



UNIVERSITY OF
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The implementation of sustainable concept in waste management through project life cycle process in Gold Coast

By:

Zhabrinna, and M. Mirza Abdillah Pratama



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The Gold Coast city, which is located in the southeast of the Australian state of Queensland, is one of the world leading examples in which a government has put a green legacy as the concern in its development.

One of the implementations of its sustainability concept is described in its **waste management**.



Gold Coast

WASTE

Waste is a distinctive sector which carries the potential to be a greenhouse gas (GHG) emissions' major saver.

The prevention and the restoration of waste, such as waste disposal and treatment, can avoid emissions in other sectors

The lifestyle, such as the selection of things we use and the way we dispose of them may also compose a significant difference in the total amount of waste and greenhouse gas produced



The general approach of waste management is by reducing and recycling waste. However, in this case, the approach is expanded to also optimise the utilisation of waste to acquire benefits for society.

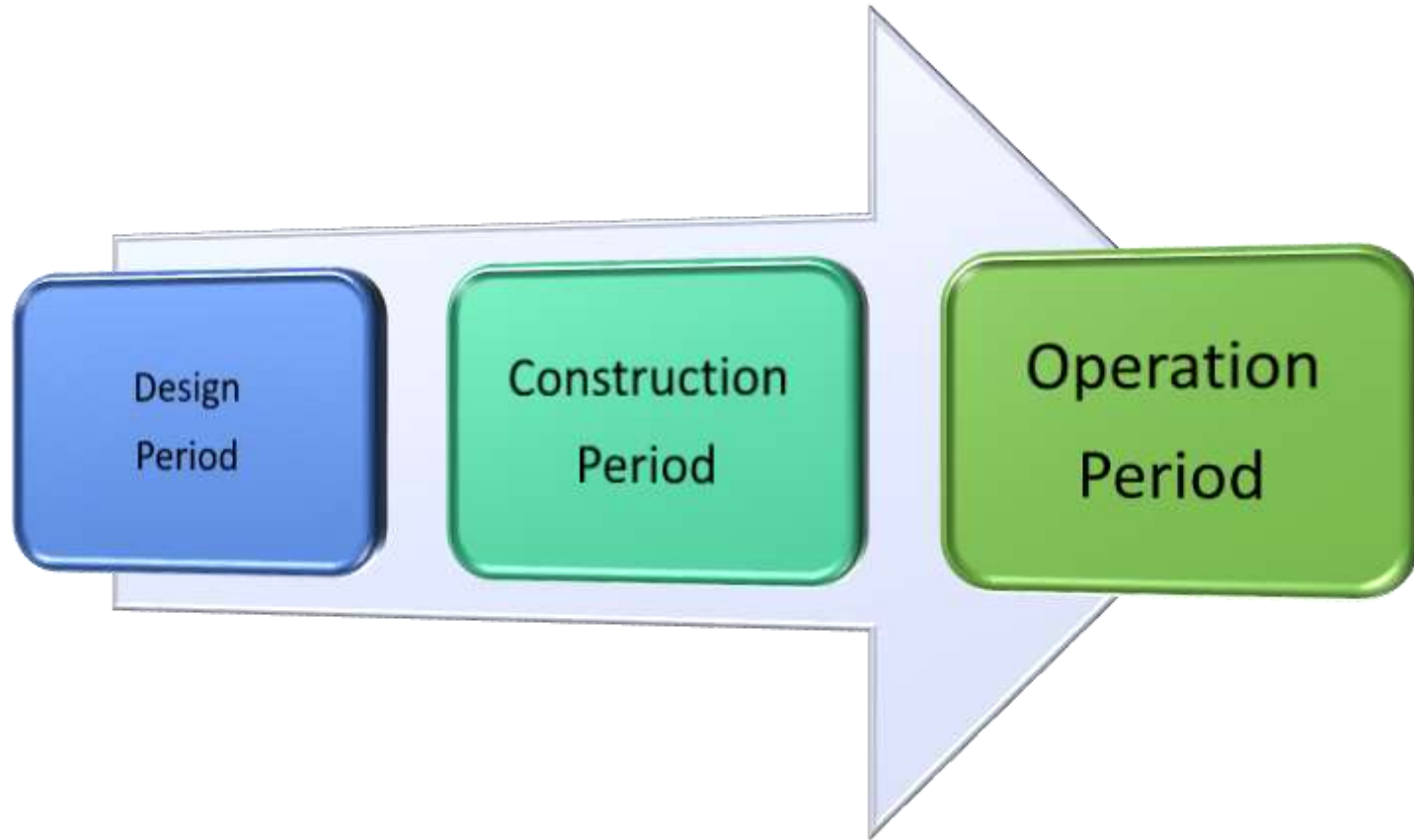
The waste management is also be integrated with the system in Gold Coast city.

Every action of waste management undertaken yield greenhouse gas, both directly (e.g. emissions generated from the process of recycling) and indirectly (i.e. over energy consumption)



WASTE MANAGEMENT

WASTE MANAGEMENT



DESIGN PERIOD

- Optimisation of the prefabricated components
- Materials standardisation
- Material efficiency consideration
- Procuring suppliers with eco-friendly packaging
- Creating a plan for the flow of the waste and the disposal area

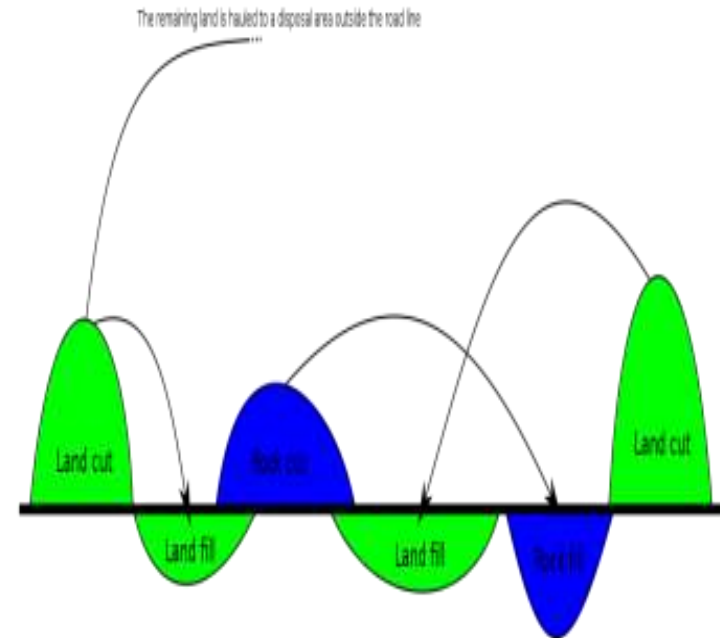


CONSTRUCTION PERIOD

- Promote avoiding and reducing waste habit to the workers
- Routine waste collection service to the landfill disposal and recycling centre → **Reedy Creek Commercial Landfill**
- Minimizing storage needed by 'just in time' materials scheduling
- Cut & Fill
- Use top soil and foundation excavation for grass lawn



Changing behaviour → Targeting zero landfill



OPERATION PERIOD

Waste collection & recycling service:

- Collection service
- Drop-off service
- Online waste service

Domestic waste management plan:

- The separation of waste
- Creating a covered/hidden place for trash bin in the apartment

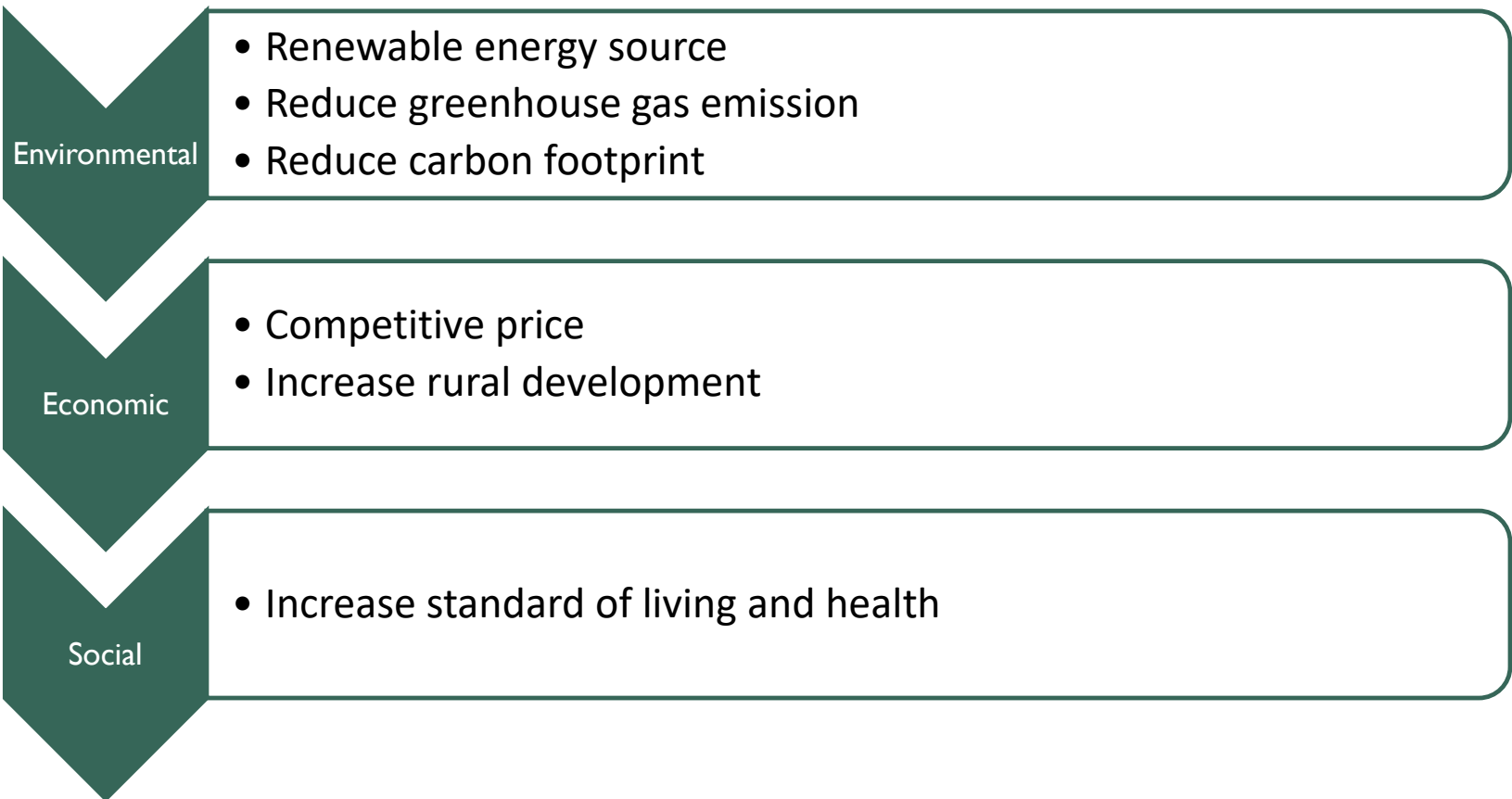
Initiative use of waste as fertilizer and electricity (Biomass)

Promote waste avoidance, re-use, and recycling behavior to the community →
Recycling Shops, Solid Waste Strategy 2024



BIOMASS BENEFITS

Why Biomass?



COST BENEFIT ANALYSIS

Qualitative analysis

Specific Actions	Benefits	Benefits' Rating	Costs	Costs' Rating	Benefit/Cost Ratio
During Design					
Optimisation of the prefabricated components	Waste avoidance, efficiency in work and resources	3	No significant cost	1	3
Materials standardisation	Less potency of error and waste	2	No significant cost	1	2
Material efficiency consideration	Waste avoidance, carbon emission reduction	4	No significant cost	1	4
Procuring suppliers with eco-friendly packaging and packages collection facility	Carbon emission reduction	3	A bit more expensive than the other conventional suppliers	2	1,5
Creating a plan for the flow of the waste and the disposal area	Better waste arrangement	3	No significant cost	1	3

COST BENEFIT ANALYSIS

Qualitative analysis

Specific Actions	Benefits	Benefits' Rating	Costs	Costs' Rating	Benefit/Cost Ratio
Construction Period					
Promote avoiding and reducing waste habit to the workers	Waste avoidance, carbon emission reduction	3	No significant cost	1	3
Routine waste collection service to the landfill and recycling centre	Better waste arrangement	5	Regular waste collection cost	3	1,7
Minimising storage needed by 'just in time' materials scheduling	Waste avoidance	3	No significant cost	1	3
Cut & Fill	Carbon emission reduction, efficiency in work and resources	2	No significant cost	1	2
Use top soil and foundation excavation for grass lawn	Carbon emission reduction, efficiency in work and resources	2	No significant cost	1	2

COST BENEFIT ANALYSIS

Qualitative analysis

Specific Actions	Benefits	Benefits' Rating	Costs	Costs' Rating	Benefit/Cost Ratio
Operation Period					
Waste collection & recycling service	Better waste arrangement	4	Regular waste collection cost	2	2
Domestic waste management plan	Better waste arrangement	4	Installation cost, maintenance cost	3	1,3
Initiative use of waste as fertiliser and electricity (Biomass)	Economic benefit, support diversity, long-term investment in energy	5	Installation cost, maintenance cost	3	1,7
Promote waste avoidance, reuse, and recycling behaviour to the community	Waste avoidance, carbon emission reduction	5	No significant cost	1	5

COST BENEFIT ANALYSIS

Quantitative analysis

Cost for waste management investment

Investment for Waste Management	Costs
Site Waste Management Plan (SWMP)	£1,640 (for £13.5m construction value)
Logistics management on site	£1,080 (for £13.5m construction value)
Training and socialisation	£1,530 (for £13.5m construction value)
Regular waste collection during construction	AU\$96.90 or £58.63 per tonne
Regular waste collection during operation	AU\$24.40 or £14.76 per year
Installation and maintenance cost of fertiliser processing	£20
Installation and maintenance cost of biomass	AU\$430,000 or £260,182.62 per 1MW
Total cost for waste management investment	£264,549.89

COST BENEFIT ANALYSIS

Quantitative analysis

Benefits gained by waste management implementation

Aspect	Baseline	Target	Estimated Value (£)	Improvement Percentage of £13.5m Construction Value
Value of materials wasted	£499,705	£241,515	£258,190	1.91 %
Cost of waste disposal	£99,661	£49,246	£50,415	0.37 %
Total benefits saved	£599,366	£290,761	£308,605	2.28 %

Total cost for waste management investment **£264,549.89**

Total benefits gained by waste management implementation **£308,606**

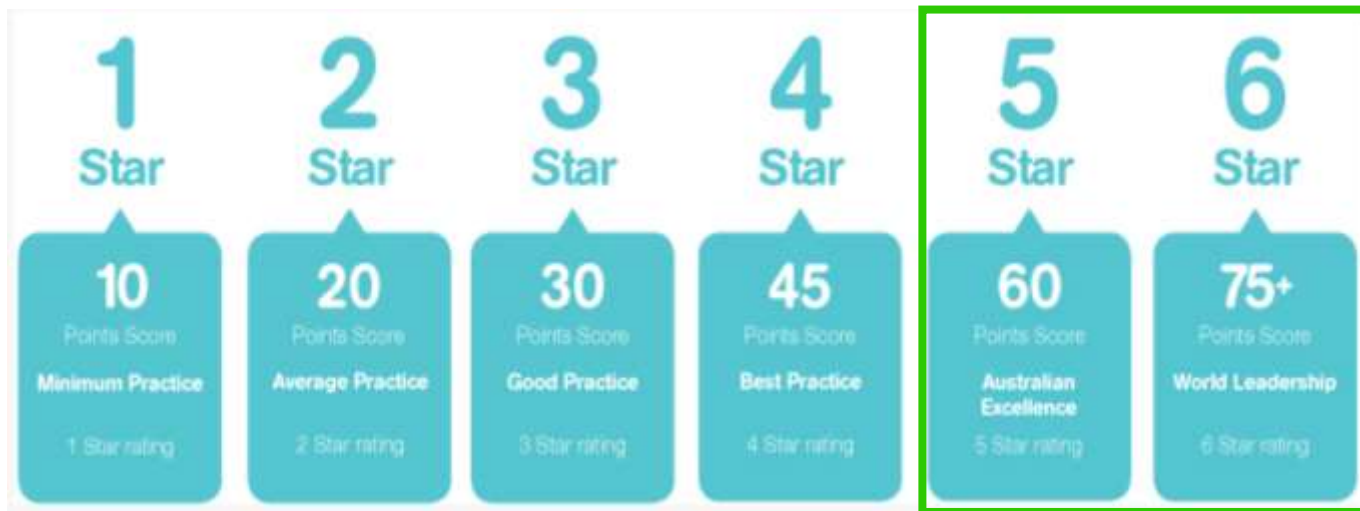
Total benefits of £13.5m construction value **£44,036.11**



BENCHMARKING

GREEN STAR

Green Star is an Australian certification system for the design, construction and operation of sustainable buildings, fitouts and communities.



The most impressive project so far which has achieved 6 Star Green Star is Frasers Property Australia's new Perth office which has successfully managed to only send 0.35 kg per m² construction and demolition waste to landfill.

GREEN STAR – DESIGN & AS BUILT

Green Star – “Design & As Built” assesses the sustainability outcomes from the design and construction of new buildings or major refurbishments, across nine holistic impact categories.



Management

Aims to encourage and reward the adoption of practices and processes that support best practice sustainability outcomes throughout the different phases of a project's design, construction and ongoing operation.



Indoor environment quality (IEQ)

Aims to encourage and reward initiatives that enhance the comfort and well-being of occupants. The credits within this category address issues such as air quality, thermal comfort and acoustic comfort.



Energy

Aims to reward projects that are designed and constructed to reduce overall greenhouse emissions from operations by addressing energy demand reduction, use efficiency and generation from alternative sources.



Transport

Aims to reward projects that facilitate a reduction on the dependency of private car use as an important means of reducing overall greenhouse gas emissions, as well as to encourage the provision of alternative forms of transportation.

GREEN STAR – DESIGN & AS BUILT



Water

Aims to encourage and reward initiatives that reduce the consumption of potable water through measures such as the incorporation of water efficient fixtures and building systems and water re-use.



Materials

Aims to address the consumption of resources for the project, by encouraging the selection of low-impact materials.



Land use and ecology

Aims to reduce the negative impacts on sites' ecological value as a result of urban development and reward projects that minimise harm and enhance the quality of local ecology.



Emissions

Aims to assess the environmental impacts of 'point source' pollution generated by projects and reduce their effects on the atmosphere, watercourse and native animals.



Innovation

Aims to recognise the implementation of innovative practices, processes and strategies that promote sustainability in the built environment.

GREEN STAR 5 STEP CERTIFICATION PROCESS

1

REGISTER – register the project with the Green Star portal.

2

DOCUMENT – guidelines for the documentation needed to demonstrate that the building, fitout or community meets Green Star's sustainability benchmarks.

3

SUBMIT – submission of the documentation for the Green Star Assessment.

4

ASSESS – submissions are reviewed by an independent panel of sustainable development experts and an overall score is assigned.

5

CERTIFY – a Green Star certified rating is awarded on the project's sustainability.

INTERDEPENDENCY

Several specific actions taken to manage waste have both indirect and direct impacts on the energy consumption.

The indirect impact can be in the form of:

- the energy needed for transportation
- material production

For example:

- the plan of waste flow and the disposal area that leads to the less energy consumption for the transportation of waste.


The direct impact on the energy efficiency:

- the initiative uses of waste for biomass

Electricity produced by biomass can reduce or even substitute the conventional electricity from coal. This action can be considered as a long-term investment in energy, besides it is also economically and environmentally beneficial

- the initiative use of waste as fertiliser


This action will support diversity restoration and revive the local identity of Gold Coast city.



The integrated waste management system is conducted to perform the sustainability concept and critical carbon design.

The cost benefit analysis performed shows that the waste management actions in Gold Coast are economically beneficial.

The undertaking of those specific actions are also related to the other main elements, such as energy, biodiversity, transportation, and sustainable community.





THANK YOU