INDOCHINE ENGINEERING

Is there a Sustainable Path to High Quality Assets at a Lower Cost …

November, 2016

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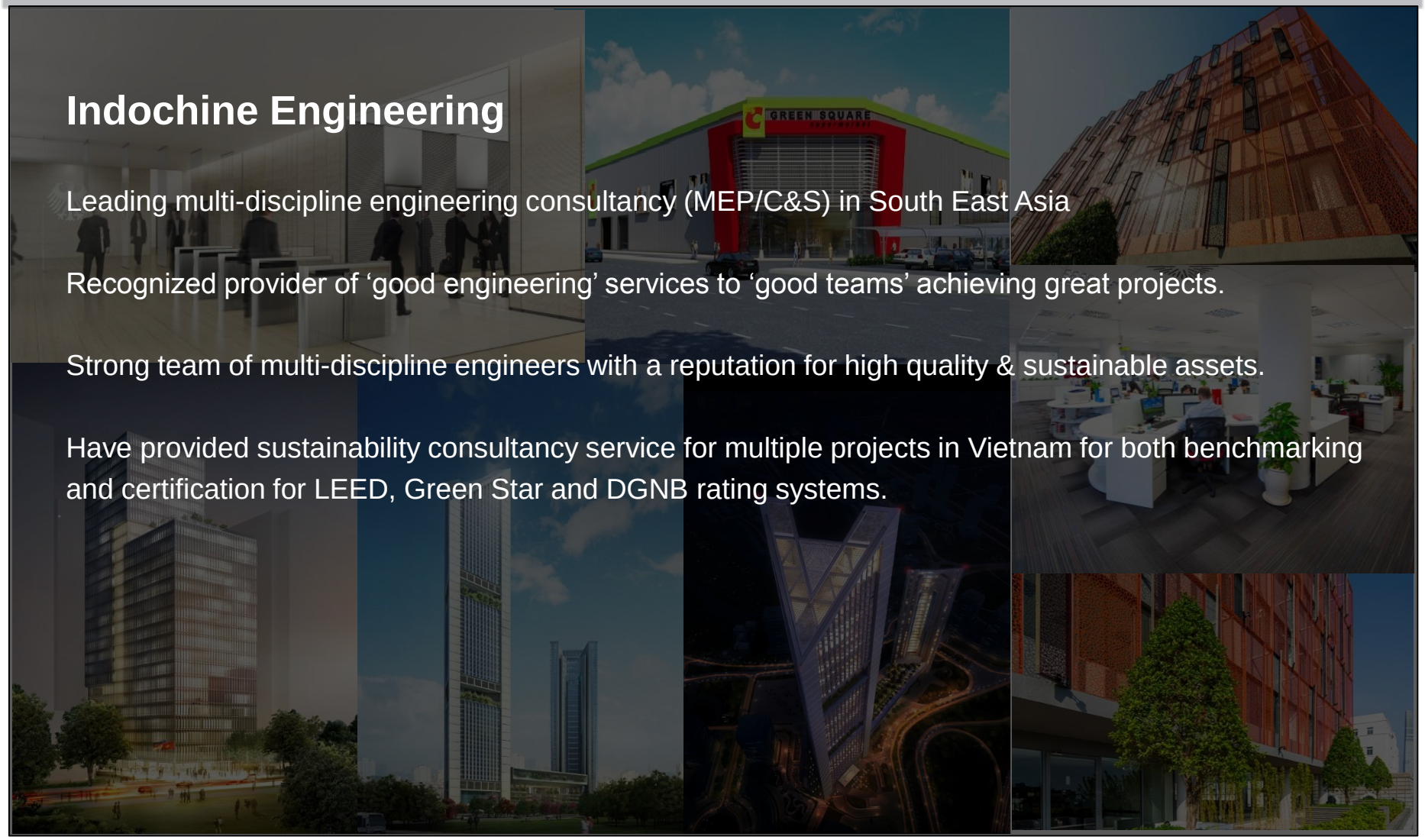
Indochine Engineering

Leading multi-discipline engineering consultancy (MEP/C&S) in South East Asia

Recognized provider of ‘good engineering’ services to ‘good teams’ achieving great projects.

Strong team of multi-discipline engineers with a reputation for high quality & sustainable assets.

Have provided sustainability consultancy service for multiple projects in Vietnam for both benchmarking and certification for LEED, Green Star and DGNB rating systems.



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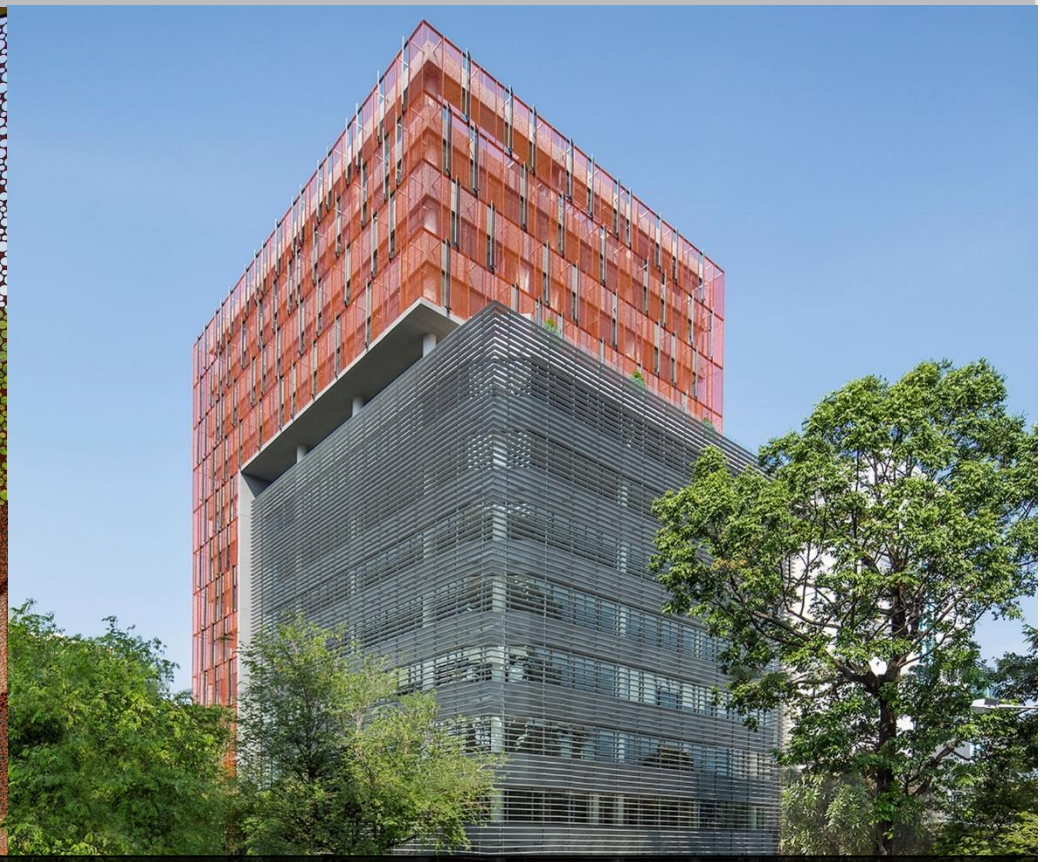

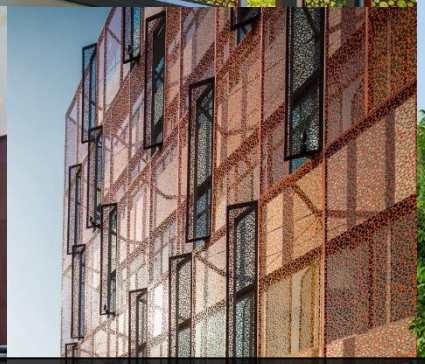

President Place

Description: Office Building
Location: Hochiminh City, Vietnam
GFA: 11,500 sqm
LEED Gold for Core & Shell
13% Energy saving - 47% Water saving - 45% Recycled content

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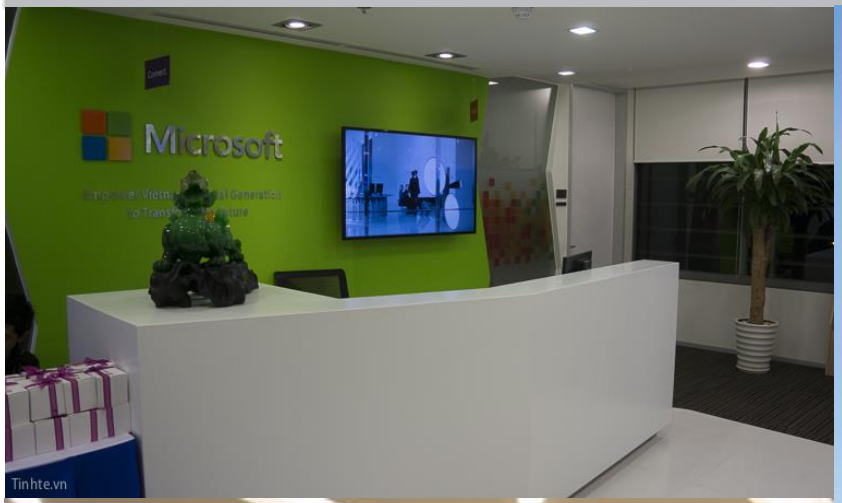

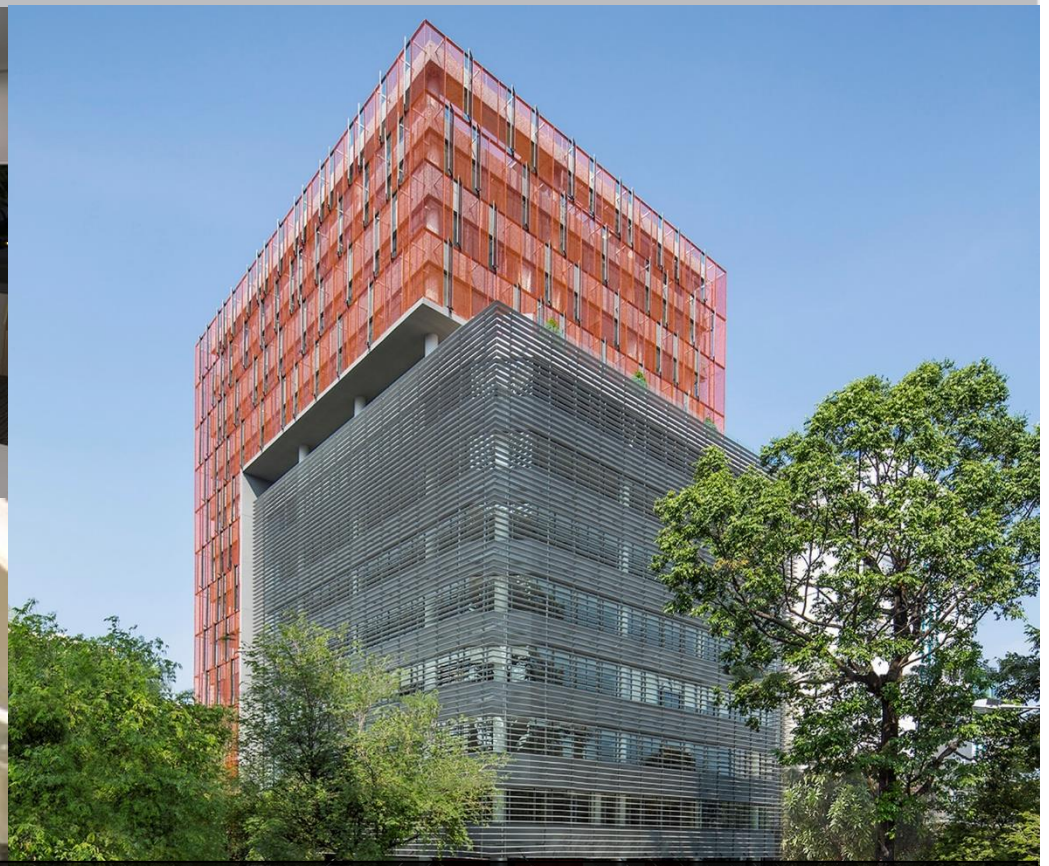

President Place

Additional Cost: 5%

Benefits:

- Attract Multi National Companies
- Marketing as the First LEED Gold Building in HCMC
- Reduce operation cost

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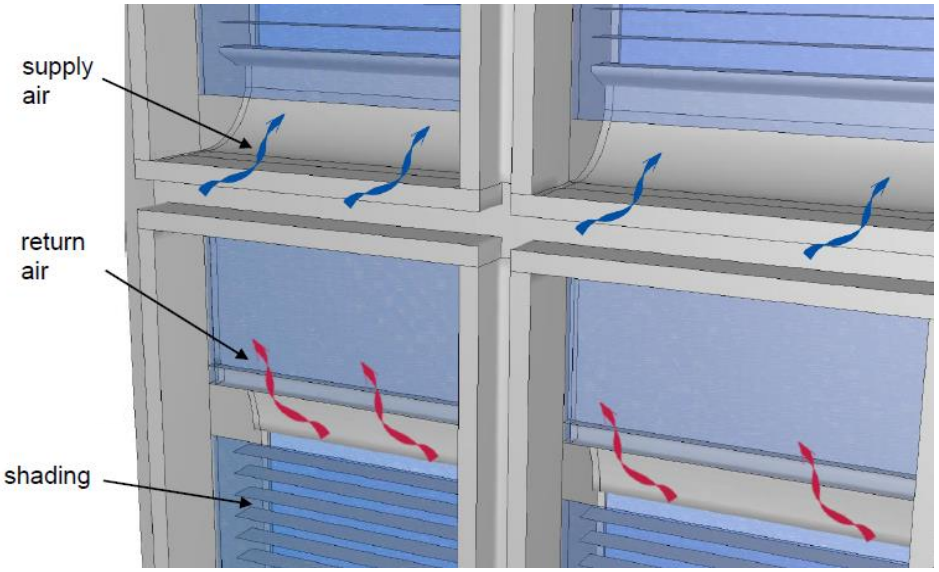
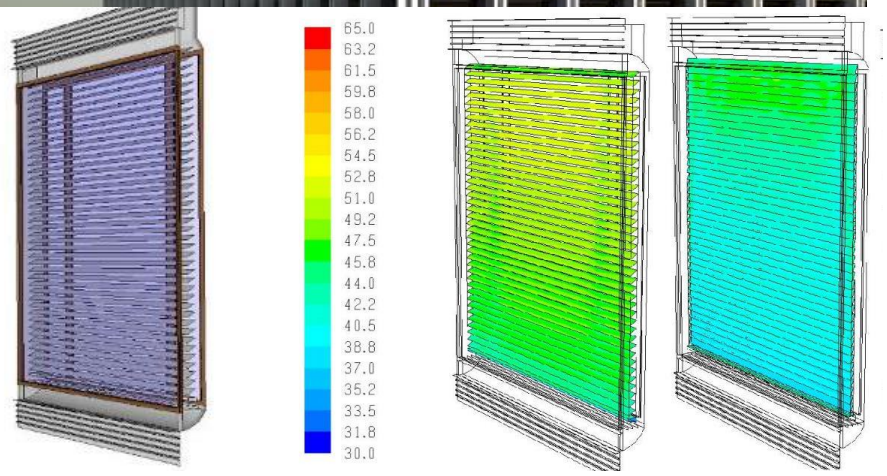
Deutsches Haus

Description: Mixed-use building (Office, Retail, Restaurant)
Location: Hochiminh City, Vietnam
GFA: 36,448 sqm
Target: **LEED Platinum**, DGNB Silver

Open Cavity Dual Facade

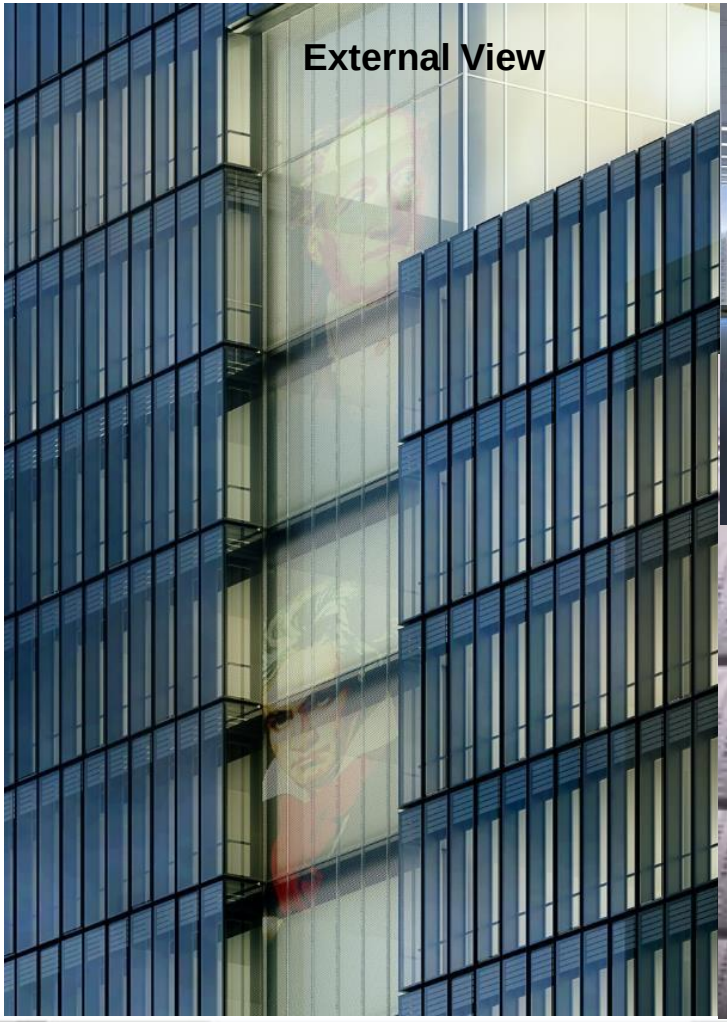




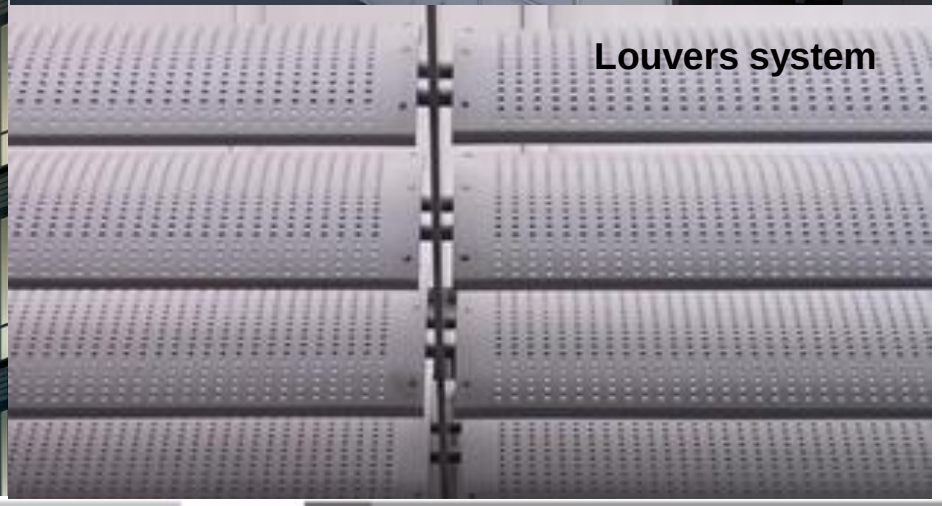
Combine transparent look and energy efficiency

Saving more than 30% energy compared to a good single glass

Visual Comfort


External View


Daylight in office spaces


Louvers system

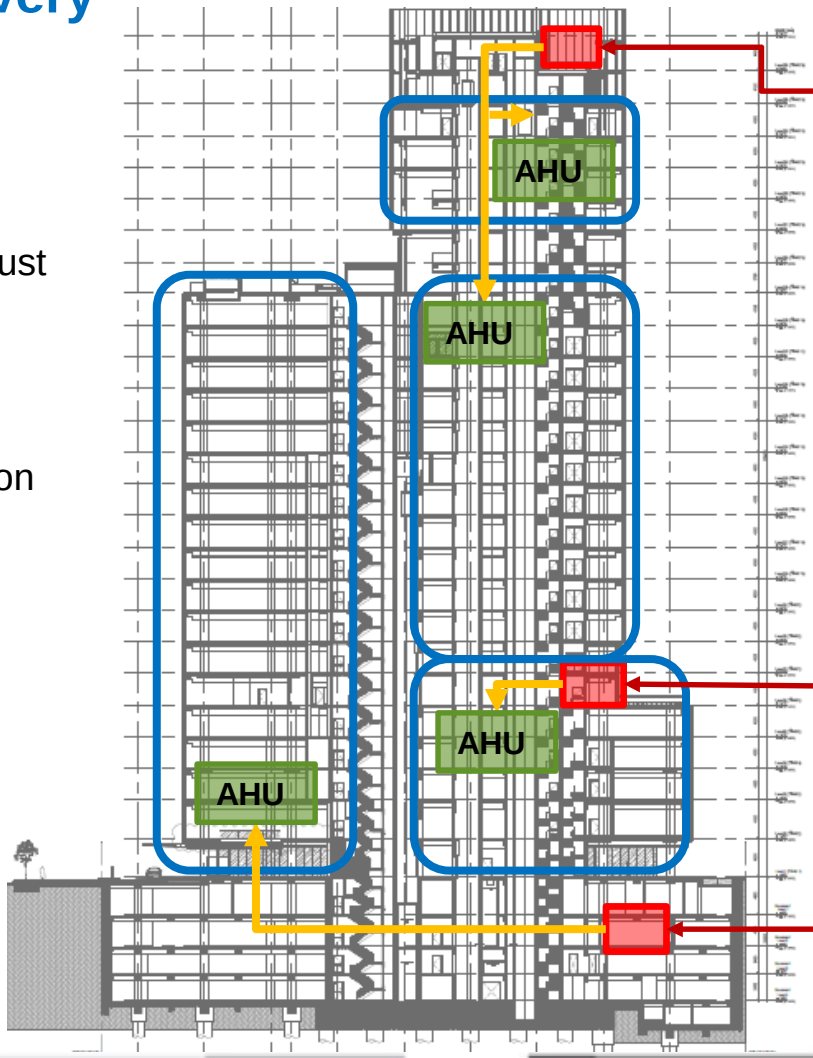
Ventilation – Heat recovery

Function

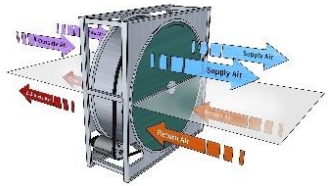
Transfers heat and humidity from incoming fresh air to outgoing exhaust air.

Savings

- Add 3% energy saving consumption
- Payback in 2.5 years



PAU - Pre-cooled outdoor air with heat recovery unit



PAU - Pre-cooled outdoor air with heat recovery unit

PAU - Pre-cooled outdoor air with heat recovery unit

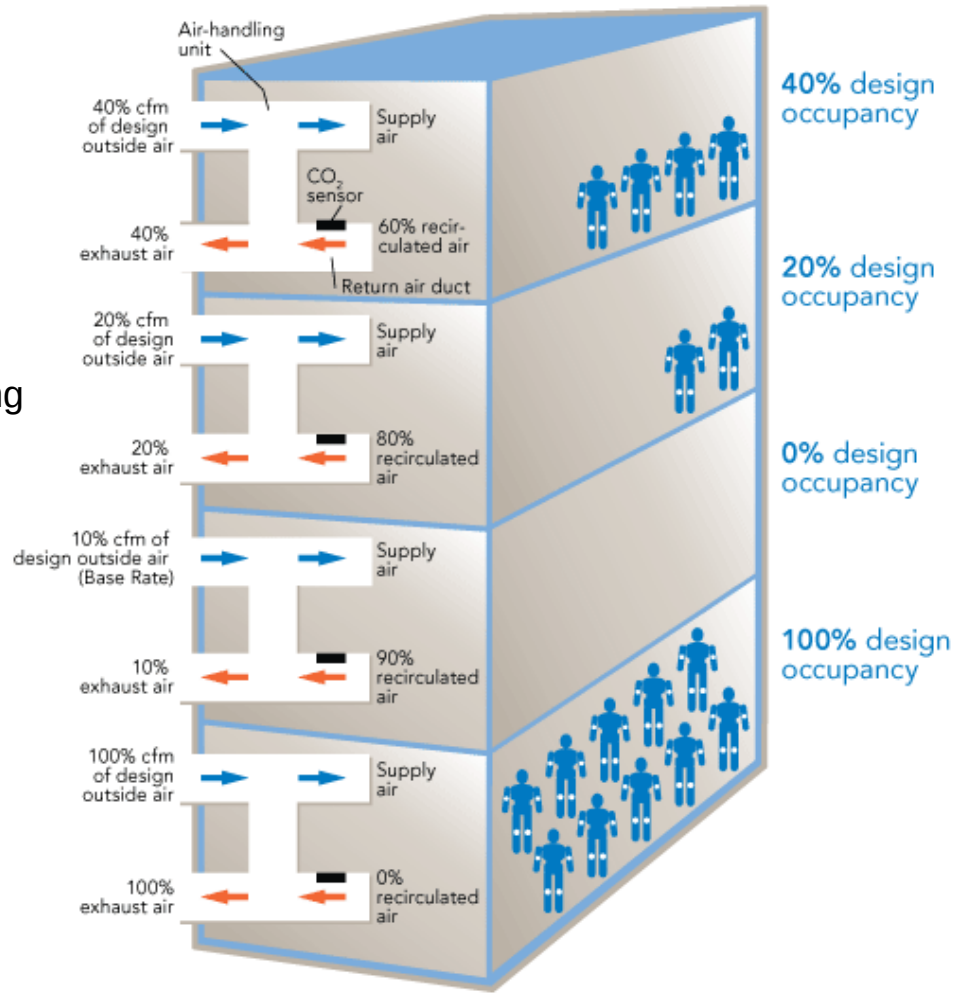
Demand Control Ventilation

Function

Control outdoor air ventilation to correspond to the numbers of people in the space

Savings

- Reduced energy waste in partially occupied spaces
- Reduces problems associated with humidity, including mold and fungal growth.

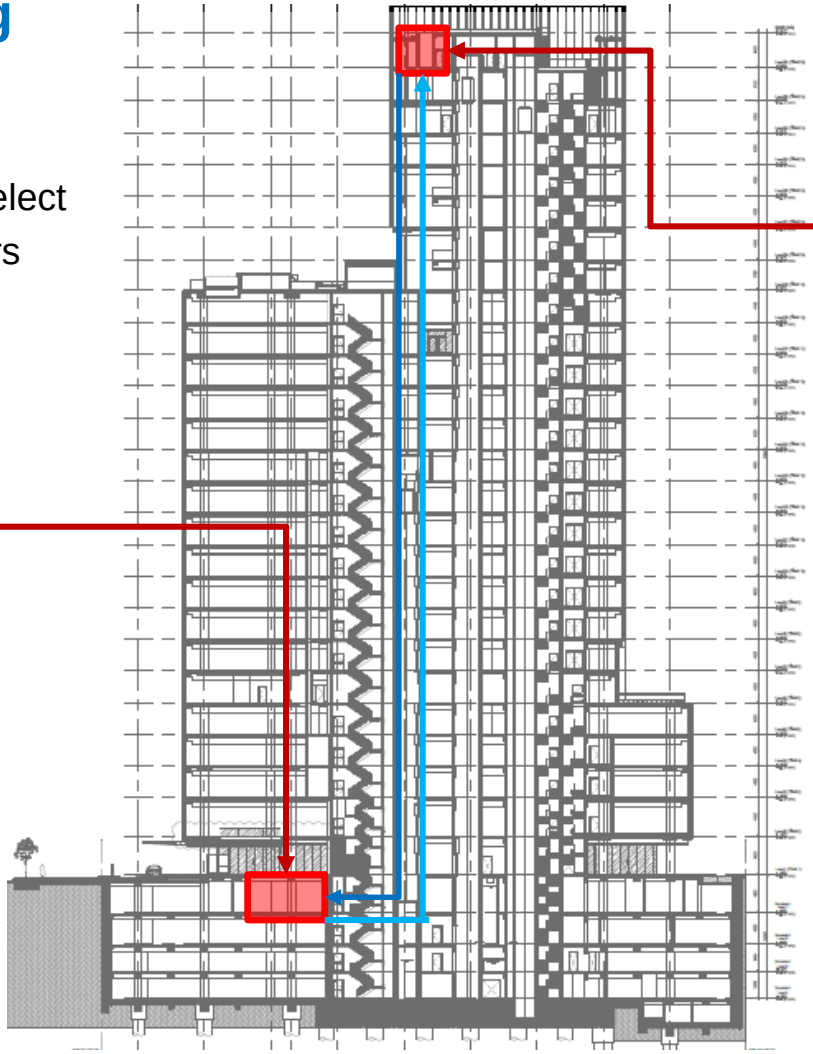


High Efficiency Cooling

Adequately sizing equipment and select high efficient ones, especially chillers reduces energy consumption.

High Efficient Chiller Plant variable speed

High Efficient Pumps variable speed



Cooling Tower Variable speed

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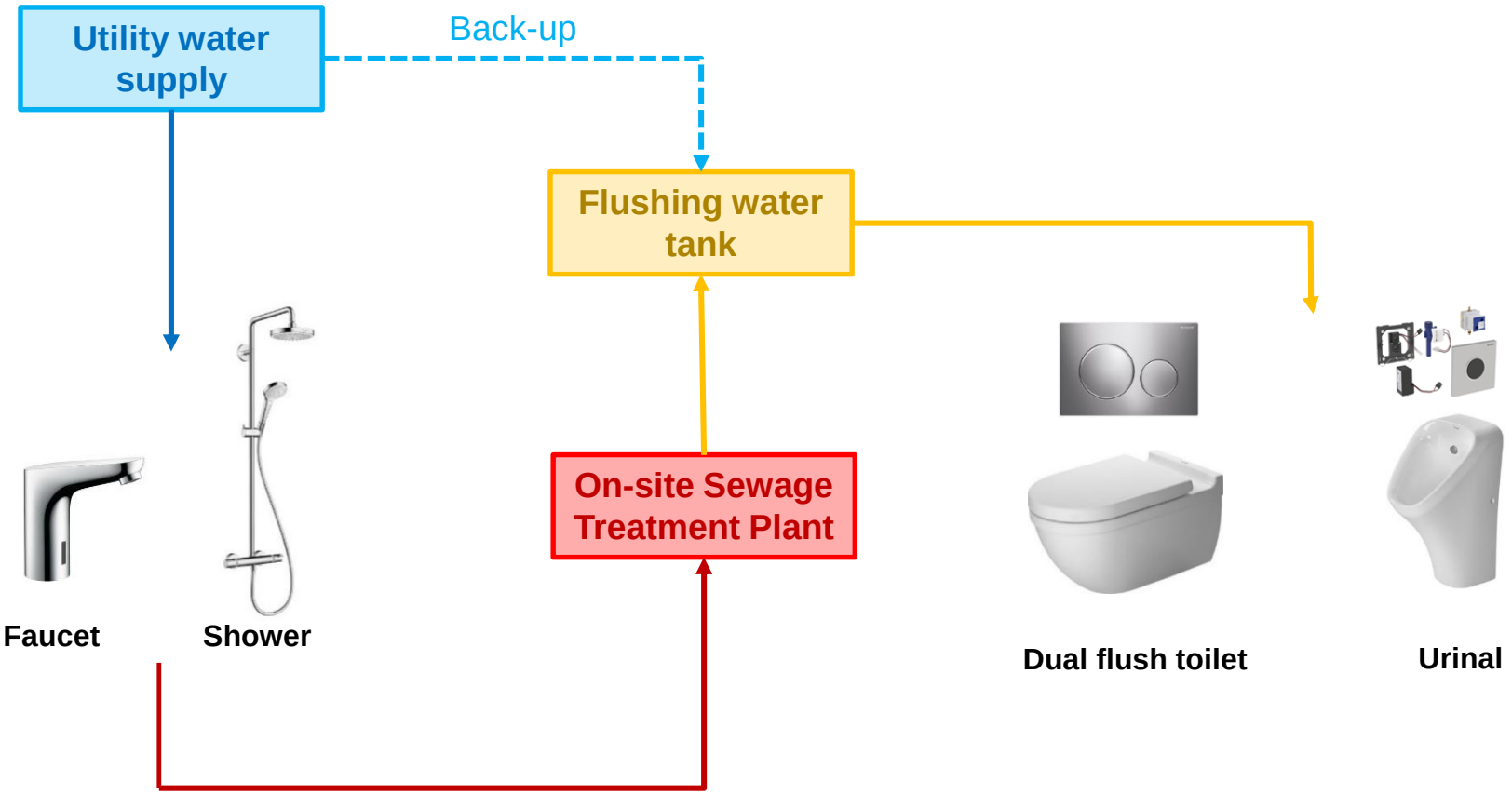
Interior Lighting

T5 is replaced by LED lighting

Payback in 5.8 years.

Add 1% more energy saving

Indoor Water Efficiency

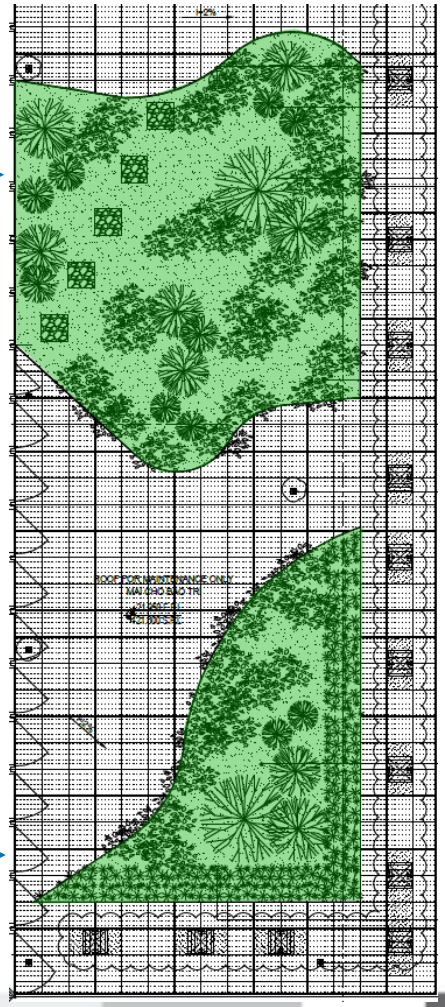


Landscape drip irrigation

Drip irrigation system

Treated wastewater

On-Site Sewage Treatment Plant



Native & Adaptive Plants

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What is Sustainability anyway …

Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

— World Commission on Environment and Development, Our Common Future (1987)

A sustainable building, or green building is an outcome of a design philosophy which focuses on increasing the efficiency of resource use — energy, water, and materials — while reducing building impacts on human health and the environment during the building's lifecycle, through better siting, design, construction, ...

Related issues …

Building resiliency is the capacity of a building to continue to function and operate under extreme conditions, such as (but not limited to) extreme temperatures, sea level rise, natural disasters, etc. As the built environment faces the impending effects of global climate change, building owners, designers, and builders can design facilities to optimize building resiliency.

Building adaptability is the capacity of a building to be used for multiple uses and in multiple ways over the life of the building. For example, designing a building with movable walls/partitions allow for different users to change the space. Additionally, using sustainable design allows for a building to adapt to different environments and conditions.

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Sustainable path …

Frank Lowy - Westfield co-founder.

Many developers built shopping centres but Lowy was one of the few who recognised the value not just in developing but in holding and managing. And he's the only one to have created a shopping centre brand – an Australian brand now a household word in London and much of the US. … For a man who has mastered so many complexities he can also make real estate very simple.

Successful property, he said, is that which "people want and can use".

http://www.afr.com/real-estate/the-australian-financial-reviews-rob-harley-lessons-from-a-life-in-property-20161114-gsowu5#ixzz4QeLQnzey

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High Value Assets …

What is a high value asset ….

Residential – good sales …. and a clean hand over to the body corporate

Offices – superior yield - better tenants, longer leases, longer life cycle

Hotels – superior yield/ EBITDA/ occupancy/ REVPAR/ ADR/ gross margin

Education – m2/student, revenue/student, revenue/m2…. (?)

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High Value Assets …

What is a high value asset ….

Residential – good sales …. and a clean hand over to the body corporate	$360/m2/annum
Offices – superior yield - better tenants, longer leases, longer life cycle	$500/m2/annum
Hotels – superior yield/ EBITDA/ occupancy/ REVPAR/ ADR/ gross margin	$1,000/m2/annum
Education – m2/student, revenue/student, revenue/m2…. (?)	$3,000/m2/annum

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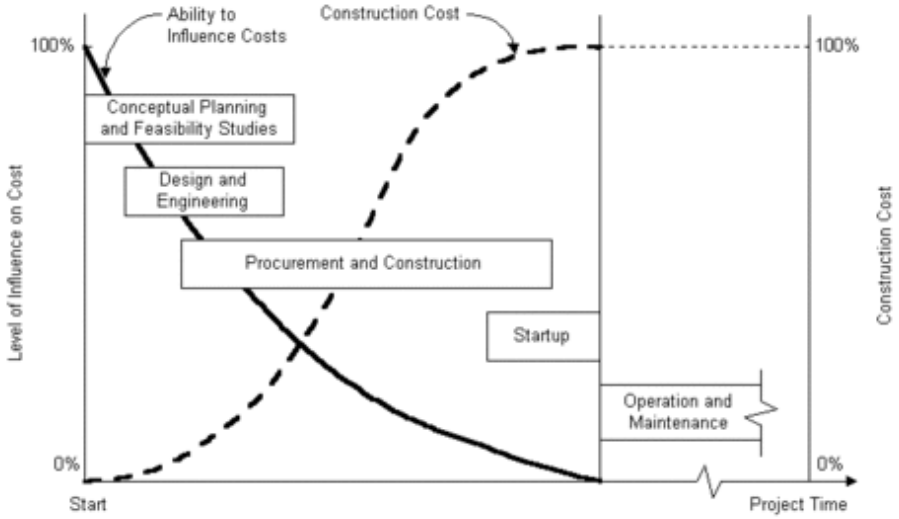
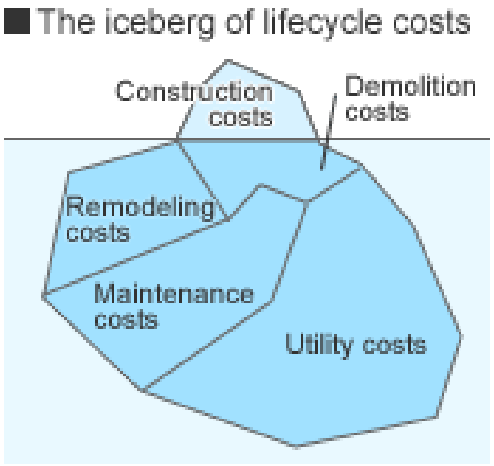
Design & time …





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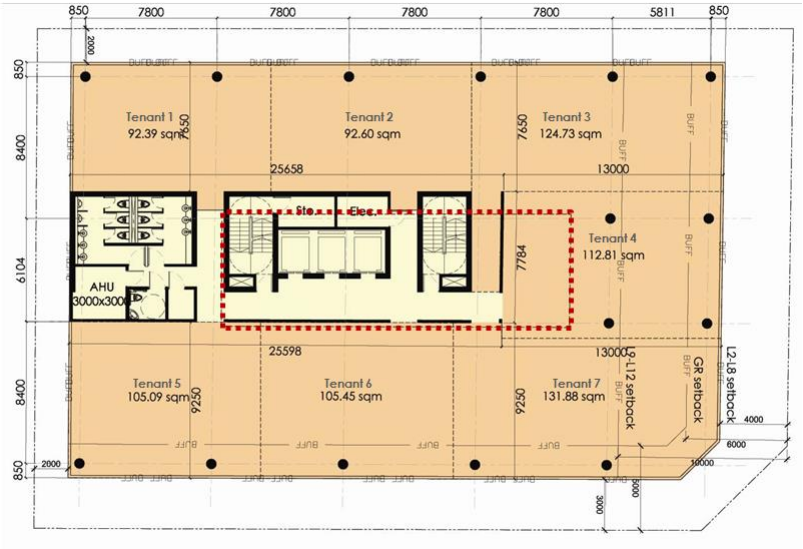
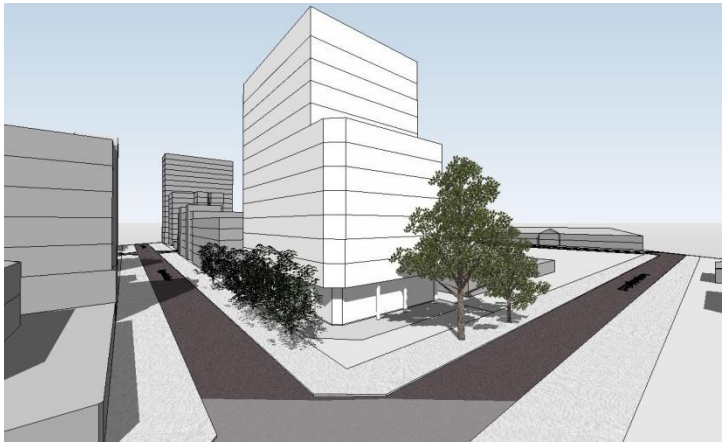
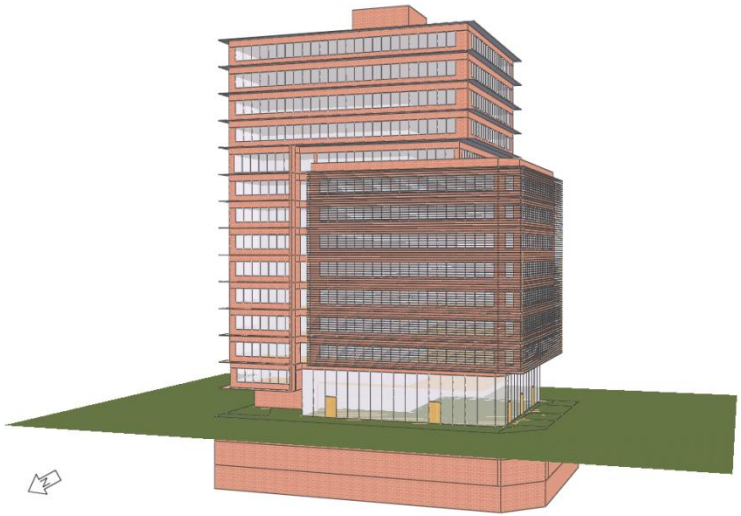
Architecture & Engineering …





Comfort & air conditioning …



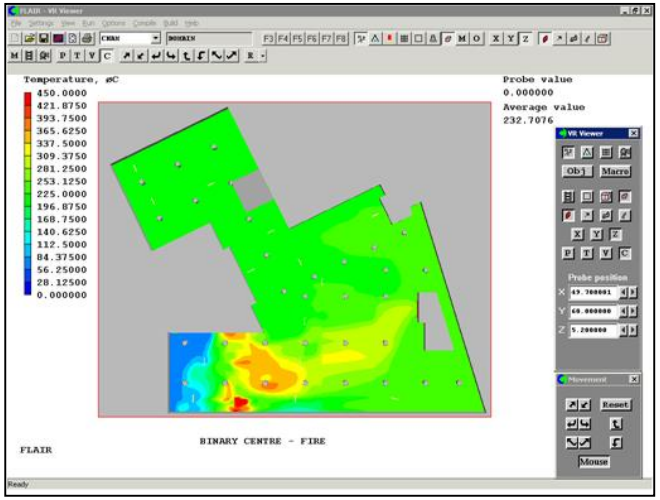
Reduce air cond. spaces

Good engineering design

Cheaper systems may be appropriate

Energy models & CFD

Performance is usually a prerequisite



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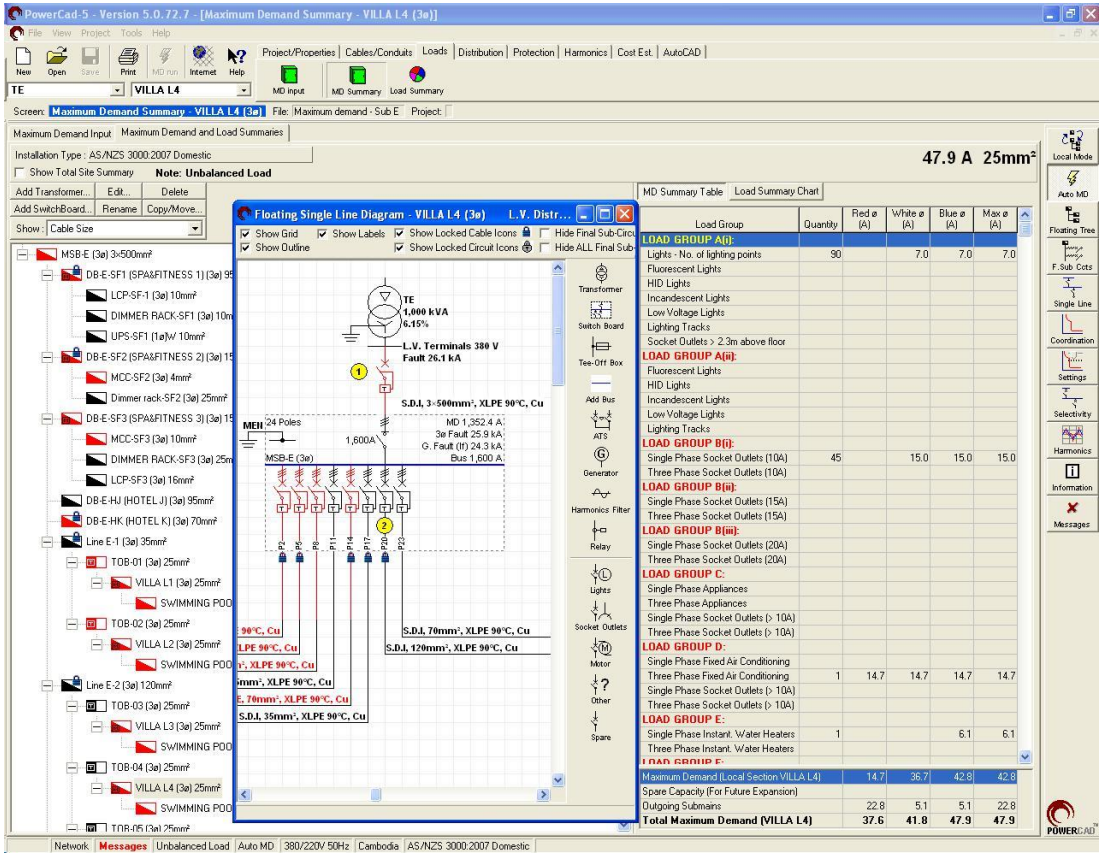
Reliability & electricity …



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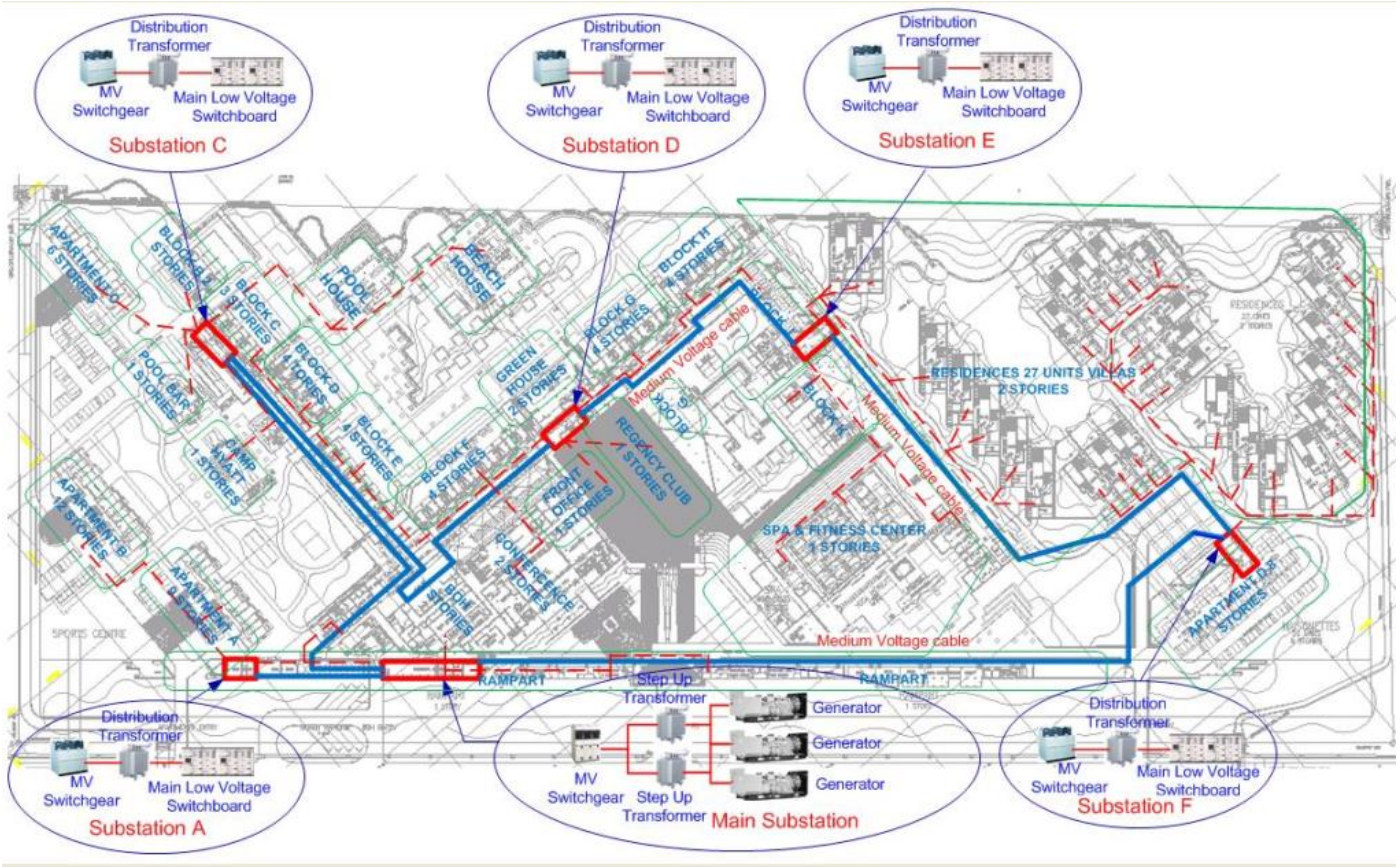
Optimisation …



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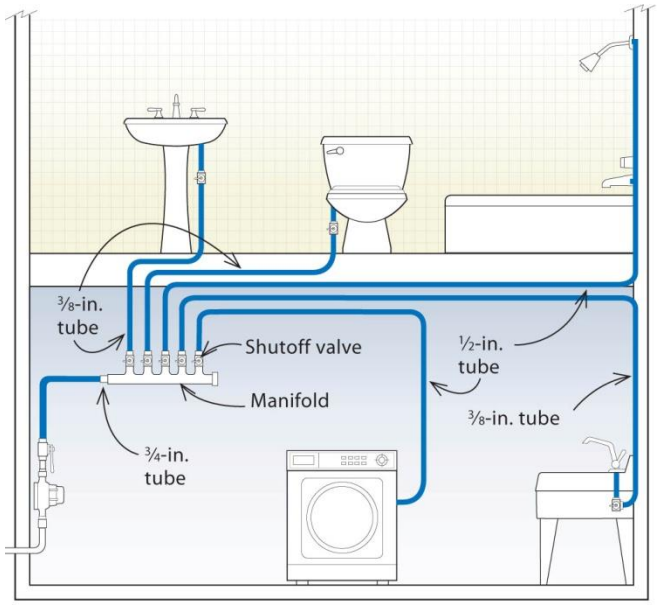
Sanitation & public health …

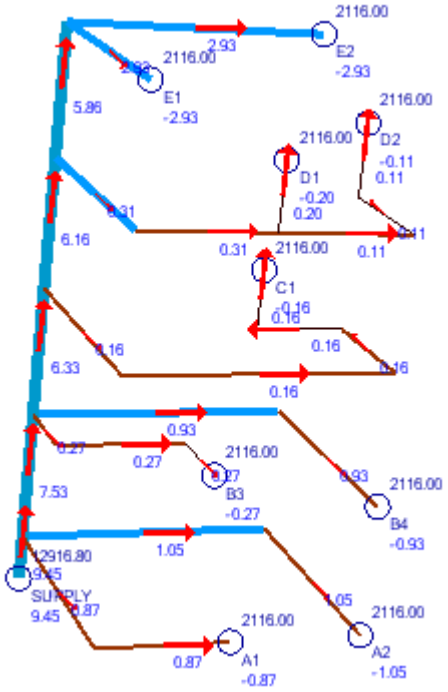


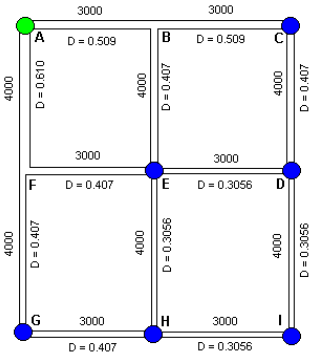
Fire & life safety …

Table 22.5.3.4 Ordinary Hazard Pipe Schedule

Steel		Copper	
1 in.	2 sprinklers	1 in.	2 sprinklers
1¼ in.	3 sprinklers	1¼ in.	3 sprinklers
1½ in.	5 sprinklers	1½ in.	5 sprinklers
2 in.	10 sprinklers	2 in.	12 sprinklers
2½ in..	20 sprinklers	2½ in.	25 sprinklers
3 in.	40 sprinklers	3 in.	45 sprinklers
3½ in.	65 sprinklers	3½ in.	75 sprinklers
4 in.	100 sprinklers	4 in.	115 sprinklers
5 in.	160 sprinklers	5 in.	180 sprinklers
6 in.	275 sprinklers	6 in.	300 sprinklers
8 in.	See Section 8.2	8 in.	See Section 8.2

For SI units, 1 in. = 25.4 mm.





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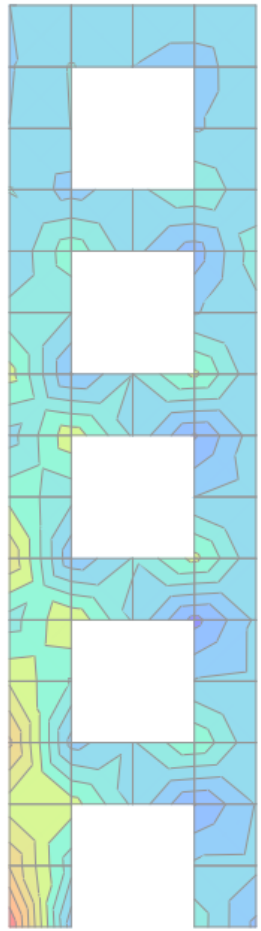
Optimise structure …

- **Height to Width Ratio:** Measure of structural efficiency. Optimal ratio between 5 and 7 for concrete and steel buildings
- **Grid:** Balance between functionality and structure.
- **Floor Systems:** Minimize structural depth to impact least on MEP, architecture and maximize available floor to ceiling height.
- **Concrete volume:** Specialised systems will lower volume, reduce flexibility.
- **Concrete grade:** Consider high concrete grade. Minimize column sizes.
- **Transfers:** Minimize column transfers.
- **Construction:** Speed/ floor-to-floor times.



c) Value Engineering

i) Four Seasons is supportive of Value Engineering (VE) when the process weighs the initial cost savings with the long-term implications of the decision. Four Seasons will actively participate in [illegible] value engineering analysis. (Four Seasons does not support a VE process where decision making is limited to approval or rejection of a shopping list of single line narrative descriptions of VE measures).

Weigh initial costs against long term implications

ii) Value engineering analysis is a process of evaluating a design or construction alternative that offers a more cost-effective method of obtaining the same result. In evaluating an alternative sugg[illegible] Owner and Four Seasons, make an informed technical decision based on cost and risk.

A more cost effective solution for same result

iii) The acceptance of VE measures is normally the result of the cooperative effort of both Consultant and Construction Teams. The Construction Team (the proponent of the VE measure) is responsible for characterizing the particulars of the change and identifying the savings offered by th[illegible] risk associated with accepting the measure, including the potential for harmful effects on the quality, comf[illegible] guest experience and/or detrimental effect on the labour, material and energy costs required to operate the facility.

A co-operative approach involving consultants & contractors ...

iv) The MEP Consultant may be asked to provide a detailed value engineering analysis of certain measures (and to evaluate proposed measures using a 5, 10 and 20 year time line). The MEP Consultant is to make recommendations to Ownership and Four Seasons about the acceptance of cer[illegible] by the proponent of the measure. By following such a process, value engineering can bring significant benefit to the project design rather than being strictly a cost cutting mechanism that leads to uninformed decisions with long term operating cost implications and a compromised guest experience.

Recommendations based upon analysis ...

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Engineering lower costs …

- Focus on end user wants & needs …
- Integrate the design process (A&E)
- Define, optimize & reduce scope earlier
- Consider to omit/ downgrade items & add/upgrade later (refurb in 10 years …)
- Think life cycle costs
- Good engineering design is sustainable … and vice versa.
- Coordinate in 3D/BIM, and collaborate in the cloud.
- If timing is everything … good design takes time …
- Great projects have good clients & better teams

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Engineering lower costs …

	Design, Tender, Construct **Construction Management**	Design, Tender, Construct **Main Contractor w/wo Nom. Sub. Con.**	**Design & Build**
Pros	Design quality specific Apparent single point accountability. Lowest cost (?)	Design quality specific Dual point accountability Fixed price for specific quality Reduced time.	Single point accountability Fixed price Reduced time
Cons	Multiple packages increases • Cost risk. • Time risk CM creates risk for managers (overruns outside of control), and for clients (expectations CM will resolve.)	In Vietnam, often need CM anyway … Main Cons. less sophisticated, especially wrt subcontractors eg M&E. Domestic sub contractors may be substandard.	Less control of design quality Less control of construction quality Domestic sub contractors may be substandard. Depends upon contractors reputation

BTW how is the current market going …

Indochine are currently working on approximately	40 projects at various stages ….
With a total construction value of approximately	US$1.2 to 1.4 billion
Hospitality	52%
Office/mixed use	24%
Residential	14%
Education	5%
Industrial	3%
Design Tender & Construction Management	62%
Design Tender & Main Contractor	30%
Design & Build	8%
Architects	all projects and 25+
External PM	maybe 15%
External QS	maybe 10%+ hidden?

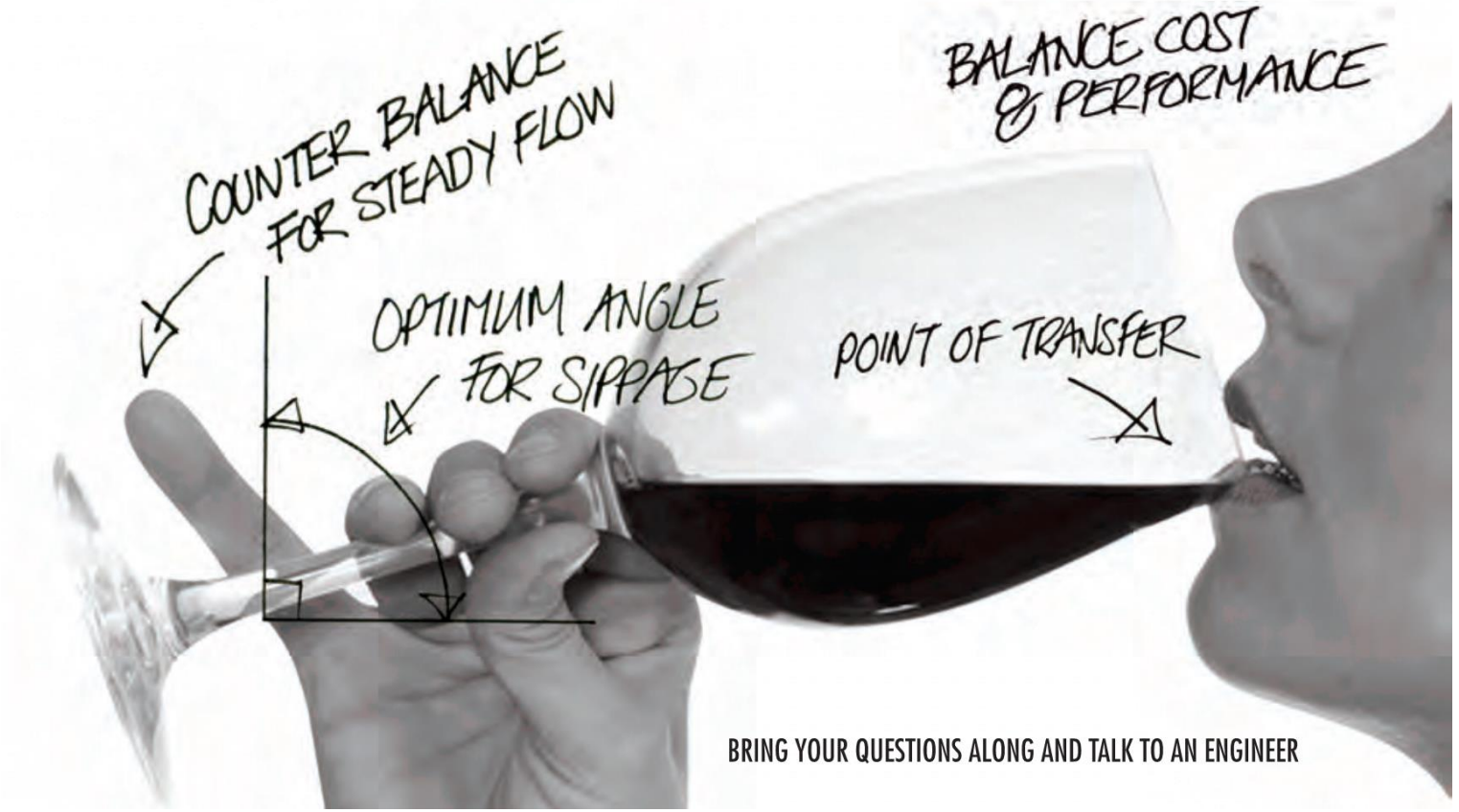
Sustainable path …

Frank Lowy - Westfield co-founder.

~~Successful~~ Sustainable property, he ~~said~~ meant, is that which "people want and can use“, over a long period of time.

WINE & ENGINEERING CONNECTIONS

THURSDAY
5pm



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BRING YOUR QUESTIONS ALONG AND TALK TO AN ENGINEER

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THANK YOU