BIOGAS

Architecture Design Studio II- Group 3
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1.WHAT

What is biogas ?

Biogas is a byproduct of the decomposition of organic matter by anaerobic bacteria.

Composition:
methane (CH4) 60%
carbon dioxide(CO2) 40%
small amounts of hydrogen sulphide (H2S), moisture and siloxanes.

2.HOW

How does it work?

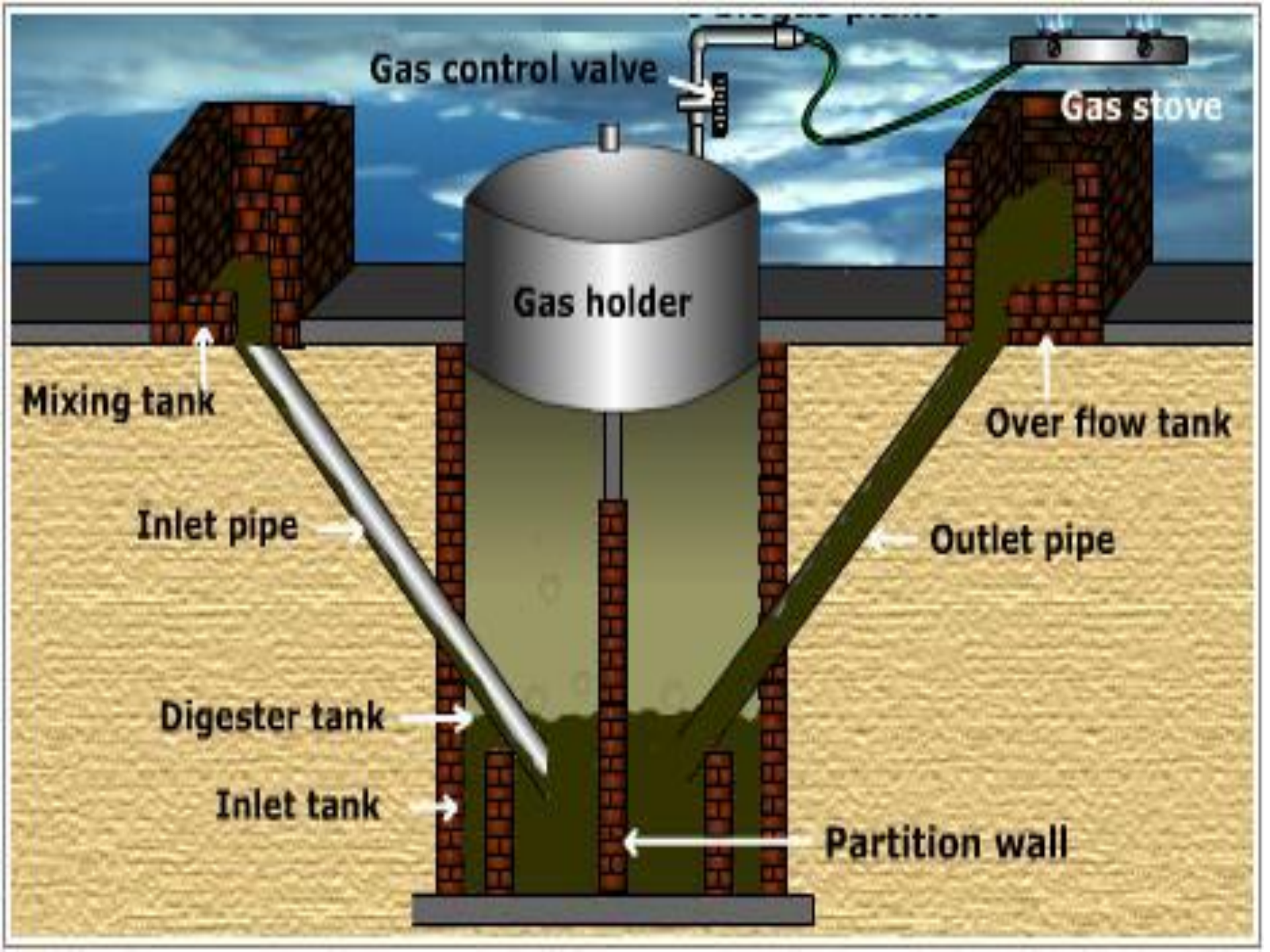
Organic waste put into a sealed tank called a digester (or bioreactor) where it is heated and agitated. In the absence of oxygen anaerobic bacteria consume the organic matter to multiply and produce biogas.

Organic Wastes

human excreta, manure, animal slurry, fruit and vegetable waste, slaughterhouse waste, meat packing waste, dairy factory waste, brewery and distillery waste, etc.

Digester

Proper condition


Gas control valve
Gas stove
Gas holder
Mixing tank
Over flow tank
Inlet pipe
Outlet pipe
Digester tank
Inlet tank
Partition wall

Proper condition

1.Proper biogas bacteria.
2.Strict anaerobic environment.
3.Enough raw material for fermentation.
4.Proper temperature.
Most of the methane bacteria are active 25-40 ℃
5.Proper concentration.
Rural digester concentration should be controlled from 6 to 12%
6.Proper pH-----6.8-7.4,
7.Regular stirring

3.WHY

What is the benefit?
Why do we apply this technique?

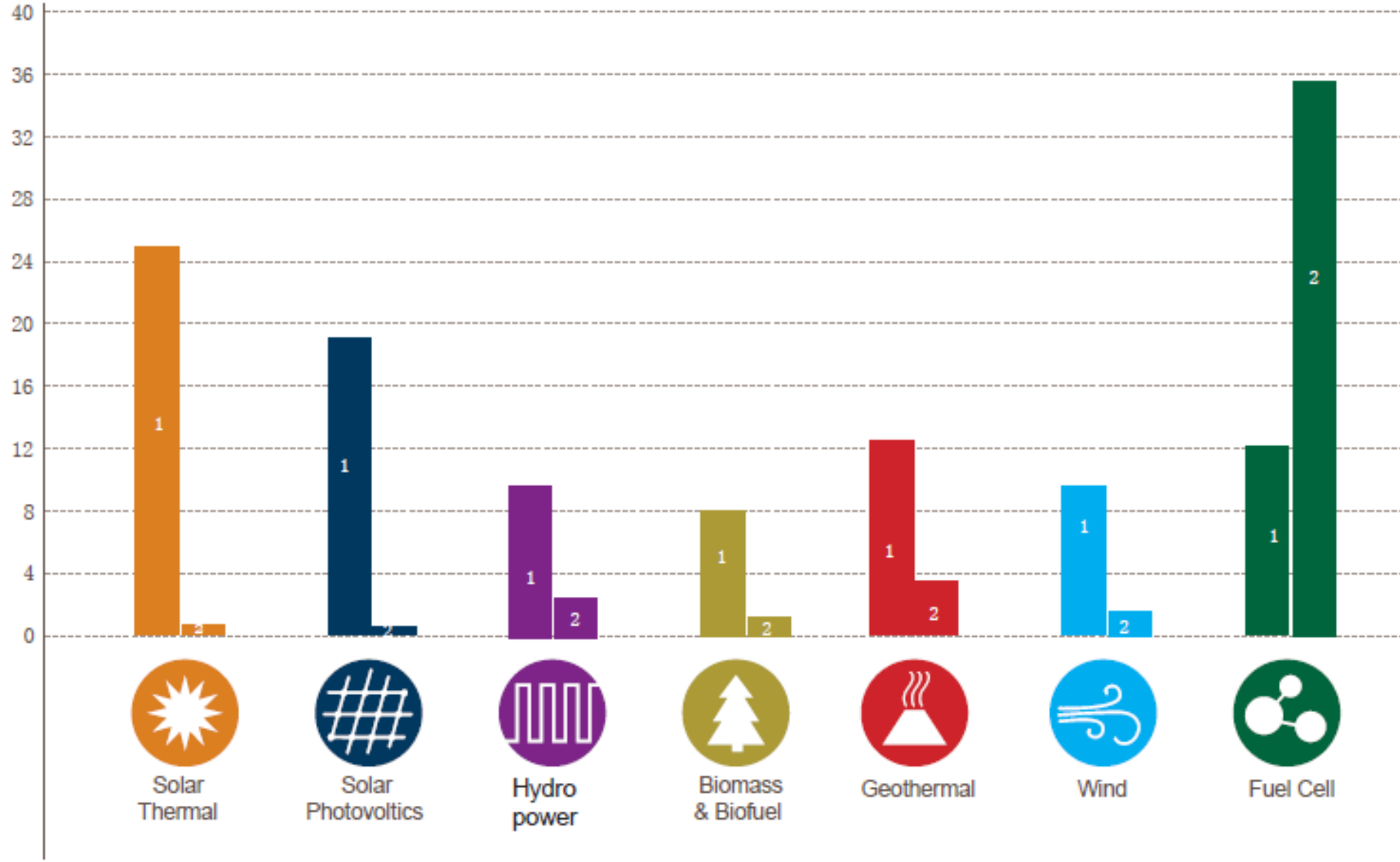
1. A good way to deal with the wastes.

2.Provide more fertilizer .

3.Provide energy for house heating and lighting.

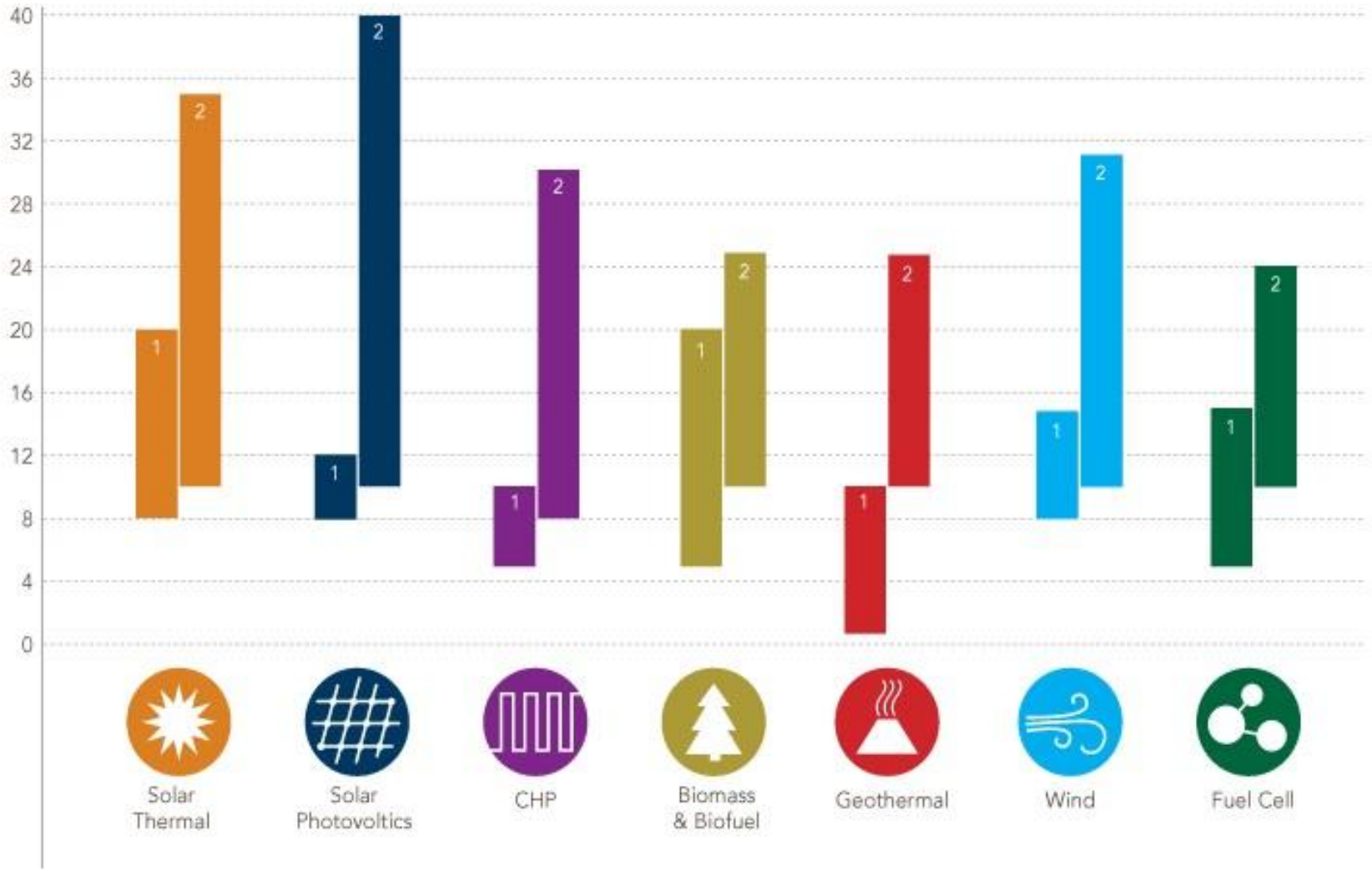
Electricity costs and Carbon Dioxide Emissions Costs
Per kilowatt hour

1.Electricity costs
2.Carbon dioxide costs

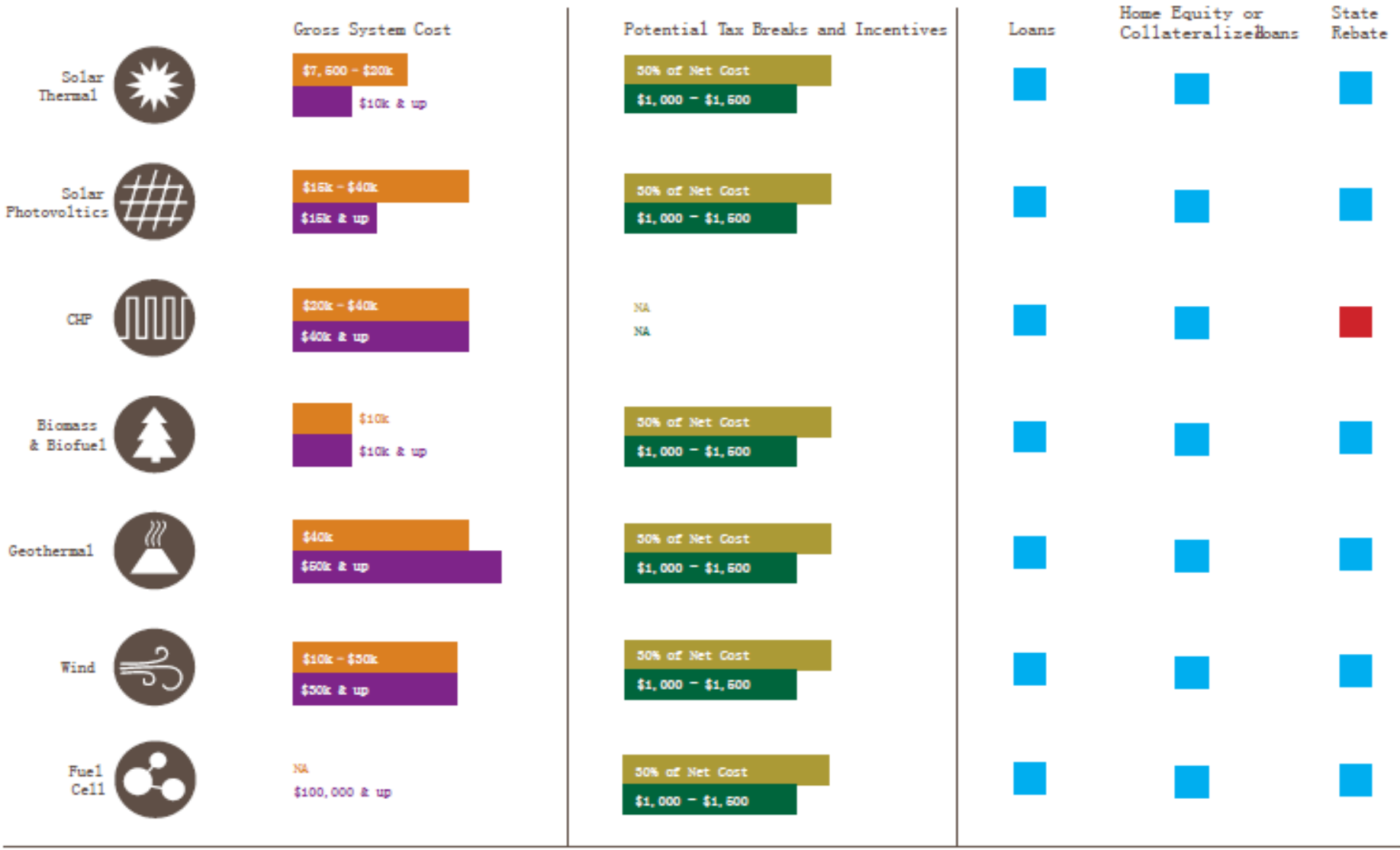


Annual Return on Investments

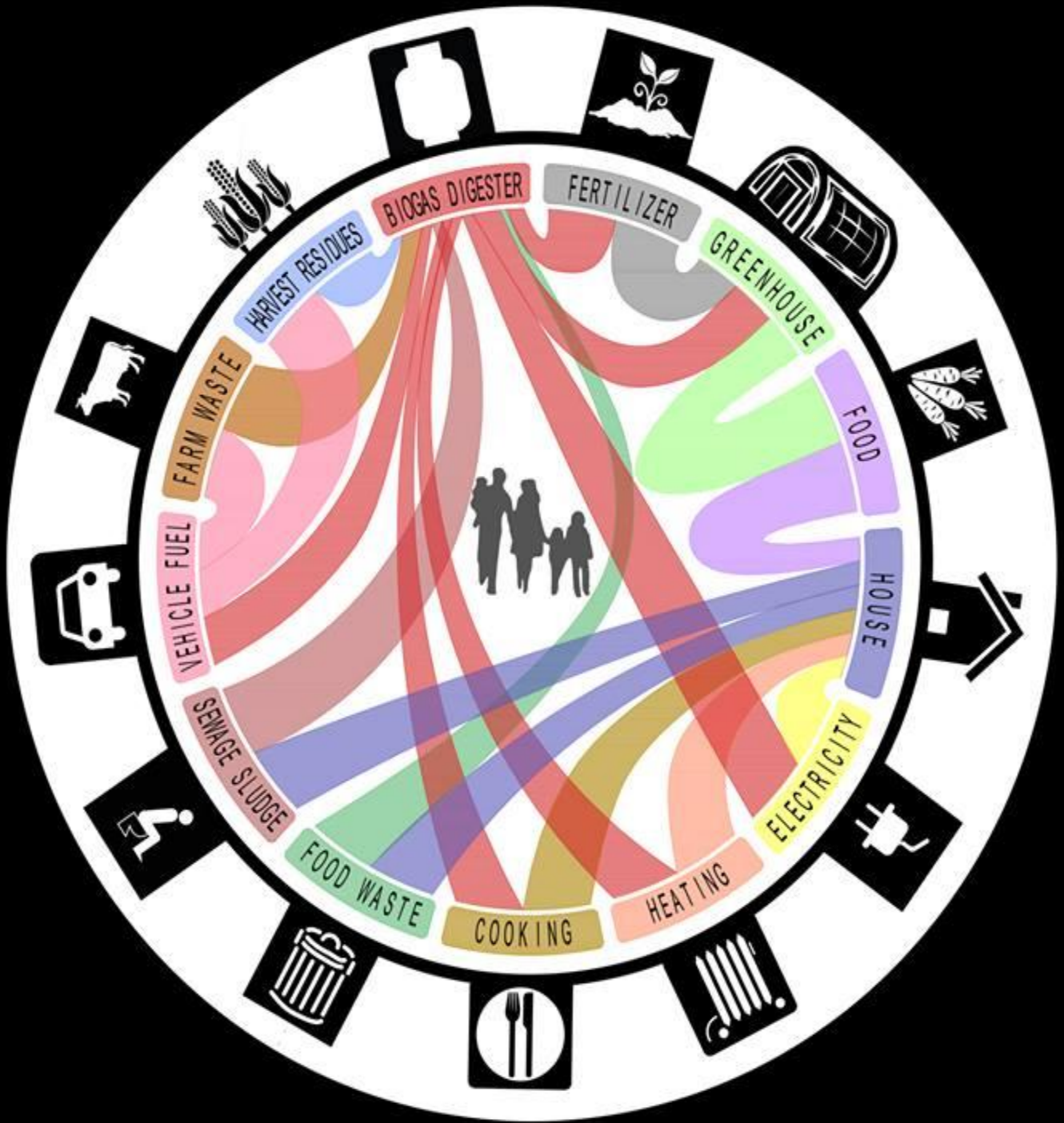
1 – Residential
2 – Commercial



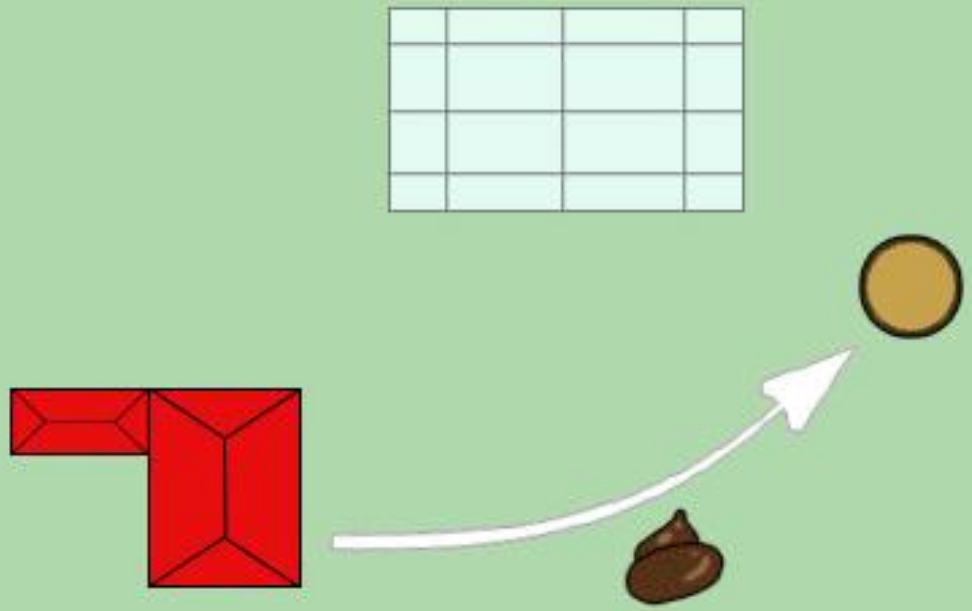
Costs, Incentives, Financing Options

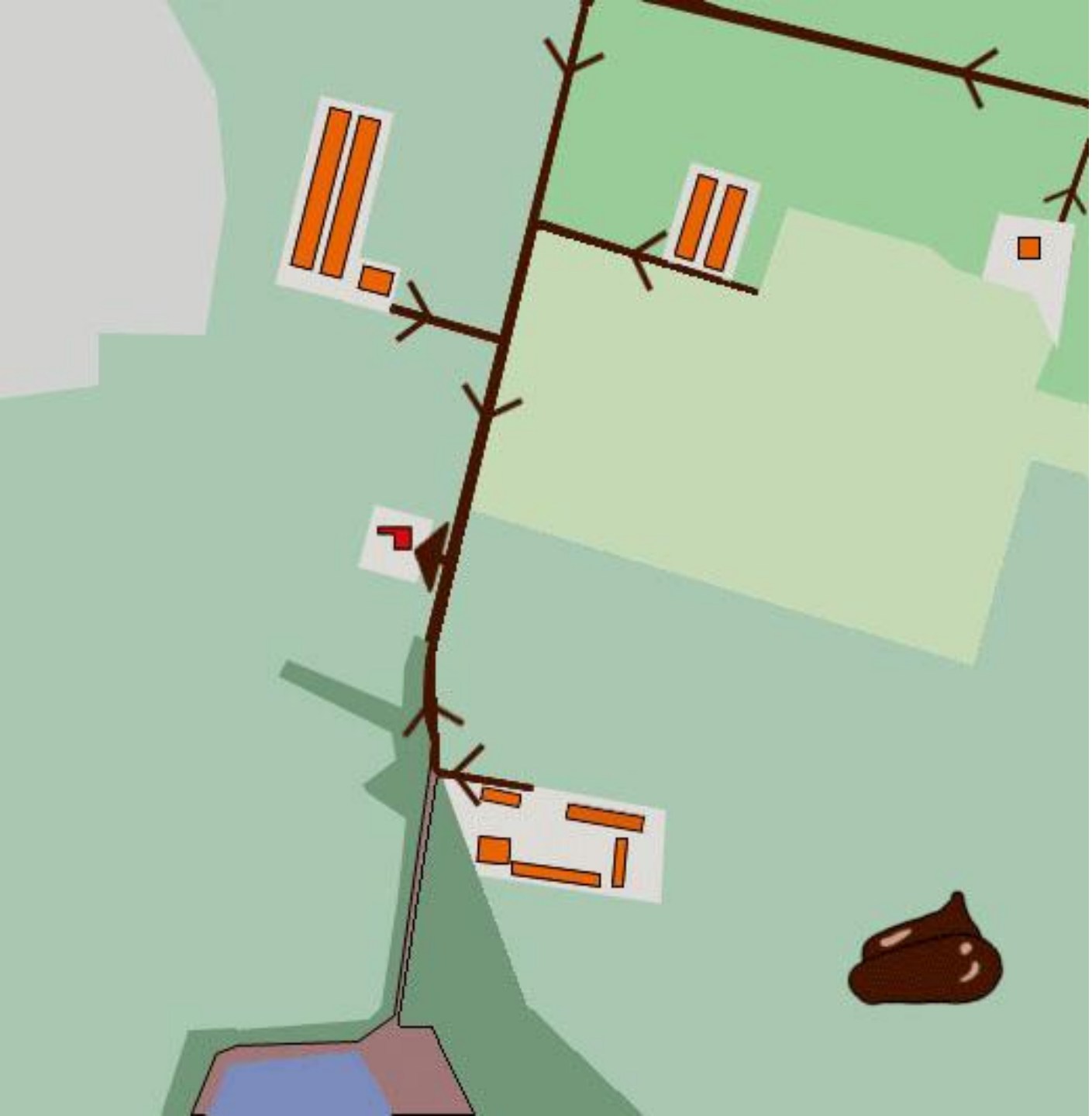



Design Concept


BIOGAS DIGESTER
FERTILIZER
GREENHOUSE
FOOD
HOUSE
ELECTRICITY
HEATING
COOKING
FOOD WASTE
SEWAGE SLUDGE
VEHICLE FUEL
FARM WASTE
HARVEST RESIDUES

The Future Mapping





neighbours

city

Case study

Biogas System Building

EDITT TOWER
SINGAPORE

ABENO HARUKAS
JAPAN

EDITT Tower

Client:
URA (Urban Redevelopment Authority) Singapore (Sponsor)
EDITT (Ecological Design in The Tropics) (Sponsor)
NUS (National University of Singapore) (Sponsor)

Date Start:
1998 (Competition: design)
Completion Date:
Pending

Areas:
Total gross area: 6,033 sq.m.
Total nett area: 3,567.16 sq.m.
Total area of plantation: 3,841.34 sq.m.

Location:
Junction of Waterloo Road and Victoria Street, Singapore

Nos. of Storeys: 26 Storeys

Site Area:838 sq.m.

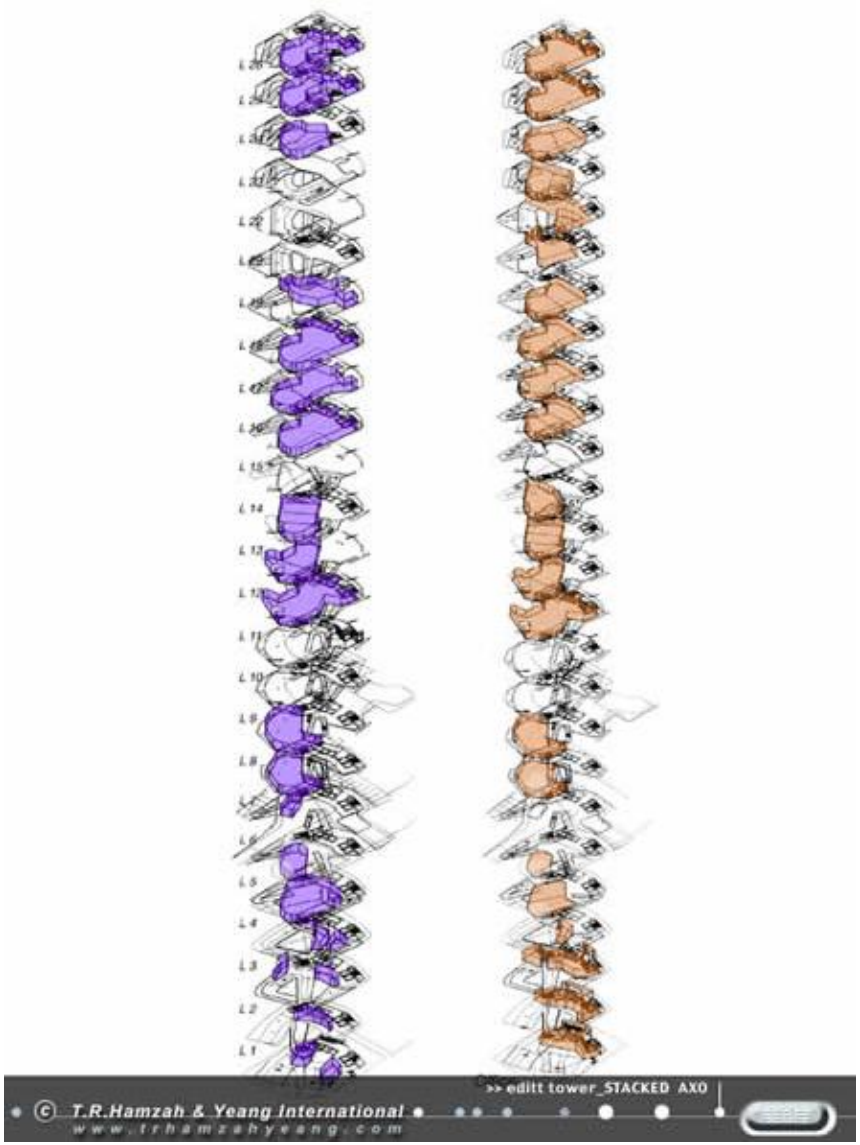
Plot Ratio: 7.1

EDITT Tower

From this hierachy, it is evident that this site is an urban “zero culture” site and is essentially a devastated ecosystem with little of its original top soil, flora and fauna remaining. The design approach is to re-habilitate this with organic mass to enable ecological succession to take place and to balance the existent inorganicness of this urban site.

Ecosystem Hierarchy	Site Data Requirements	Design Strategy
Ecologically-Mature	Complete Ecosystem Analysis and Mapping	Preserve Conserve Develop only on no-impact areas
Ecologically-Immature	Complete Ecosystem Analysis and Mapping	Preserve Conserve Develop only on least-impact areas
Ecologically-Simplified	Complete Ecosystem Analysis and Mapping	Preserve Conserve Increase biodiversity Develop only on low-impact areas
Mixed-Artificial	Partial Ecosystem Analysis and Mapping	Increase biodiversity Develop on low-impact areas
Monoculture	Partial Ecosystem Analysis and Mapping	Increase biodiversity Develop in areas of non-productive potential Rehabilitate ecosystem
Zeroculture	Mapping of remaining ecosystem components (e.g. hydrology, remaining trees, etc.)	Increase biodiversity and organic mass Rehabilitate ecosystem

EDITT Tower


>> editt tower_STACKED AXO
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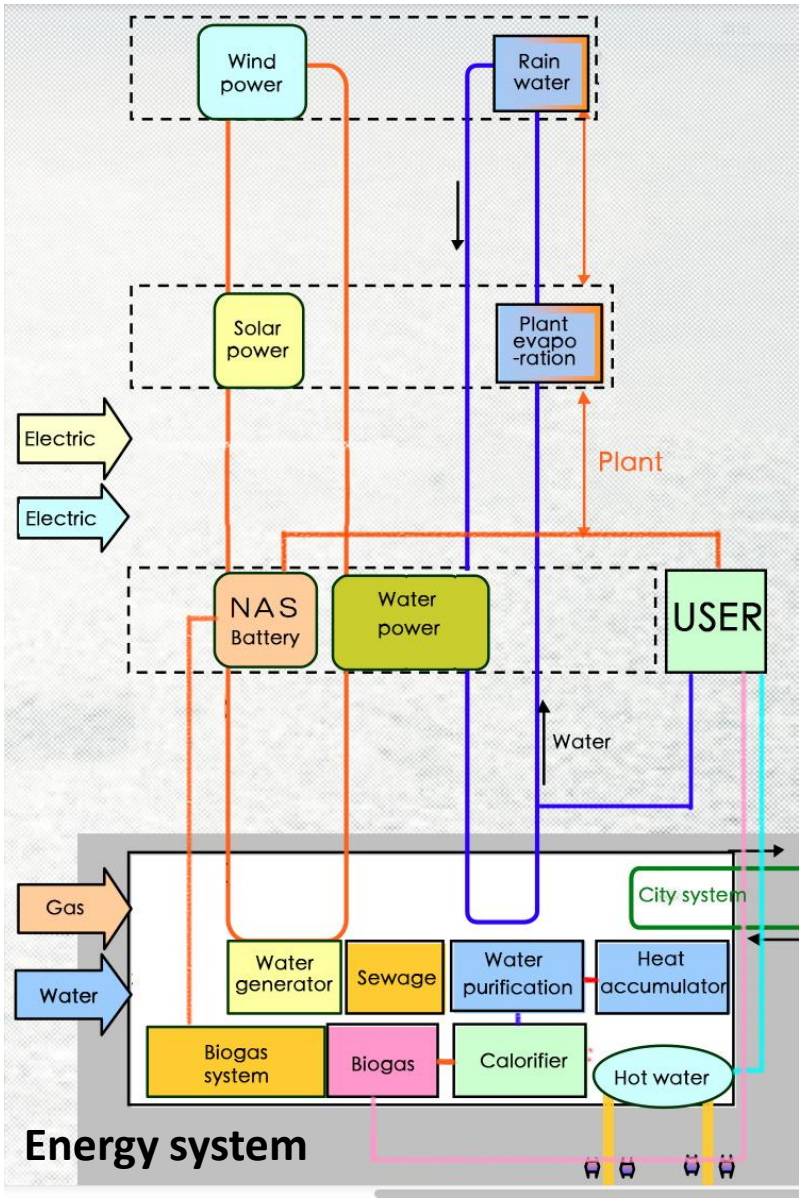
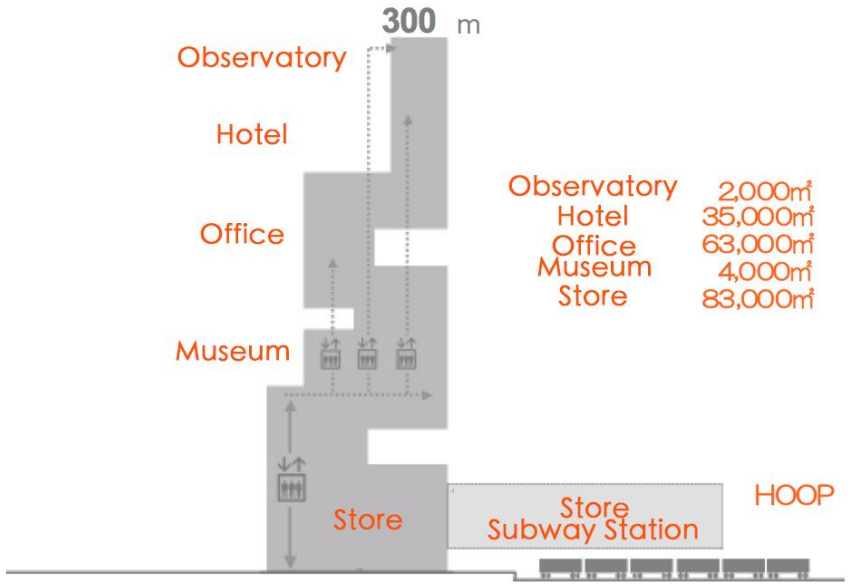

Wind power
Rain water
Solar power
Plant evapo -ration
Plant
Electric
Electric
NAS Battery
Water power
USER
Water
Gas
Water
City system
Water generator
Sewage
Water purification
Heat accumulator
Biogas system
Biogas
Calorifier
Hot water
Energy system

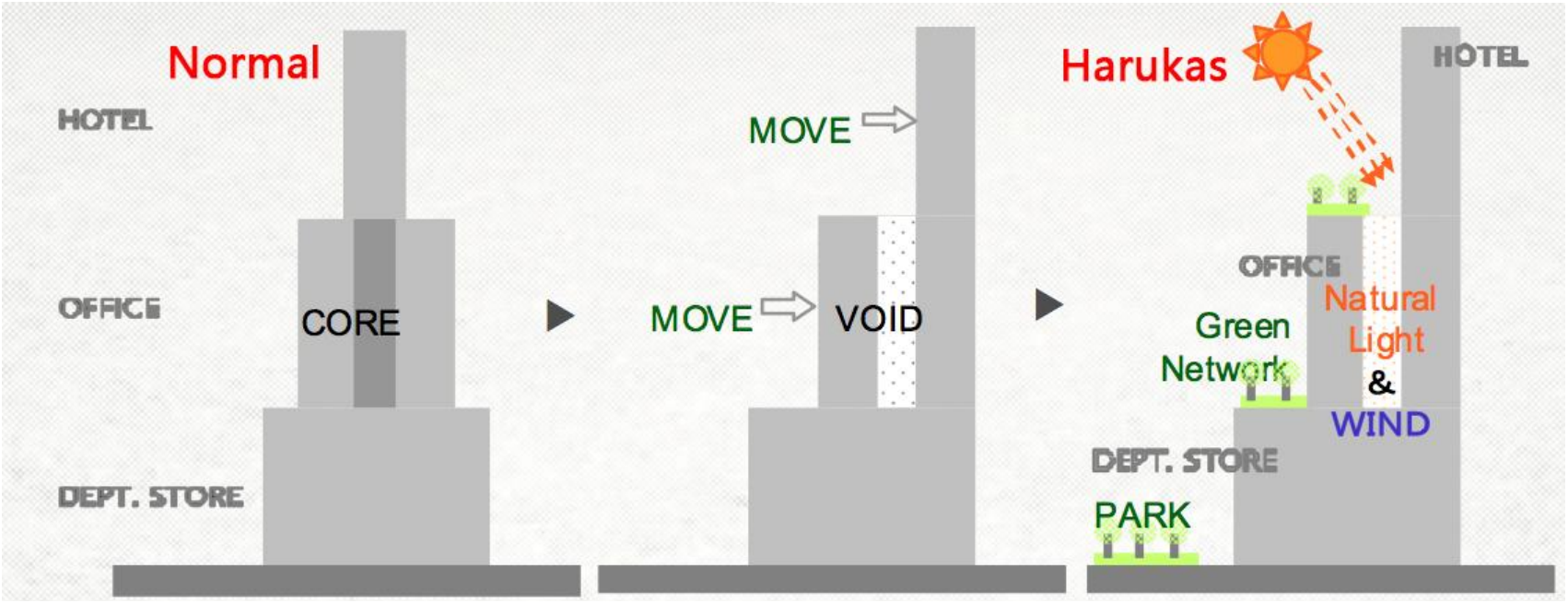
Abeno Harukas

Abeno Harukas is a multifunctional urban space being developed in the Abeno district of Osaka, Japan. Japan Railway's Kintetsu Corporation is building the skyscraper as a hub for various railway terminals.

Abeno Harukas

"**Harukasu** in Japanese means to brighten or to clear up, which suggests that it will provide stunning and clear views of Osaka's skyline."





Abeno Harukas

Grand Opening in spring 2014

ABENO HARUKAS — Japan's highest building of 300m

A multifaceted Urban Gem with All the Cutting-Edge Amenities of the City

HARUKAS300 (Observatory)
58-60F

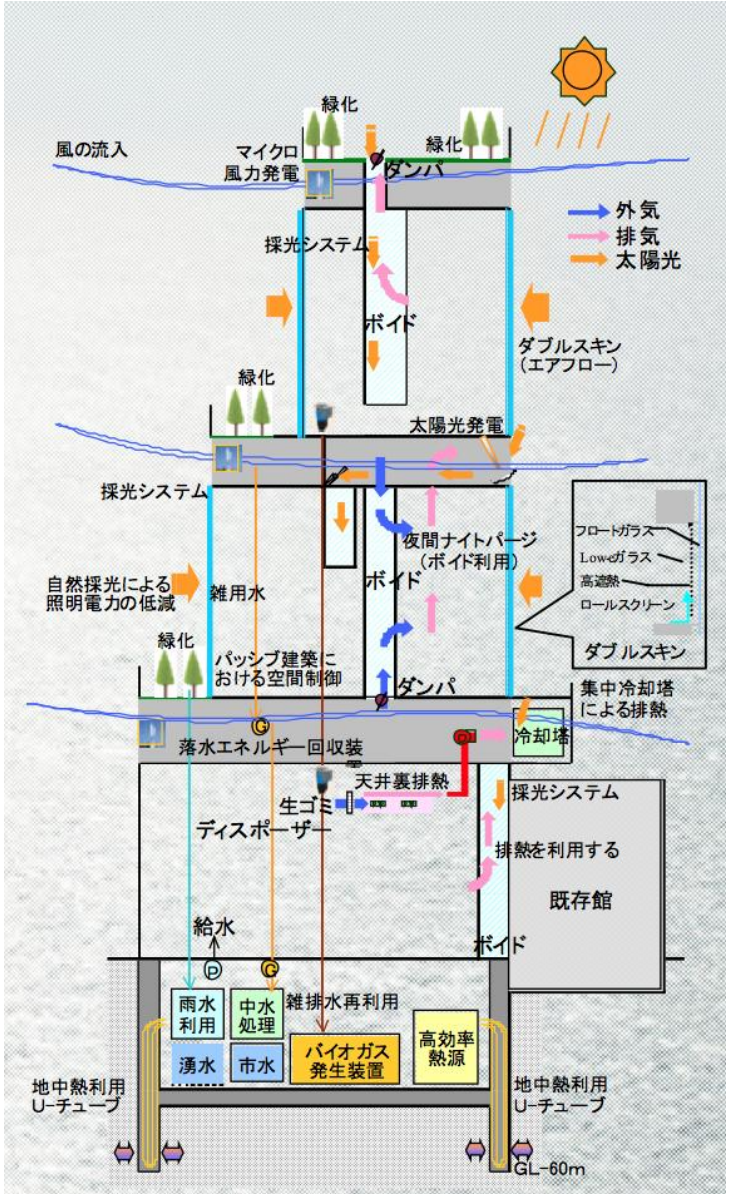
Osaka Marriott Miyako Hotel
19F/ 20F/ 38-55F/ 57F
360rooms

Office floors
17F/ 18F/ 21-36F
Tenant floor area : Approx. 40,000㎡

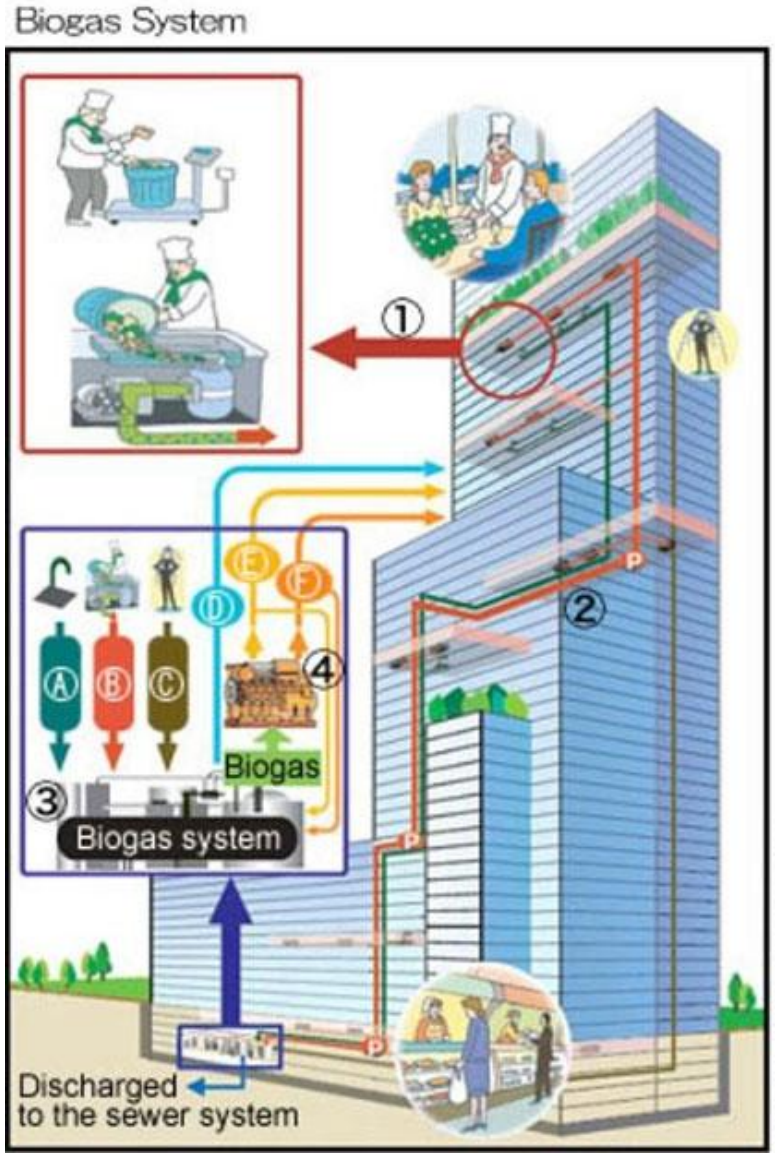
ABENO HARUKAS Art Museum
16F

Kintetsu Department Store
Main Store Abeno Harukas
B2-14F
Sales area : Approx. 100,000㎡

Kintetsu Osaka-Abeno Station
B2F/ 1F



Abeno Harukas



The building features open spaces that let in natural light and air,rooftop green space,and biogas power generated by energy recovered through methane fermentation from the building's kitchen waste.Thevery latest in environmental technologies make ABENO HARUKAS a leading environmentally responsible urban project.

Abeno Harukas