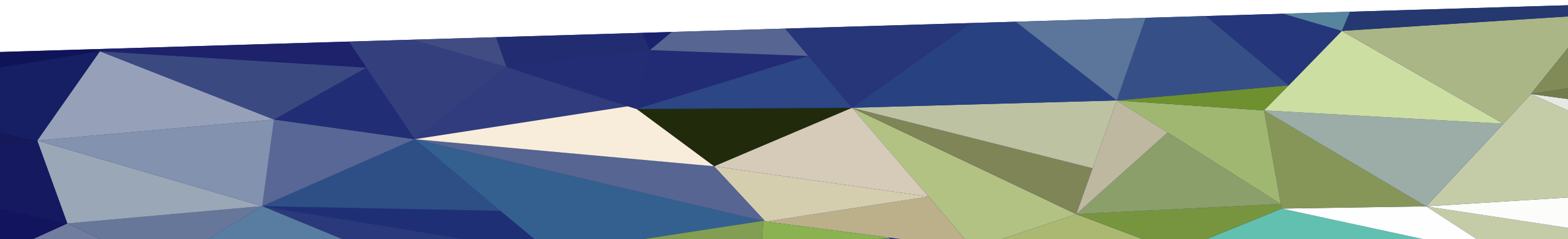


# GreenBIM Program National Museum of Marine Science and Technology(NMMST)



International Climate Development Institute(ICDI)



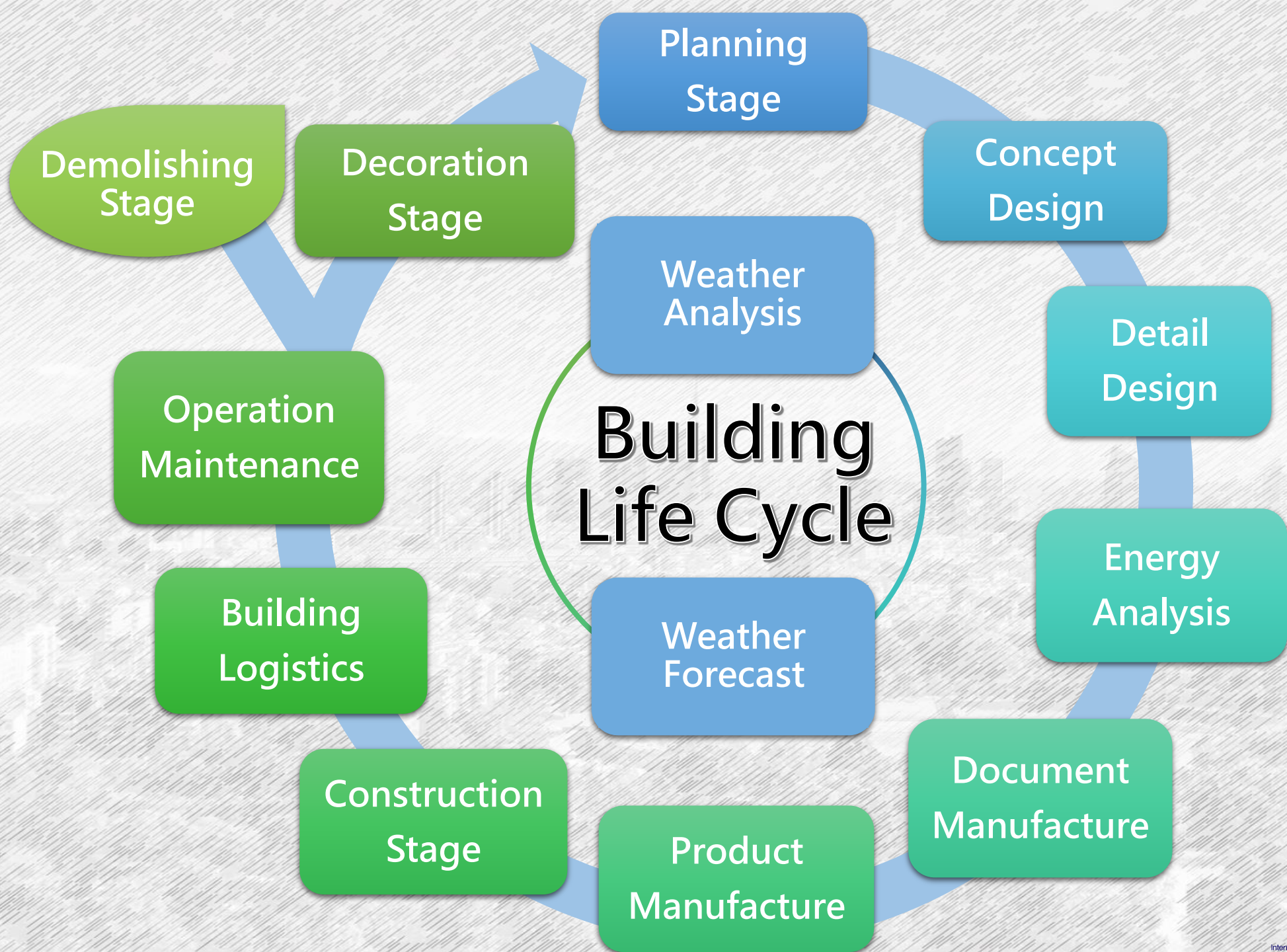
# Abstract



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-  Building Maintenance is one of the largest energy consumption during the building life cycle. In order to apply energy saving by using dependable weather information from building design to maintenance, we establish a website platform for GreenBIM project to help the architect to access the local weather data when they simulate building energy consumption. But there is more, we also get to help the NMMST to plan their energy saving as a demonstration case.
-  ICDI is able to cooperate with Central Weather Bureau and National Building Centre to execute this program with the DELTA company' s support.





# Demonstration Case : NMMST

## Introducing NMMST:

- NMMST - National Museum of Marine Science and Technology, its total area around 48 ha and is located at the eastside of Keelung, next to the Badouzi Bay.
- Sensors in/outside the museum :  
Micro-weather stations outside the museum → 3 units  
Sensors inside the museum → 11 units
- Cooling Unit for Museum :  
500 tons water chiller unit → 2 units  
200 tons water chiller unit → 1 units



## Ways for energy saving



Using the method of pre-cooling to decrease the power consumption and peak demand at noon



Adjust daily cooling schedule to decrease unnecessary power waste by using daily forecast

## Results

- Due to high temperature in summer, the air conditioner is turned on earlier to help decrease power consumption in peak hour. For example, in July and August, **the maximum load demand decreases after adjusting the cooling schedule. The penalty charge decreased almost 20% after adjusting the cooling schedule.**
- If the season temperature changes a lot, **the efficiency of adjusting cooling schedule will be more improved.** In October for an example, since the late October has colder temperatures, we can **decrease 31% for power consumption and decrease 30% for the charge.**

# Demonstration Case : NMMST

Items	July (Normally)	August (Adjusted)	Ratio
Days	31	30	
Power Consumption	Power Consumption (degree)	Power Consumption (degree)	
Off Peak(degree)	155800	183800	
On Peak(degree)	431600	398400	▼8%
Total(degree)	587400	612200	
Highest(degree)	1755	1729	
Maximum load demand(kwh)	1784	1756	
Charge	Charge(NTD)	Charge(NTD)	
Monthly Charges	2,017,769	2,005,775	
Penalty Charges(NTD)	87651.2	69763.2	▼20%
Monthly Visitors	39937	43544	
Average Charges(NTD/man)	50.52	46.06	▼9%
Average Consumption (Degree/man)	14.71	14.06	▼5%

## Contract Capacity :1,600kW

Monthly Highest Demand(kWh)	Jul	Aug	Ratio
1600-1760kWh(Day)	8	10	
Amount above 1600(kWh)	792	614	▼22%
1760kWh above(Day)	2	0	
Amount above 1760(kWh)	37	0	
Power Rate(kW/ 15mins)	Jul	Aug	Ratio
1600-1760kW(Times)	108	91	▼16%
Amount above 1600(kW)	8263	5152	▼38%
1760kW以上(Times)	3	0	
Amount above 1760(kW)	45	0	

On peak(degree) decreased about 8% in August and penalty charge also decreased about 20%. The amount of monthly highest demand that above 1600 also decreased almost 22% compared to July.

\*8/9 Closed one day due to typhoon strikes



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