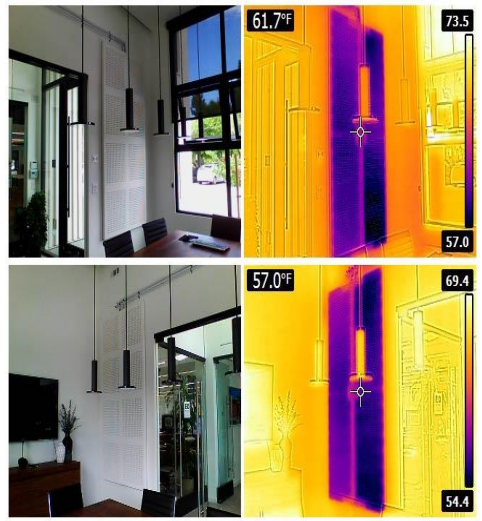
Are we cooling the whole atrium ?



Can we have a hybrid system with radiant cooling + fan in internal zooms like lift lobby and corridors

Less fan power , higher chiller efficiency with higher chilled water temperature





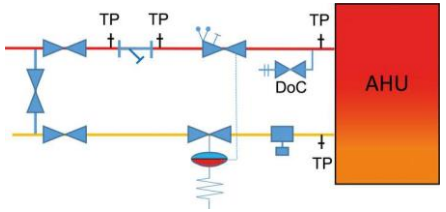
Palo Alto, CA - July 2015
Meeting room wall radiant panels at **Clarum Homes** passive office.
Two Ray Magic Gyptone radiant panels installed on the wall next to the door (Gyptone Big Quattro 41 by Saint-Gobain).
The radiant panels have multiple functions: decorative, acoustical and space conditioning.
Radiant panels are in cooling mode with surface temperature at about 57F.
© Messana Radiant Cooling

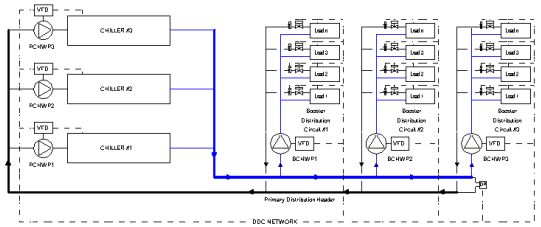
ASHRAE® Falcon Chapter

Radiant Cooling and Smart Water Systems

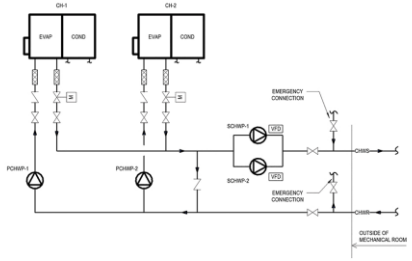
HVAC chilled /condensing water system

- Can we control chilled water flow from increasing system resistance to using distributed in-line pump for each AHU ?
- Split the chilled water system to 1)a high temperature system for radiant cooling or units only cater for sensible cooling and winter seasons 2) a lower temperature for units with high loading , dehumidification, server rooms ?
- Provide server room with condensing water instead of chilled water ?
- Use condensing water from cooling tower as chilled water in cold seasons ?

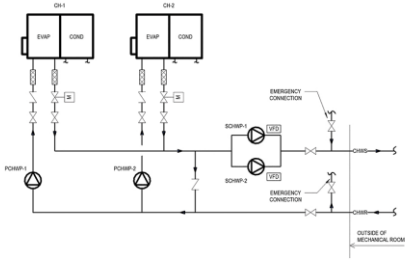




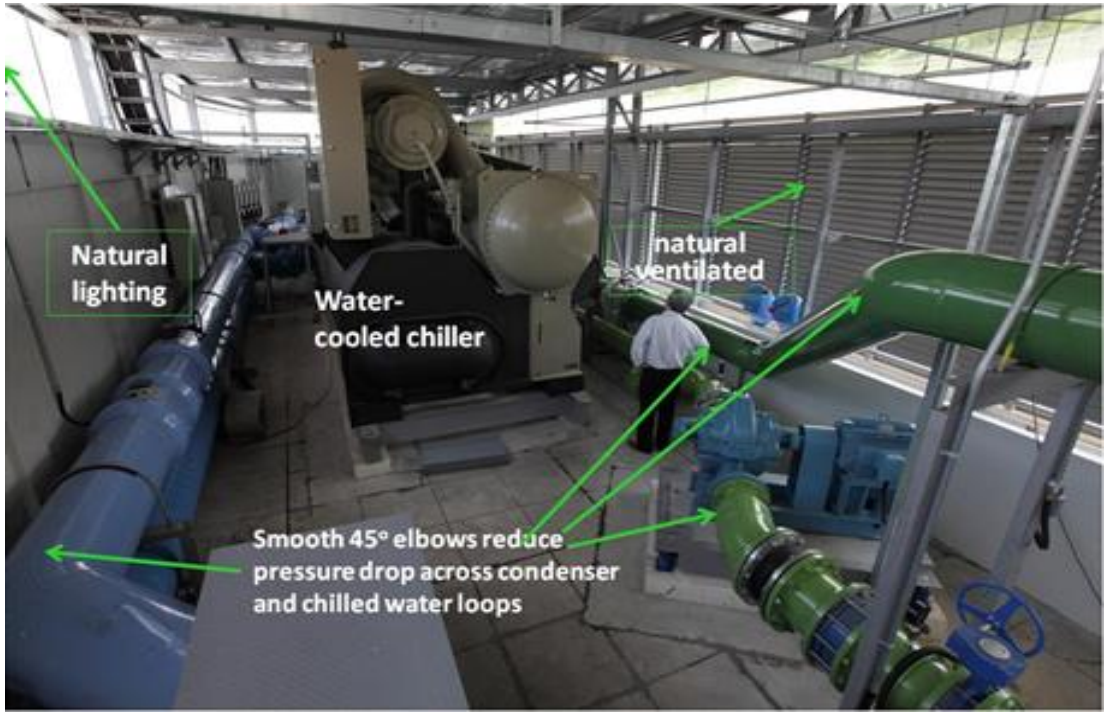
7-10 deg C



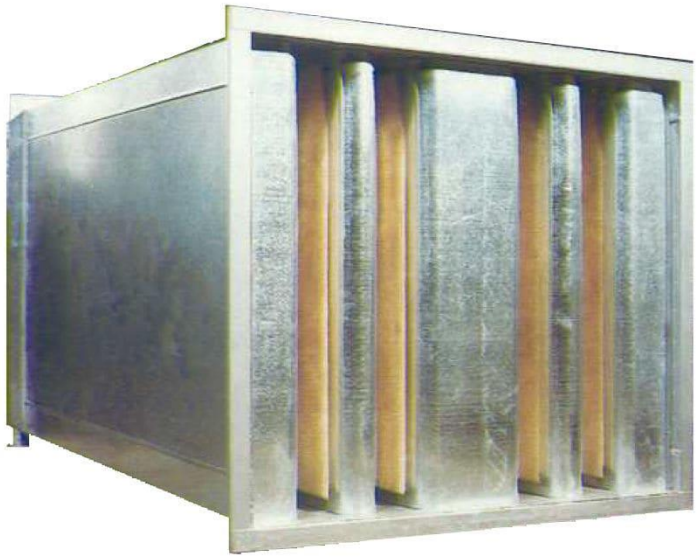
12-16 deg C

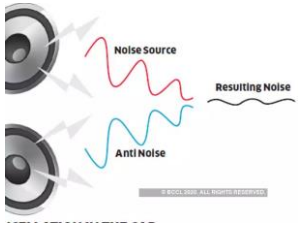


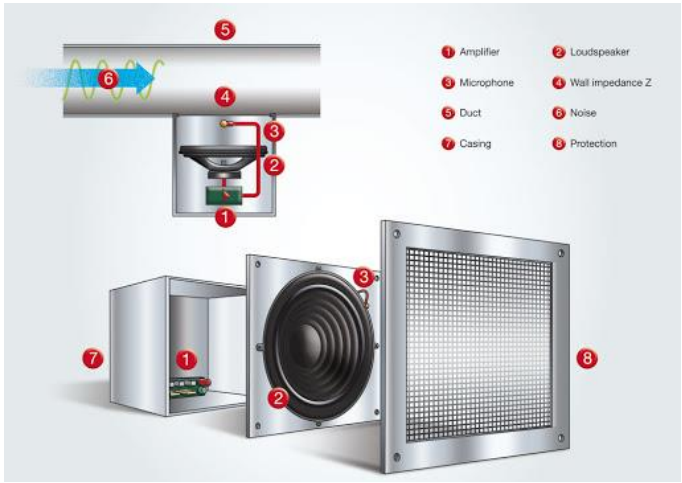
Can we have smoother elbows to reduce system pressure ?

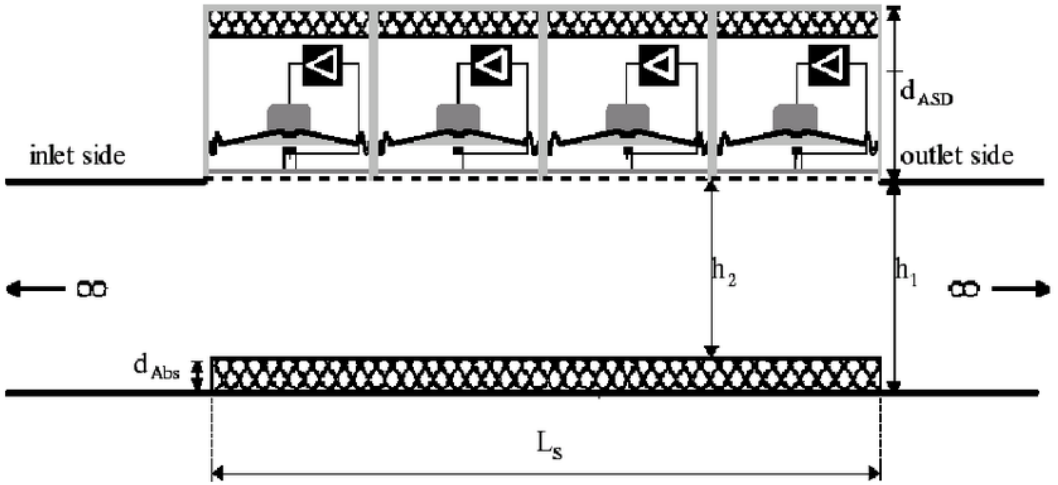


Silencer vs noise cancellation to reduce fan power ?

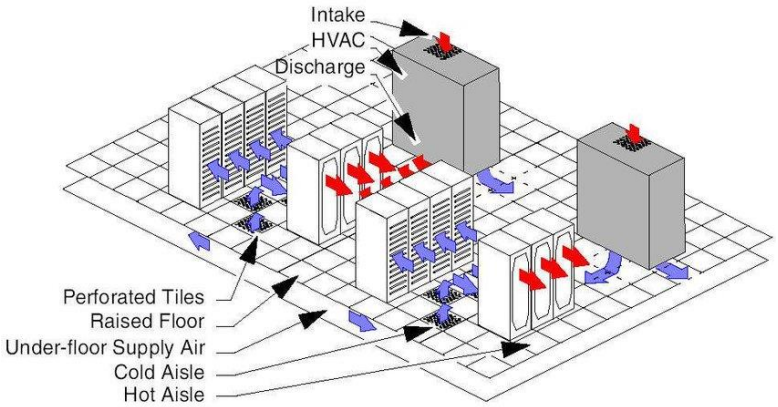


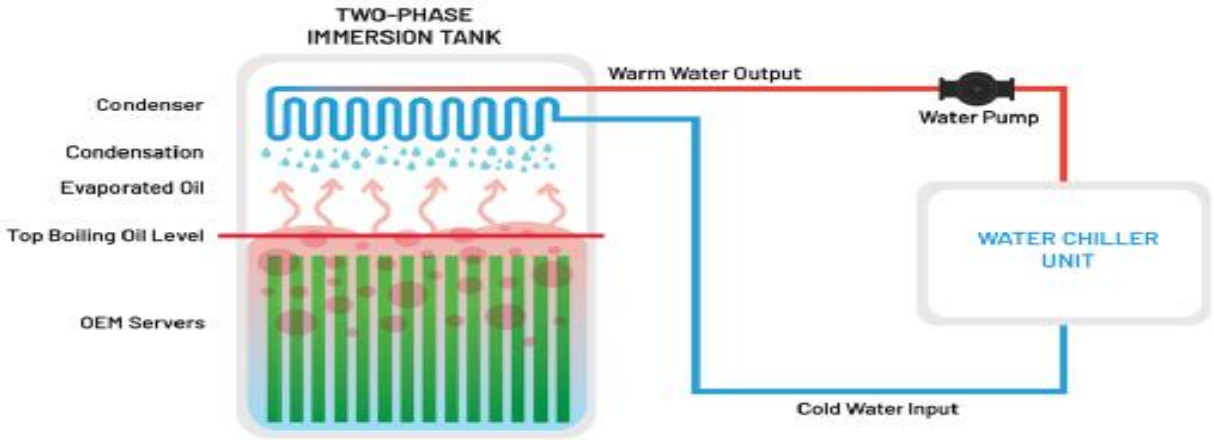




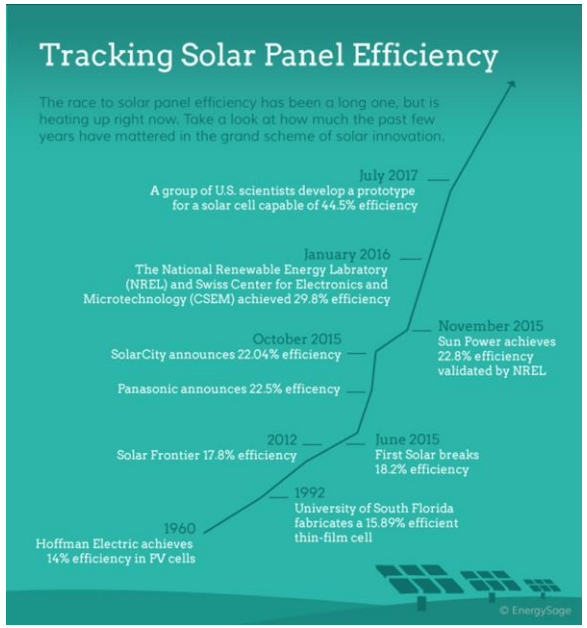


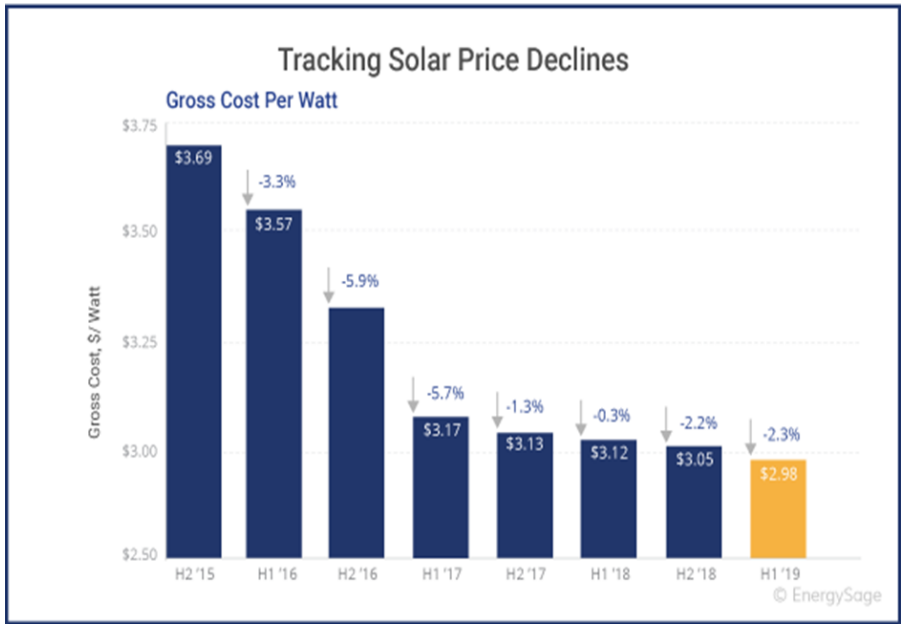
Get away with HVAC to cool servers ?





Wider adoption of solar energy ?





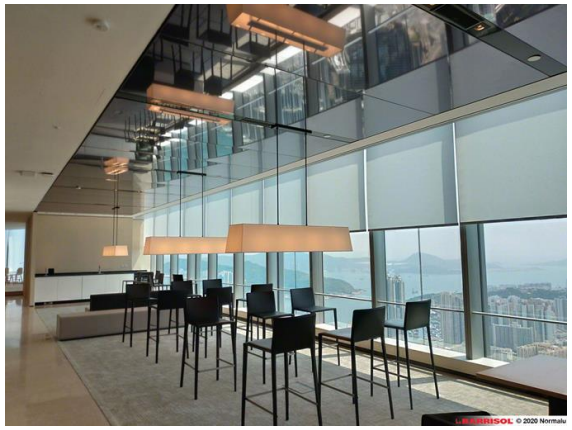
Curtain wall vs window wall ?

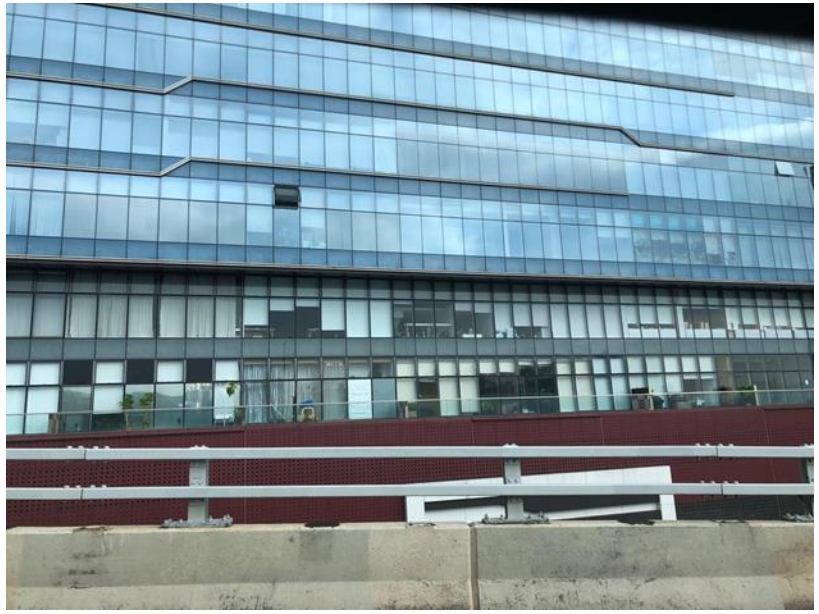
Energy consumption ?

Indoor environment ? Glare ? Thermal- comfort ?

Reduce artificial lighting ?

Better looking ?





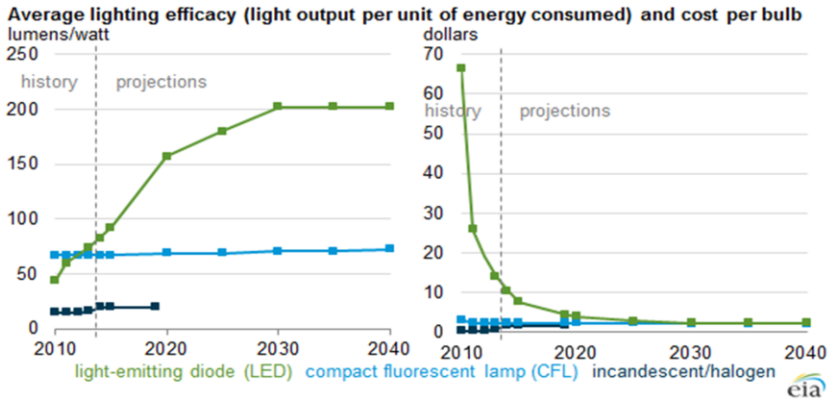
Internal blinds ?

Lighting design to cater night time

Upsets the diming system

Solar heat already in the building

Radiant heat

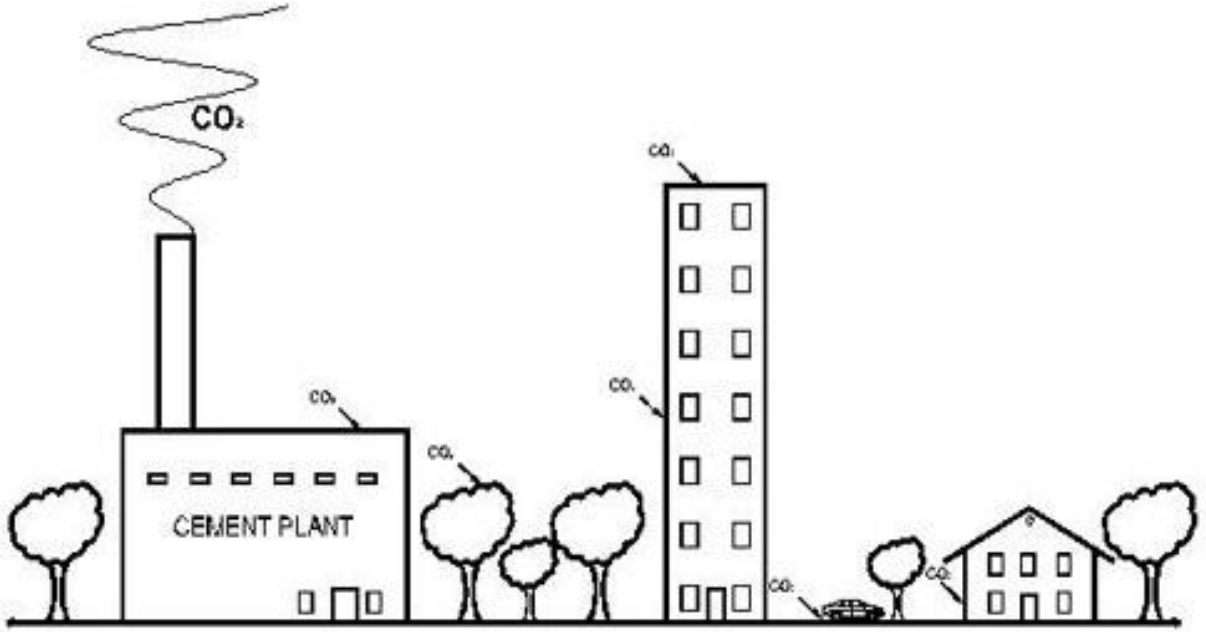


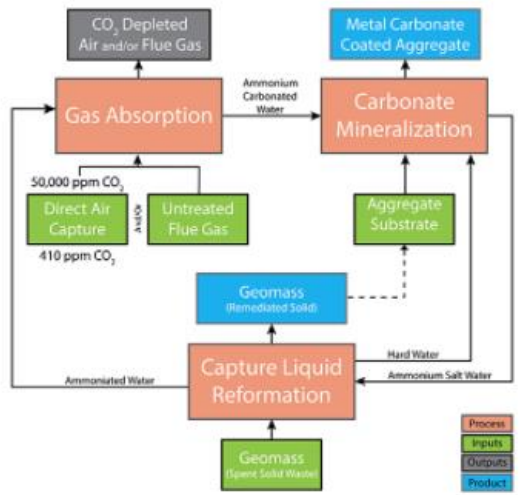
Simple solutions ?

How about embodied carbon ?

Timber / hybrid building

Concrete can be carbon Zero to positive as well !



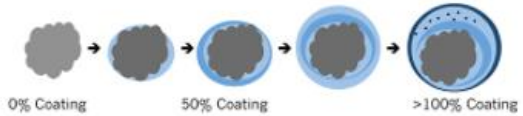


capture solution reacts with the Geomass, reforming it, these metal ions are released and combined with the carbonate solution to form the carbonate mineral coating.

Blue Planet Process is Similar to Ooid Formation in Nature

A rock particle is coated with our synthetic limestone, forming a carbon-sequestering coating that is 44% by mass CO_2.The coating can contain residual fine particles from the capture solution regeneration.

44% (by mass) of $CaCO_3$ Coating is CO_2



HOME > OUR RESEARCH > MANUFACTURING AND INDUSTRIAL PROCESSES > RETHINKING CEMENT

Australia can have a zero carbon cement industry in 10 years, meeting demand while leading the world in alternative cements.

Cement production is the world's single biggest industrial cause of carbon pollution, responsible for 8% of global emissions. That's as much as the global car fleet.

beyond ZERO emissions

Zero Carbon Industry Plan

Rethinking Cement summary

COLLEGE OF ENGINEERING
CENTER FOR LOW CARBON BUILT ENVIRONMENT
UNIVERSITY OF MICHIGAN

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Closing the Loop

Incorporating carbon dioxide into the production of new cement-like materials can reduce existing emissions and improve durability.

A pathway to zero carbon cement

The Rethinking Cement report presents a pathway for tackling cement emissions comprising five strategies. The is the first plan in the world showing how to achieve a zero carbon cement sector.

The first three strategies enable the Australian cement industry to eliminate most emissions by changing the way cement is made. The fourth strategy takes us to zero emissions and beyond, by using less cement and sequestering carbon in timber structures. The fifth strategy involves researching carbon negative cements, which could turn our built environment into a major carbon sink.

5 Strategies

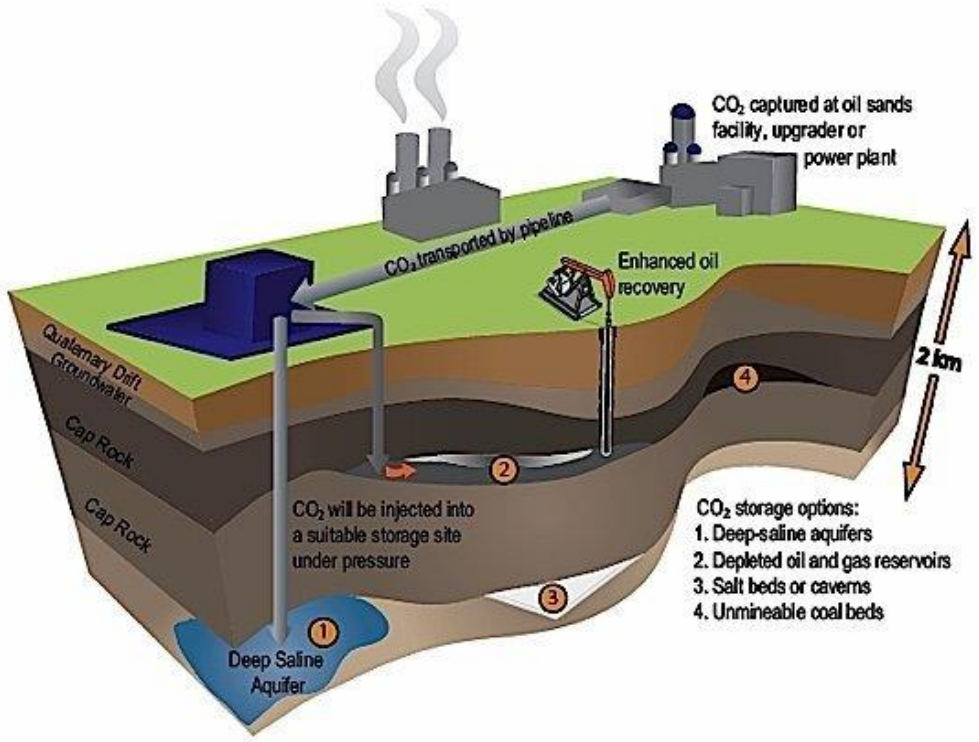
	Action	Target	Emissions reduction (CO_2) 10 years	Emissions reduction (CO_2) 30+ years
Strategy 1	Using geopolymer cements that contain no Portland cement	replacing 50% of cement market	2.7 MT	
Strategy 2	Using high-blend cements with a low volume of Portland cement	replacing 50% of cement market	1.9 MT	
Strategy 3	Carbon mineralisation	reducing remaining Portland cement emissions to nearly zero	0.8 MT	
Strategy 4	Minimising the use of cement	reducing cement use by 15%	0.9 MT* 1.4 MT*	3 MT*
Strategy 5	Carbon negative magnesium-based cements.	developing commercial carbon negative cements	–	2-3 MT*
Final emissions			1.4 MT	~ 3 to 6 MT

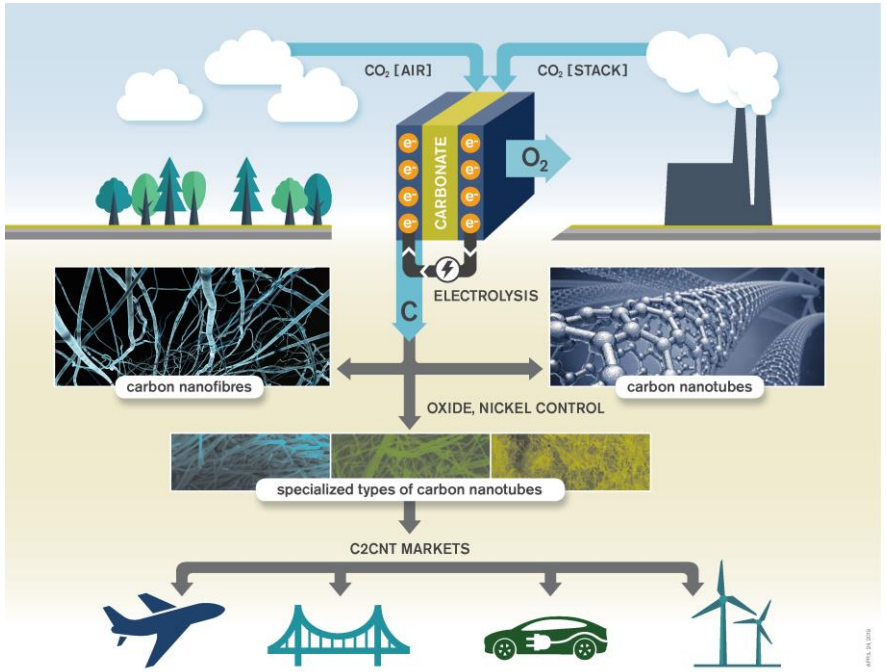
STARTING POINT: 6.3 MT*

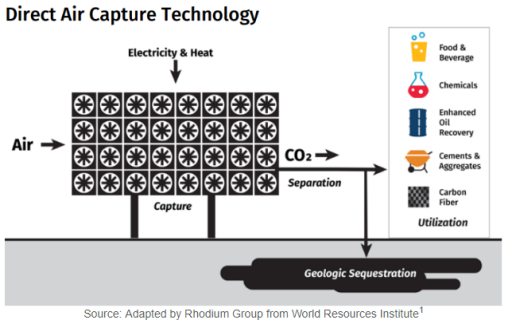
ZERO EMISSIONS ACHIEVED

* Estimated process emissions from Australian cement production in 2017 (business-as-usual)
* Avoided emissions from reducing cement use
* Carbon sequestered in structural timber
* Carbon sequestered in concrete (uncertain)

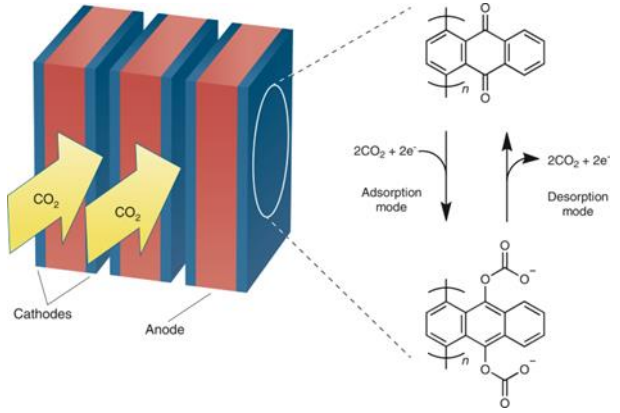
Carbon Capture, Storage and UTILIZATION !



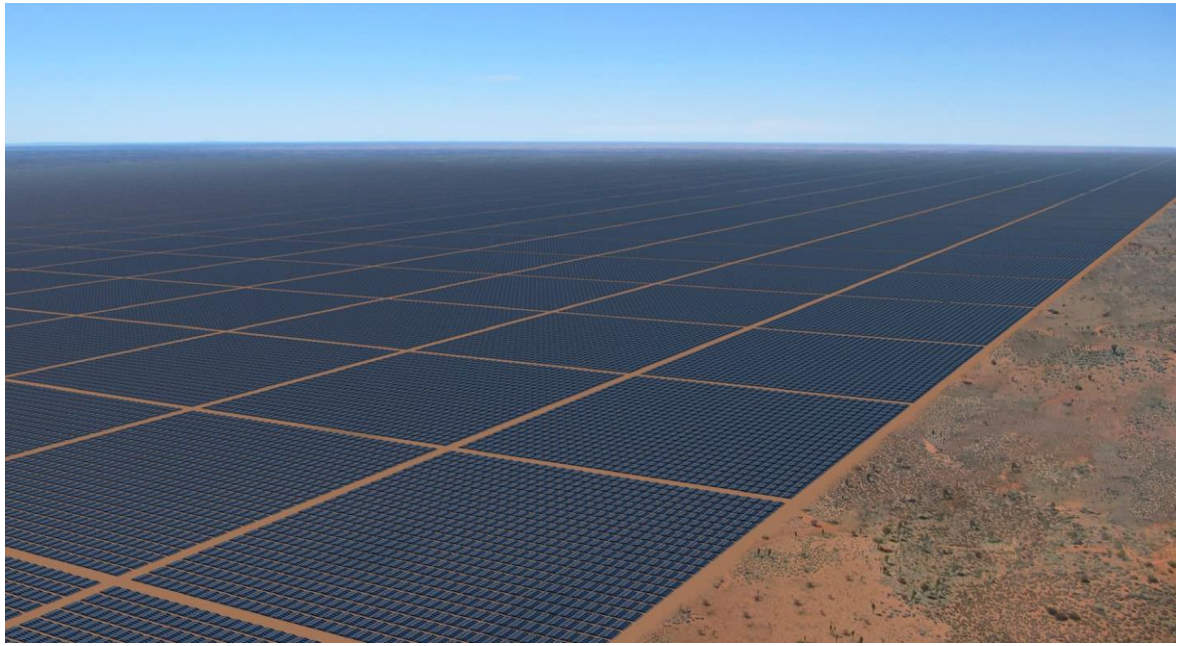


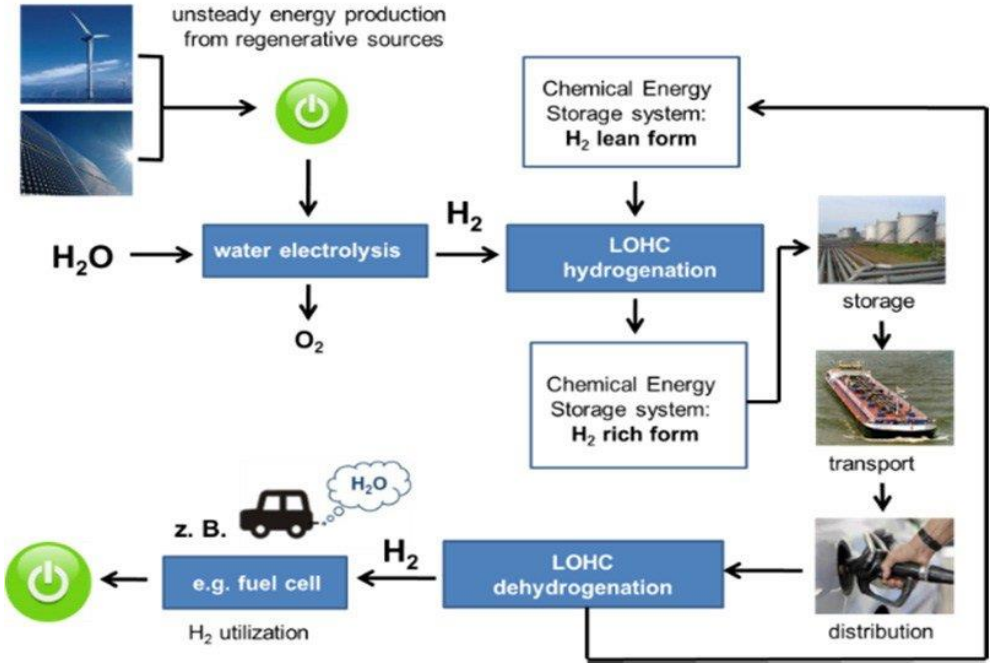


Source: Adapted by Rhodium Group from World Resources Institute[1]



Importing renewables



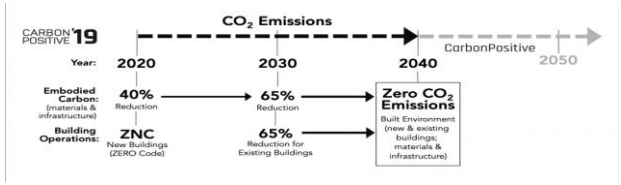


Formulating policies and regulations

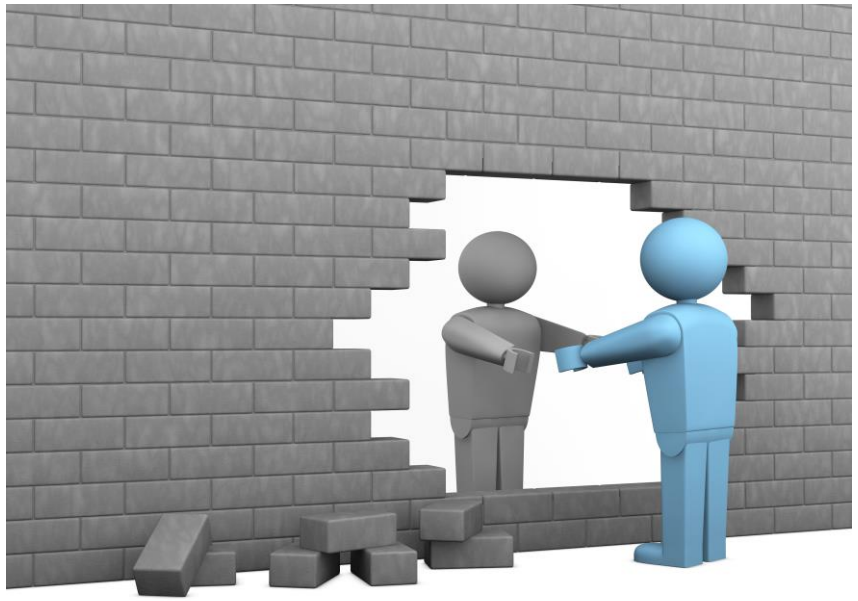
Looking around ?

Looking forward ?

These new regulations will be effective in 5 years time .
So act now !

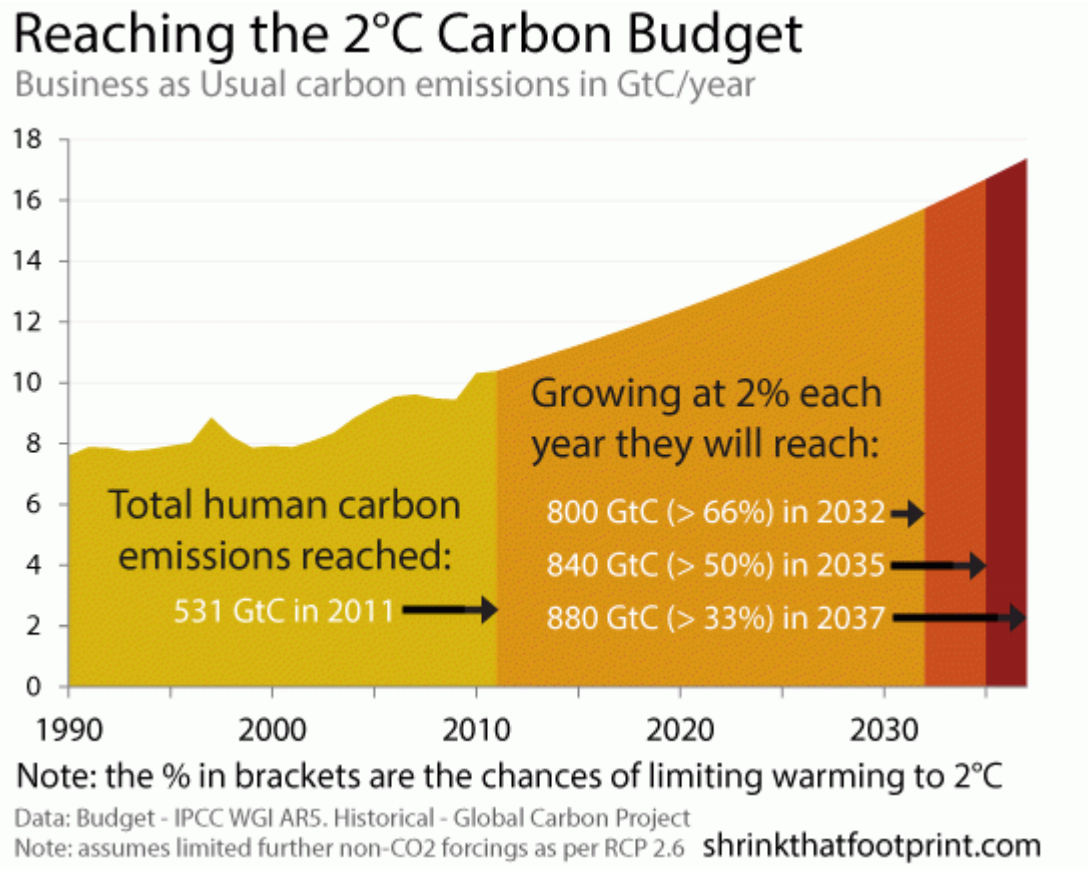


Passive to active involvement



Actualizing innovations with the industry

How much reduced or how much consumed ?



feasible

Let’s make Hong Kong a role model for other high density citie

Thank You !

HKGBC
香港綠色建築議會

Ir Dr. Cary Chan , JP
Executive Director