Version 1.3
November 2022

The Sustainable City Yiti (TSCY)

Sustainability Strategy

Social · Environmental · Economic

NZE SOLUTIONS

OMRAN

DIAMOND DEVELOPERS

THE SUSTAINABLE CITY YITI

Masterplan

- 1 Luxury Serviced Apts.
- 2A Plaza Apartments
- 2B Plaza Office
- 2C Plaza Retail
- 3A Sustainable District West
- 3B Sustainable District East
- 4 5-Star Hotel
- 5 4-Star Hotel
- 6 Sports Complex
- 7 Staff Accommodation
- 8A Nursery
- 8B School
- 9A SEE Lab
- 9B University
- 10A STP
- 10B District Cooling
- 11 Autism Village
- 12 Wellness Centre
- 13A Equestrian Arenas
- 13B Equestrian Stables
- 14 Mosque
- 15A Green Space
- 15B Festival Park
- 15C Sustainable Park
- 16 Promenade
- 17 Green Spine
- 18 Park and Ride
- 8 Gateway Bridge

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NZ3 SOLUTIONS

The Sustainable City – Yiti integrates the three pillars of sustainability to achieve a working mode for future cities. aa

SOCIAL

- Indoor & outdoor gyms
- Cycling & jogging tracks
- Parks & kids' playgrounds
- Nursery
- Swimming pool
- Mosques
- Health clinics
- Educational programs

ENVIRONMENTAL

- Urban farming & biodomes
- Energy efficient homes equipped with rooftop PV
- Water reuse for public landscaping
- Efficient design with home automation
- Charging stations for electric vehicles and buggies
- Waste separation and recycling

ECONOMIC

- Up to 100% savings on electricity bills
- Up to 50% savings on water bills
- Up to ZERO service charges

The Sustainable City – Yiti integrates the three pillars of sustainability to achieve a working mode for future cities.

Social Sustainability aims to achieve community building, well-being, inclusion, education, as well as safety and security.

Community Building

Walkability
Connectivity
Indoor gathering
Outdoor gathering
- Festival Park
- Sustainable Park
- Promenade

Education

Formal education (nursery & school)
Informal education
Special education (Autism Village)
Community education (residents)

Well-being

Thermal comfort
Sports complex
Equestrian Arenas
Active lifestyle
Wellness Centre
Mosque
Green Space
Clinics

Safety & Security

Know your neighbor
Park and Ride
Speed limits
Concierge service
Home automation
CCTV cameras

Entertainment (Edutainment) – Arts - Sports

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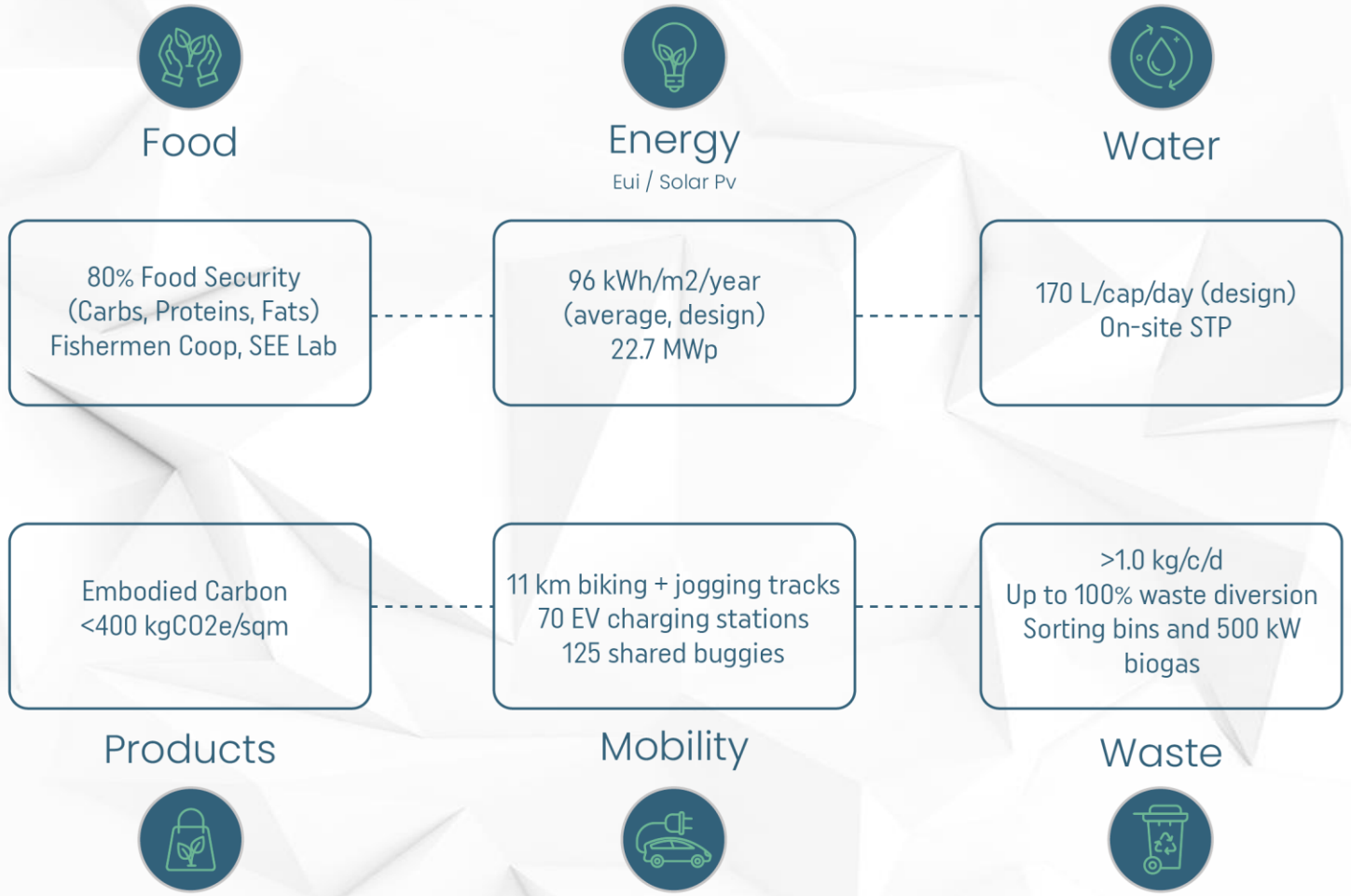
NZE SOLUTIONS


GLASSWARE
Established
1888

The Sustainable City – Yiti integrates the three pillars of sustainability to achieve a working mode for future cities.

The Sustainable City Yiti,

Environmental KPIs



* Forecasted

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NZE SOLUTIONS

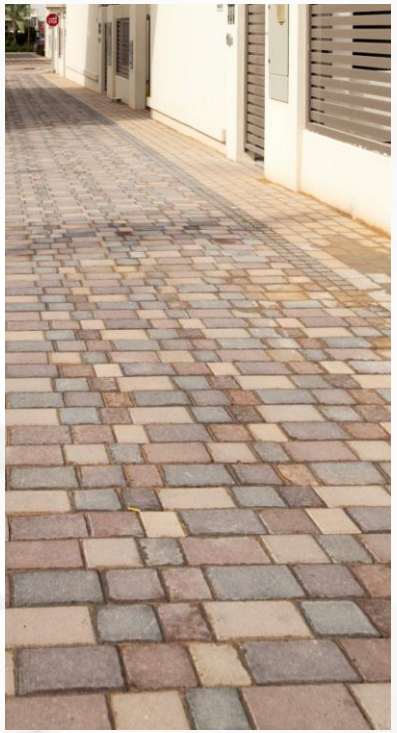
Environmental

Environmental sustainability focuses on six elements covering all major sources of carbon emissions.

Food

Energy

Water



Product

Mobility

Waste

DIAMOND DEVELOPERS

NZE SOLUTIONS

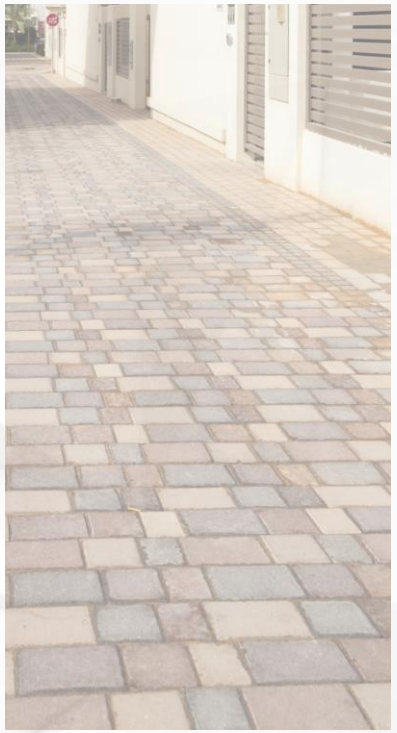
Environmental #1

Environmental sustainability focuses on six elements covering all major sources of operational carbon.

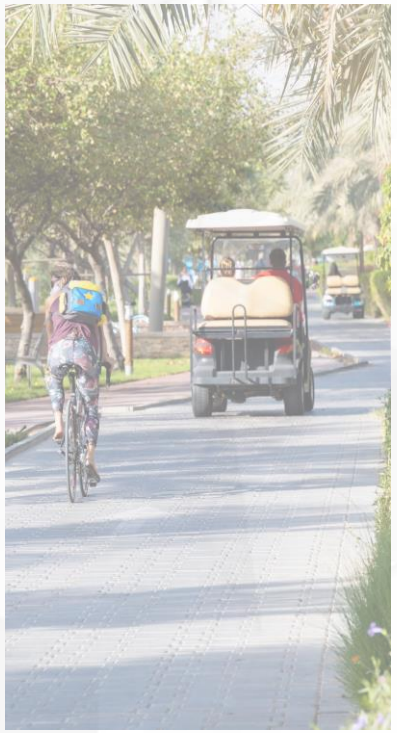
Food

Energy

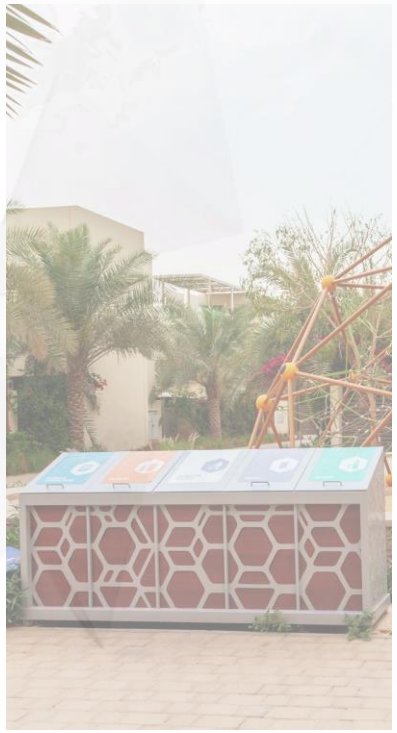
Water



Product



Mobility



Waste

DIAMOND DEVELOPERS

NZE SOLUTIONS

TSCY will produce nutritious food onsite, supporting food security in Oman. Planned food systems include:

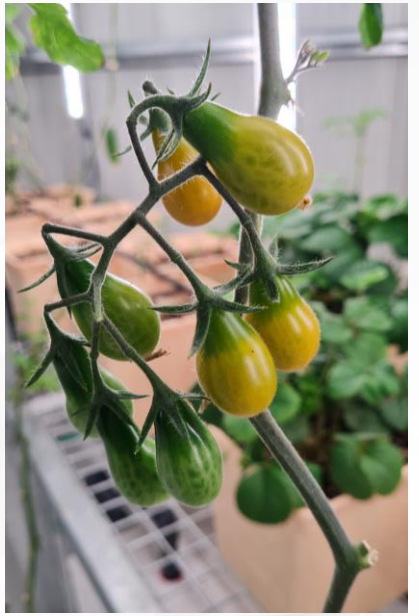
- Productive Urban Landscape (PUL)
- Biodomes in the Sustainable District (x3)
- SEE Lab equipped with vertical farms
- Beehives for honey production
- Fishermen Cooperative

Collectively, these systems will satisfy up to 80% of the calorific requirements of the resident population, broken down into carbohydrates (40%), proteins (30%), and fats (30%).

The Sustainable District

4 Biodomes:

- Diameter 12m
- Height 3.6 to 5.0m
- Insulated panels
- Indoor temp 20-22°C
- Rooftop solar PV 14 kWp
- Production 10,000 kg/year



Photos: Sharjah Sustainable City

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NZE SOLUTIONS

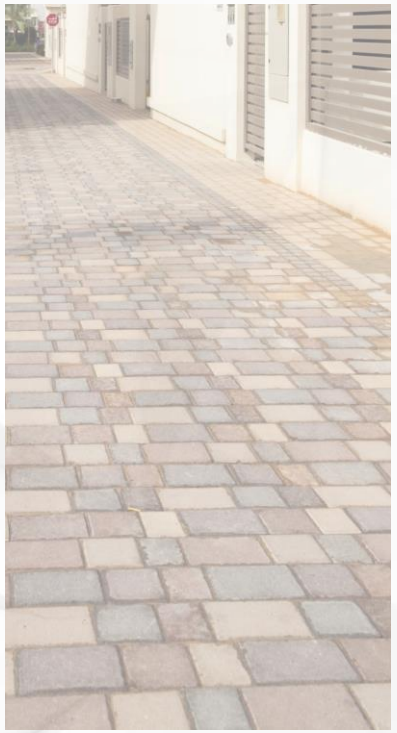
Environmental #2

Environmental sustainability focuses on six elements covering all major sources of operational carbon.

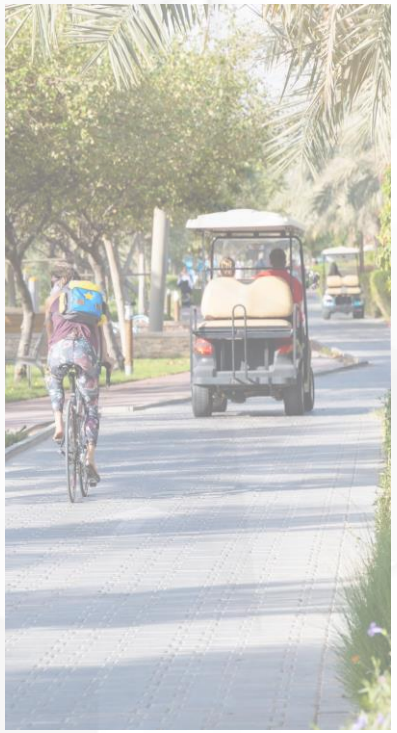
Food

Energy

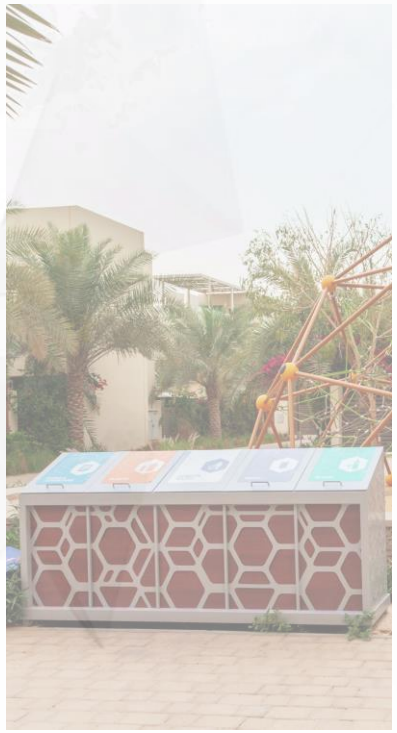
Water



Product



Mobility



Waste

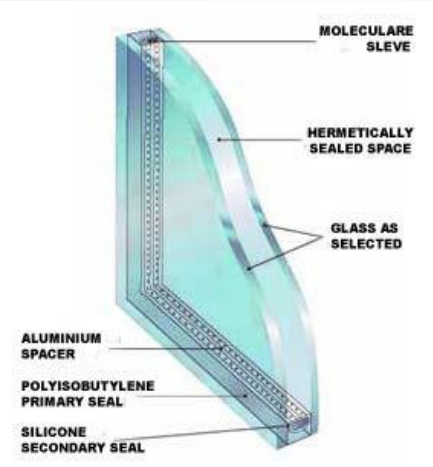
DIAMOND DEVELOPERS

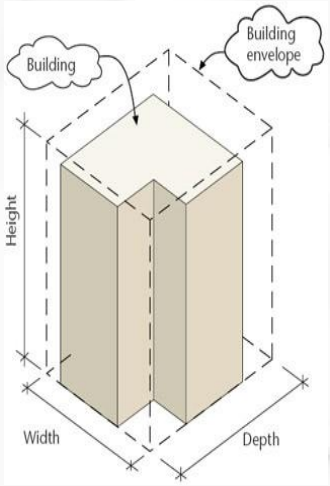
NZE SOLUTIONS

ENERGY IN THE SUSTAINABLE DISTRICT

The villas and townhouses reduce energy consumption through **Demand Side Management,** including passive and active design.

- The villas and townhouses avoid the sun and maximize shading (see shadow study next).
- Highly insulated UV reflective walls, roofs, and windows reduce air-conditioning loads and electrical consumption.





Comparison of thermal values in TSC (Oman) and TSC (Dubai):

Element	U-Values	TSC Dubai	TSC Yiti
Roof	W/m2.k	0.20	**0.18**
Wall	W/m2.k	0.32	**0.27**
Glazing	W/m2.k	1.30	**1.20**

Note: These are the theoretical U-Values for the Sustainable District villas and Plaza apartments.

Using active design, the villas and townhouses consume less energy than any comparable unit in Oman, with guaranteed savings.

Energy saving features include:

- Variable Refrigerant Flow - VRF
- LED lighting
- Energy-efficient home appliances (fridge, dishwasher, washing machine)

Advantages of VRF:

- greater energy efficiency (1.1 kW/TR),
- modular design,
- less complicated installation,
- zone control,
- better cooling comfort,
- auto dust removal,
- BMS integration and compatibility,
- heating mode available.

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NZE SOLUTIONS

ENERGY IN THE PLAZA

Plaza apartments reduce energy consumption through **Demand Side Management,** including passive and active design.

Several buildings in the plaza avoid direct sunlight (see shadow study on next slide).

Highly insulated UV reflective walls, roofs, and windows reduce air-conditioning loads, electrical consumption, and operational loads.

The Plaza
The Plaza comprises 17 residential buildings and 2 office buildings. The residential buildings comprise 1,225 apartments as follows:

- 168 Studios
- 451 x 1-bedroom
- 527 x 2-bedrooms
- 79 x 3-bedrooms

Comparison of insulation values: TSC-Yiti and TSC Dubai

Element	U-Values	TSC Dubai	TSC Yiti
Roof	W/m2.k	0.20	**0.18**
Wall	W/m2.k	0.32	**0.27**
Glazing	W/m2.k	1.30	**1.20**

The U-Values are estimated for Sustainable District villas and Plaza apartments

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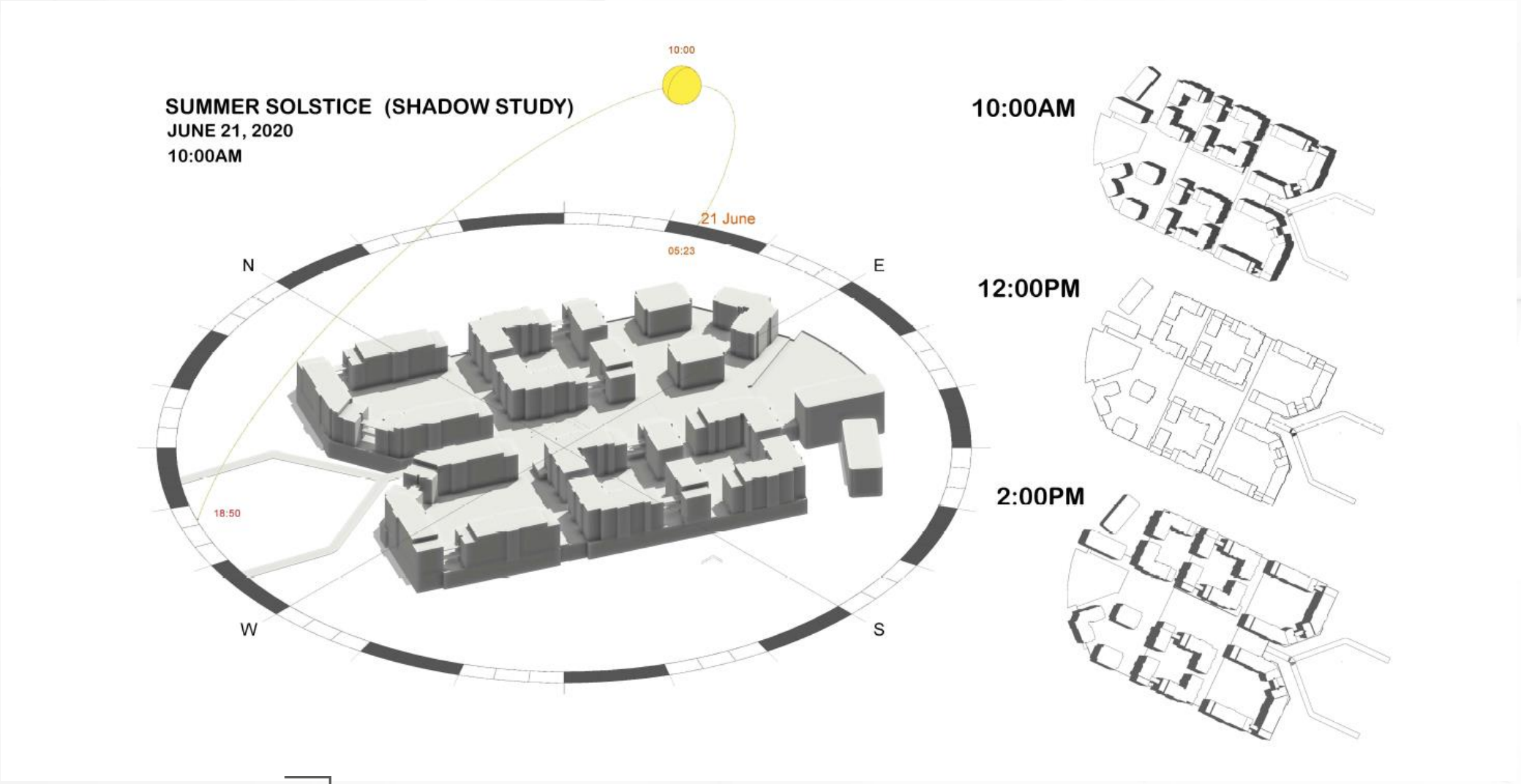
NZE SOLUTIONS

Shadow study for the Plaza apartments (summer solstice)



Source: Prepared by ALAJMI Engineering Consultants

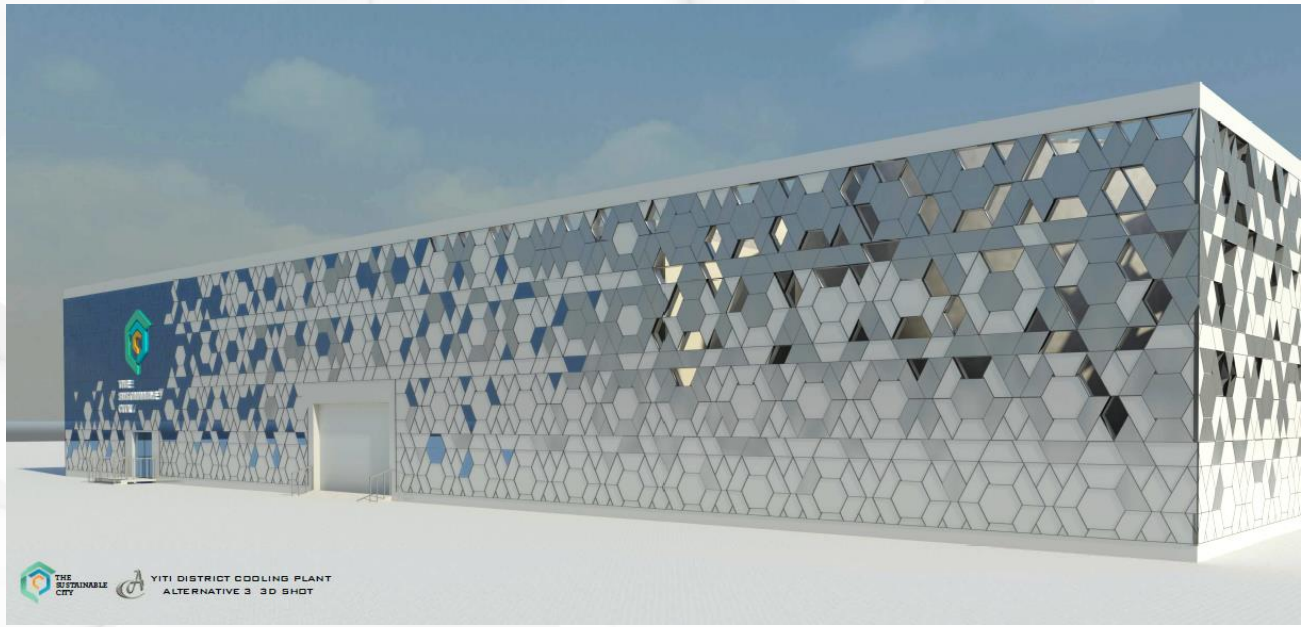
Using active design, the plaza apartments consume less energy than any comparable unit in Oman, with guaranteed savings.

Energy saving features include:

- Centralized cooling service – District Cooling
- LED lighting
- Energy –efficient home appliances (fridge, microwave, dishwasher, and washing machine)

Advantages of District Cooling:

- Higher diversity rate
- Energy efficient (0.9 kW/TR)
- Centralized cooling station
- Solar to Cooling (StC) – Thermal Energy Storage



Artist impression: District Cooling Plant, TSC-Yiti

ENERGY IN THE LUXURY SERVICED APARTMENTS

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NZE SOLUTIONS

The Luxury Serviced Apartments (LSA) are designed to achieve energy and water efficiency.

- See sun path study (next slide).
- The building is highly insulated, uses UV reflective walls, roofs, and windows.
- The shading coefficient is 0.25 (see box).
- Central cooling (District Cooling Plant) reduces electrical consumption (kWh/TR) and operational loads.

What is the shading coefficient?

A measure of the ability of a window or skylight to transmit solar heat. The shading coefficient is expressed as a number without units between 0 and 1. The lower a window's solar heat gain coefficient or shading coefficient, the less solar heat it transmits, and the greater is its shading ability.

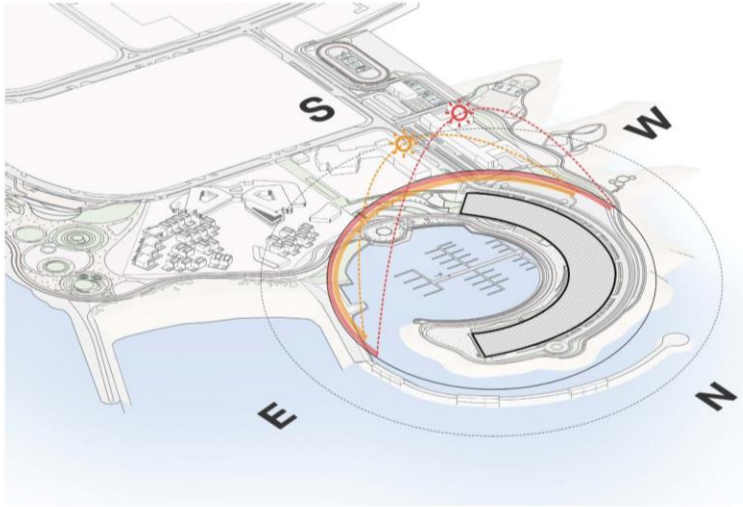
Power values for Luxury Serviced Apartments:

Energy Parameters	Units	TSCY - LSA
Power Density	W/m2	
Energy Use Intensity*	kWh/m2/Year	80 | 110
Total Connected Load	MW	3.9

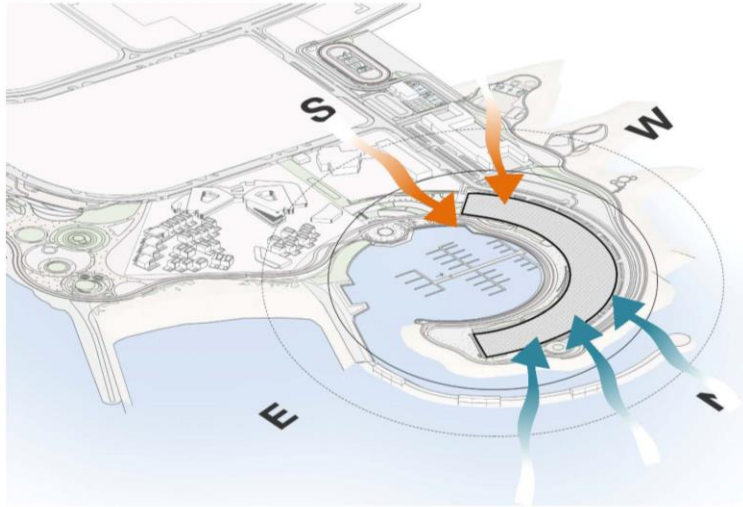
*EUI show two scenarios: Ambitious & Conservative

Thermal (U) Values for Luxury Serviced Apartments:

Element	U-Values	TSC Dubai	TSC Yiti
Roof	W/m2.k	0.20	0.20
External Walls	W/m2.k	0.32	0.20
Glazing	W/m2.k	1.30	1.20



Sun Path



Wind Direction

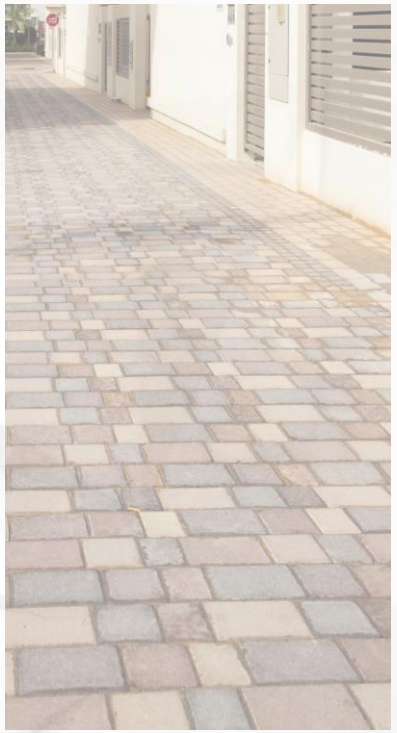
Environmental #3

Environmental sustainability focuses on six elements covering all major sources of operational carbon.

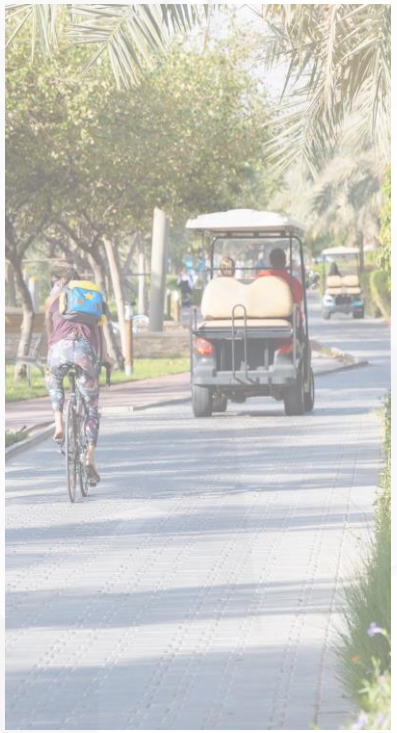
Food

Energy

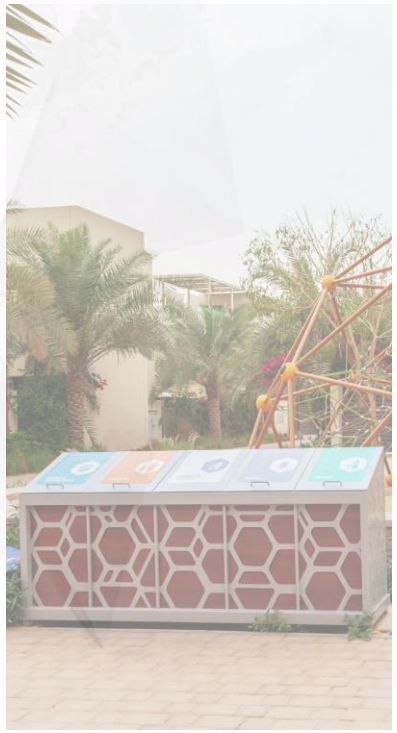
Water



Product



Mobility



Waste

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NZE SOLUTIONS

Residential units will be equipped with low-flow water fixtures and appliances to reduce total water consumption and footprint.

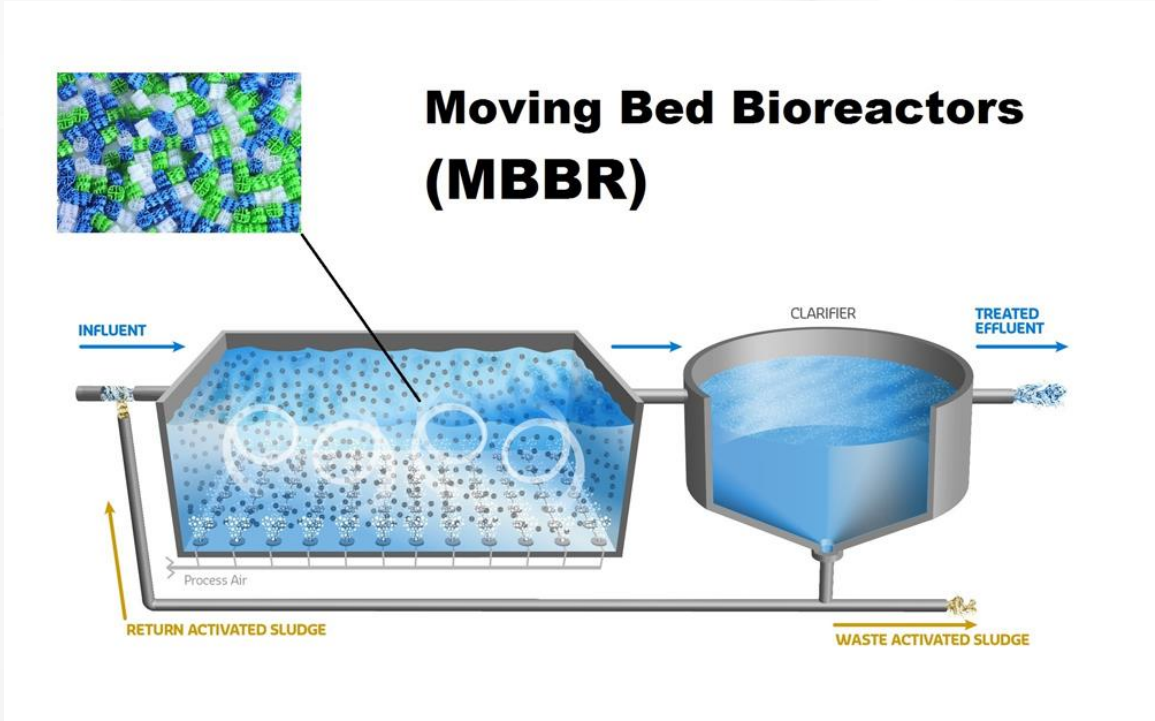
Fixture	International regulation	TSC - Yiti
Taps	9 L/min	3.8 L/min
Shower heads	9 L/min	9 L/min
Hygienic Shower	6 L/min	3.8 L/min
Toilets	6 L/flush	Dual flush: 4.5 L and 3 L

The target water consumption rate per person is

170 liters/person/day

Actual water consumption will depend on behavior. Community education programs will encourage greener (water conserving) behaviors and practices.

TSCY is equipped with a Sewage Treatment Plant (STP) that will handle up to 2,000 m3/day using MBBR technology.



Treated Sewage Effluent (TSE) will be reused in landscape irrigation and, in case of any surplus, in the District Cooling Plant (make-up water).

The STP will be located near the DCP and the Sports Complex. The design will be modular (2,000 m3/day):

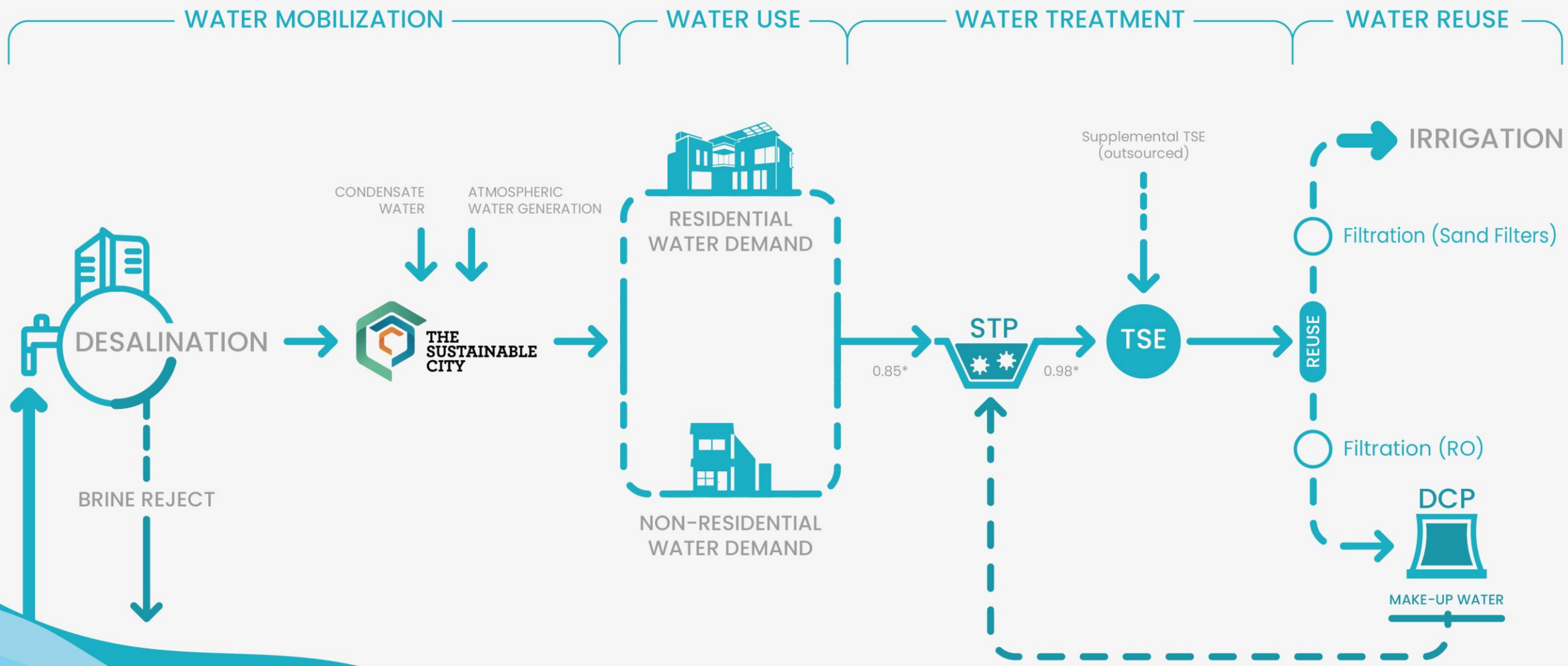
2 x 125m3
1 x 250m3
3 x 500m3

The capacity is based on design assumptions:

- Water demand (see table)
- Sewage generation (85% return flow)

Category (Unit Type)	Water Demand (L/c/Day)
Residential (all)*	170
Offices (Employees)	75
Visitors	25
Trainees	40
Hotel Guests	400-500

*Sustainable District, Staff Accommodation, Plaza Apartments, and LSA



TSC Yiti aims to achieve a water balance between incoming freshwater and outgoing treated sewage effluent, and reuse.

STP SEWAGE TREATMENT PLANT
TSE TREATED SEWAGE EFFLUENT
DCP DISTRICT COOLING PLANT

*0.85 - Wastewater factor
*0.98 - STP factor

SEA

NZ3 SOLUTIONS

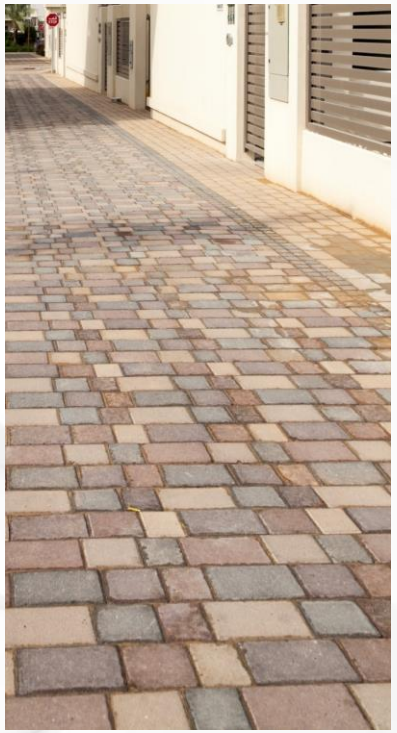
Environmental #4

Environmental sustainability focuses on six elements covering all major sources of operational carbon.

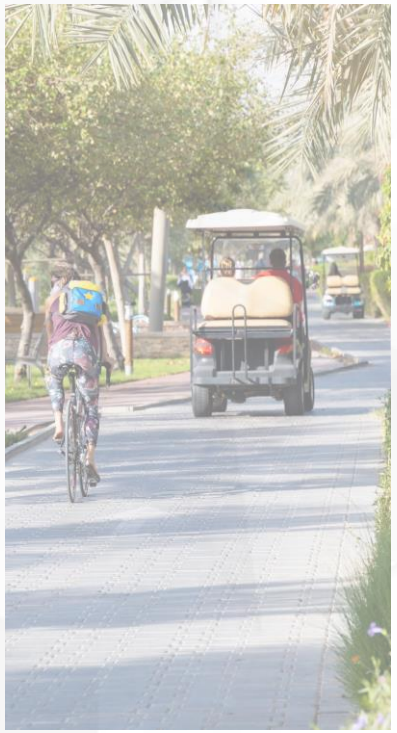
Food

Energy

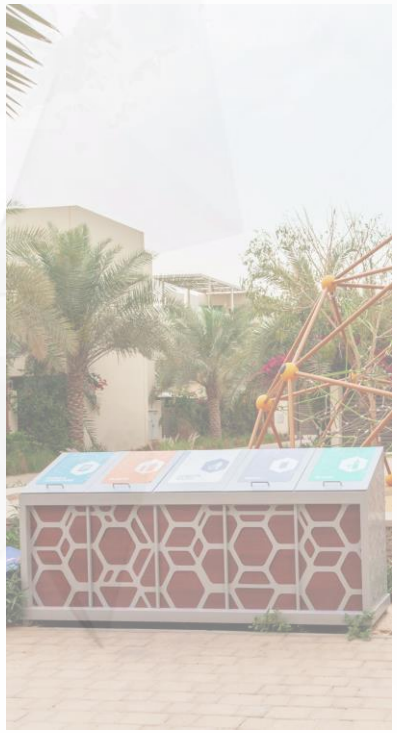
Water



Product



Mobility



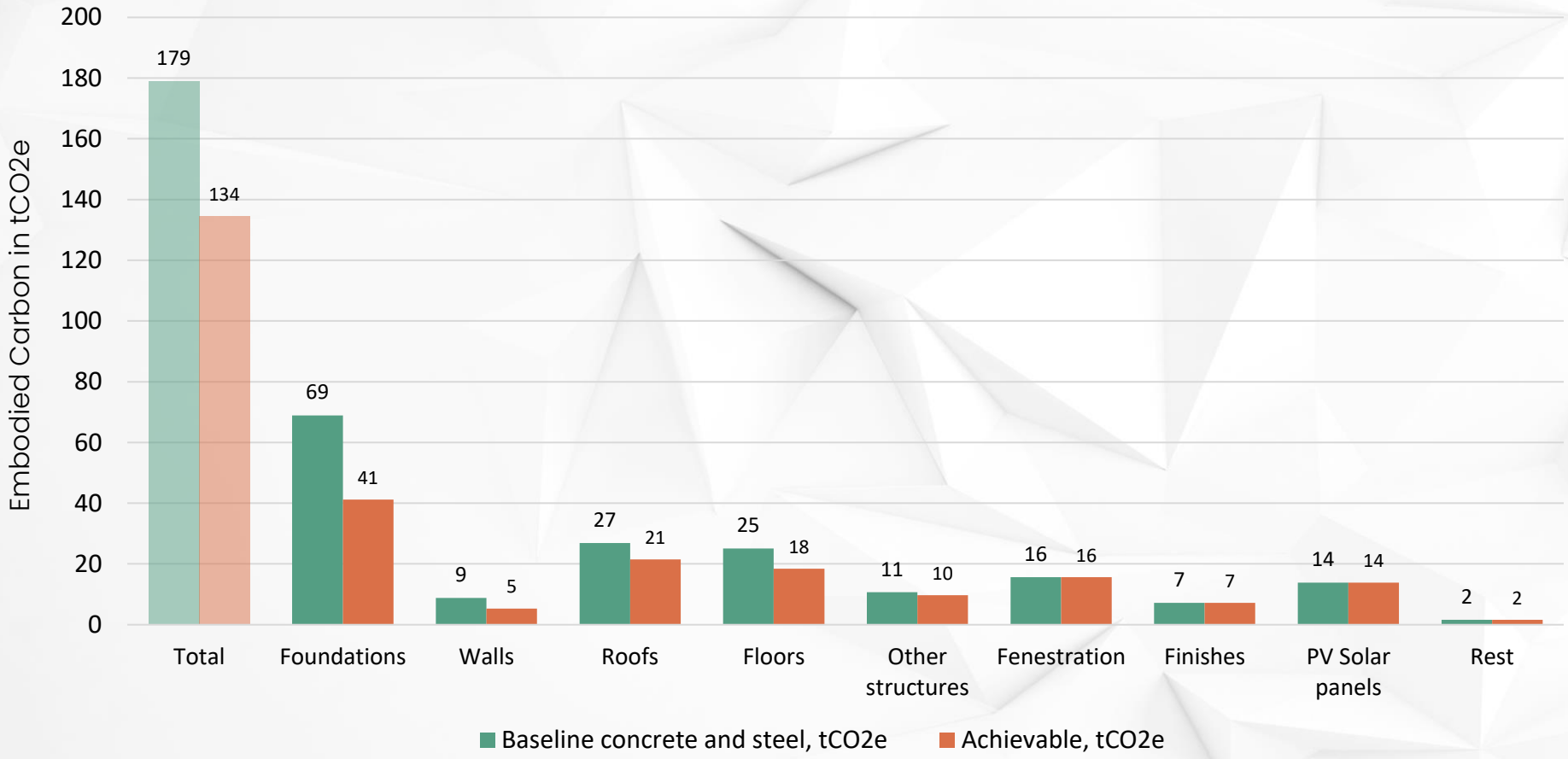
Waste

DIAMOND DEVELOPERS

NZE SOLUTIONS

Case Study: The Sustainable District

Estimating the embodied carbon of 4-bed Garden Villa (BUA 458 sqm)



Key finding: using alternative concrete and steel will reduce embodied carbon emissions by 25% compared to conventional construction (A1-A3 emissions).

We used One Click LCA by Bionova Ltd (Database v 7.6)

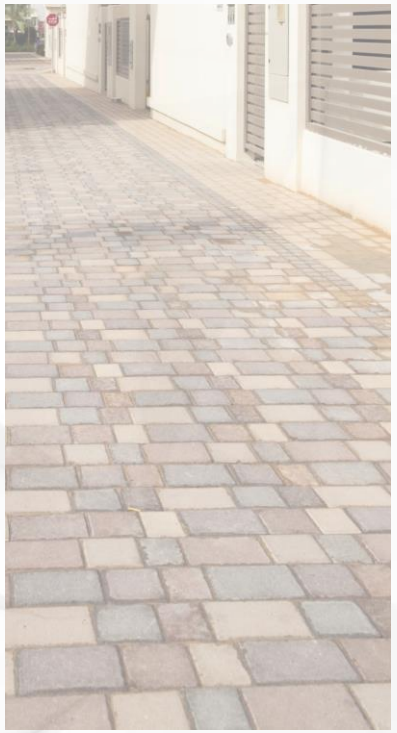
Environmental #5

Environmental sustainability focuses on six elements covering all major sources of operational carbon.

Food

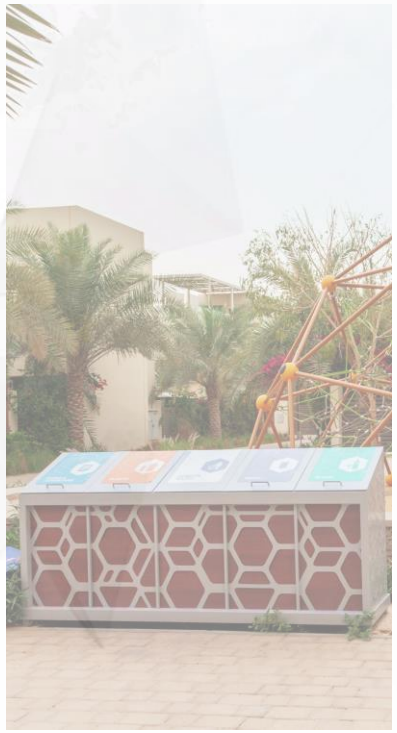
Energy

Water



Product

Mobility



Waste

DIAMOND DEVELOPERS

NZE SOLUTIONS

TSC – Yiti promotes all forms of clean mobility including **soft mobility**, electrification, and shared mobility.

This strategy avoids emissions, reduces noise pollution, and creates a safer environment for families.

Soft Mobility includes:

- Shaded sikkas to avoid the sun
- Interlock paving to reduce heat islands
- Bicycle and jogging tracks to encourage an active lifestyle

TSC – Yiti promotes all forms of clean mobility including soft mobility, electrification, and **shared mobility.**

Shared Mobility includes

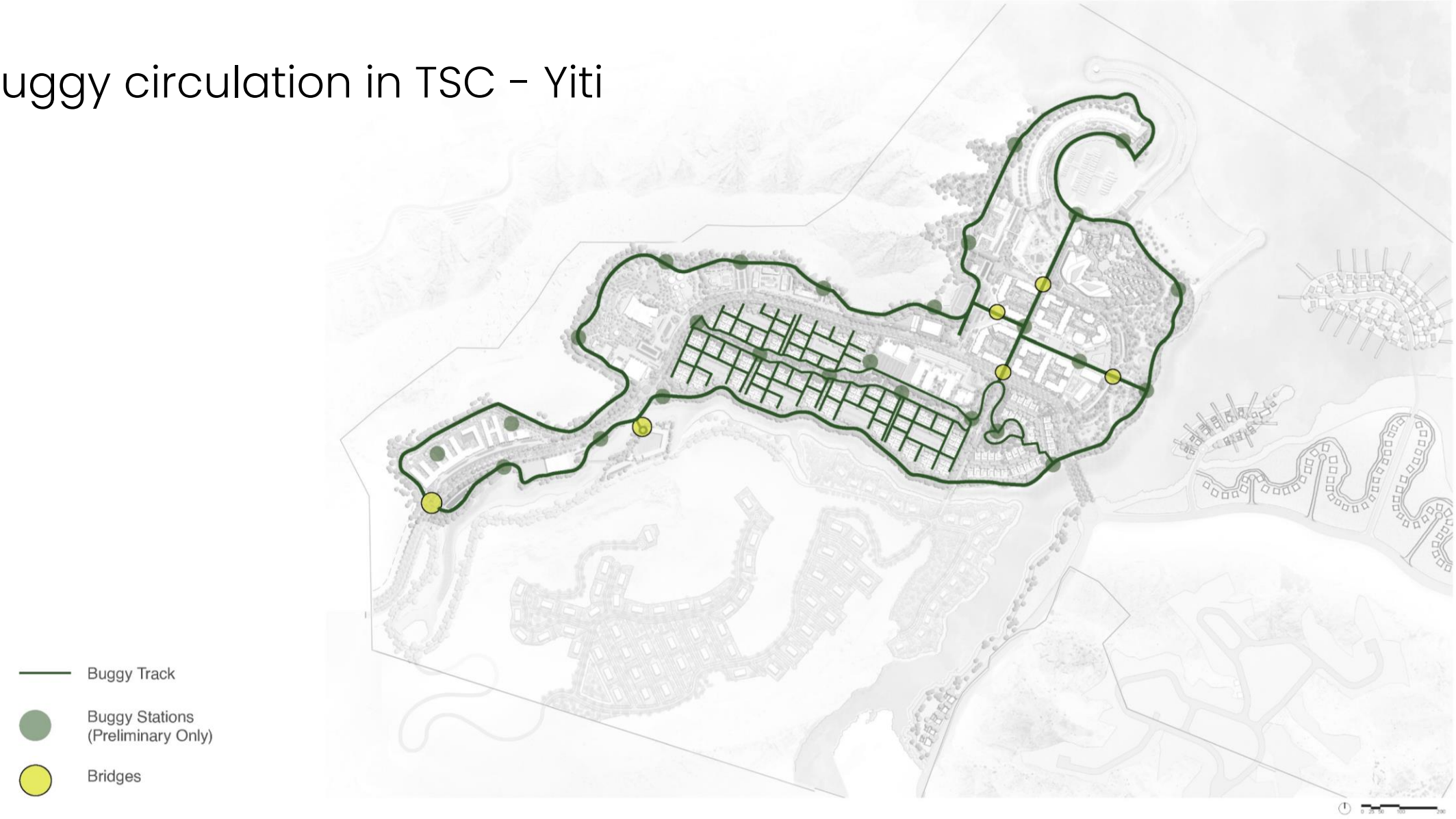
- Shuttle buses
- Electric buggies (ca. 130)
- EV car sharing service (to be confirmed)

The buggies will be speed-limited and geo-fenced to enhance safety and security in the city (see buggy circulation map on next slide).

DIAMOND DEVELOPERS

NZE SOLUTIONS

Buggy circulation in TSC - Yiti



Ridesharing shuttle (MAIO, Hannover) - BEV

Driverless shuttle (EasyMile, Dubai) - BEV

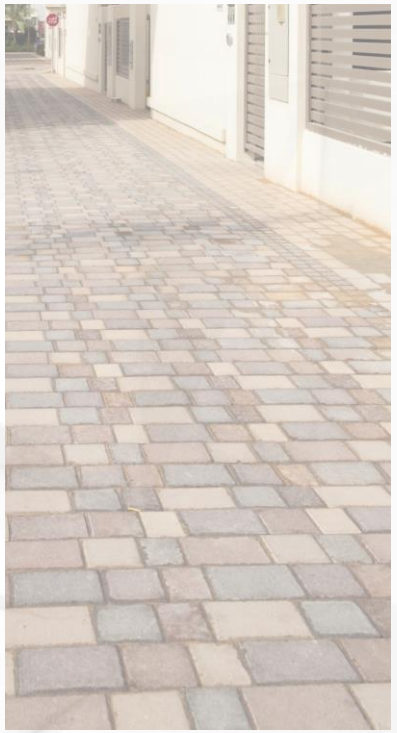
Environmental #6

Environmental sustainability focuses on six elements covering all major sources of operational carbon.

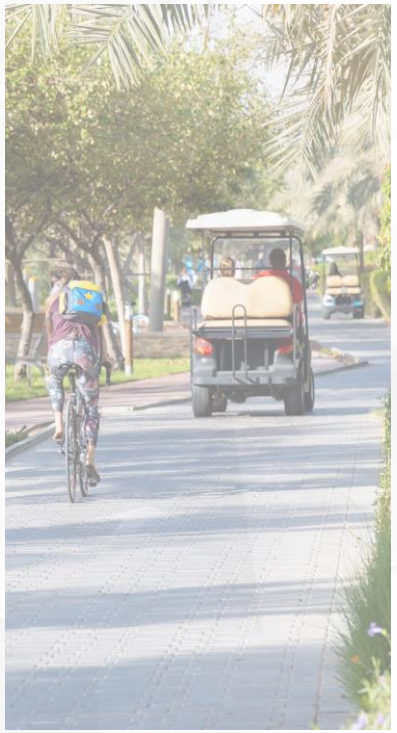
Food

Energy

Water



Product



Mobility

Waste

DIAMOND DEVELOPERS

NZE SOLUTIONS

SSC aims to achieve **Zero-Waste to landfill** through waste minimization, sorting, and recycling.

Residential waste will be segregated at source and disposed of according to three streams:

1. Recyclables (dry waste)
2. Organic (wet waste)
3. Residual (Other)

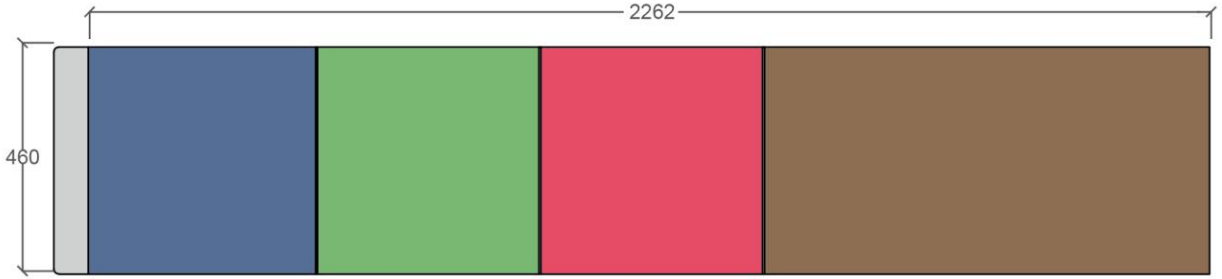
Household waste generation based on a population of 5,500 Residents			
Waste Streams	**% Composition**	**Value**	**Unit**
Wet waste	35%	2,310	kg/day
Dry waste	50%	3,300	kg/day
Residual waste	15%	990	kg/day
Total Waste	**100%**	**6,600**	**kg/day**

Other waste streams from the Sustainable District and Plaza include:

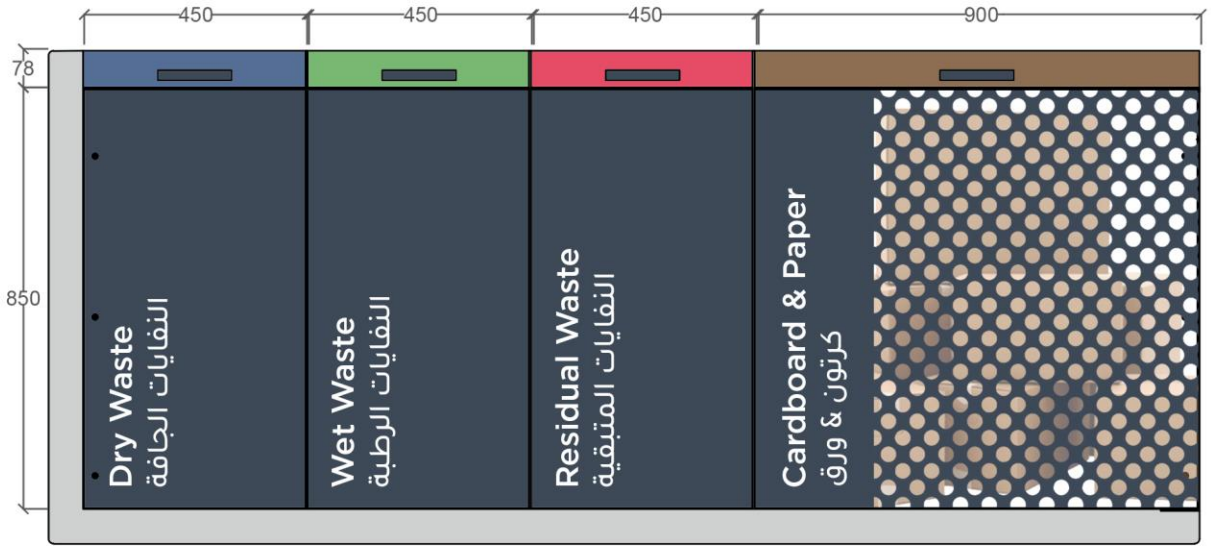
Electronic waste will be collected separately and sent to a dedicated processing facility in Oman. At 8kg/person/year, TSC Yiti residents will generate an estimated **44,000 kg of electronic waste** per year!

Green waste from landscaping. At 2kg of green waste per sqm per year, TSC Yiti will generate an estimated 270 kg of green waste daily, 8,000 kg per month, **and 100 tonnes per year.**

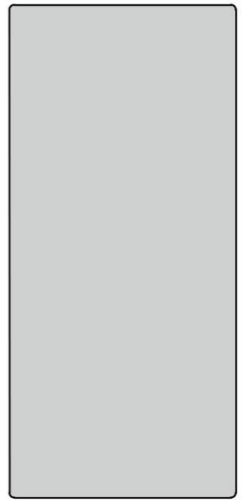
Waste bins proposed design



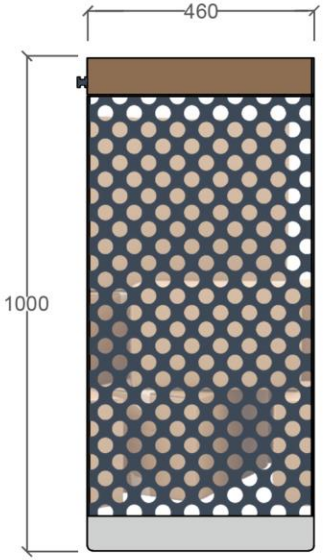
TOP VIEW



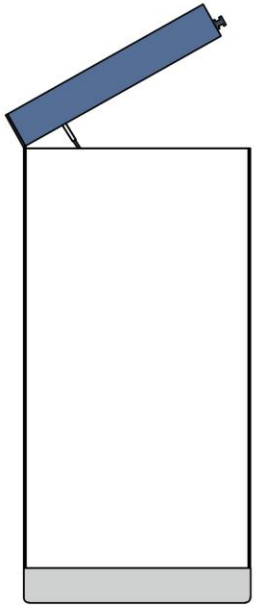
FRONT ELEVATION



RIGHT SIDE ELEVATION



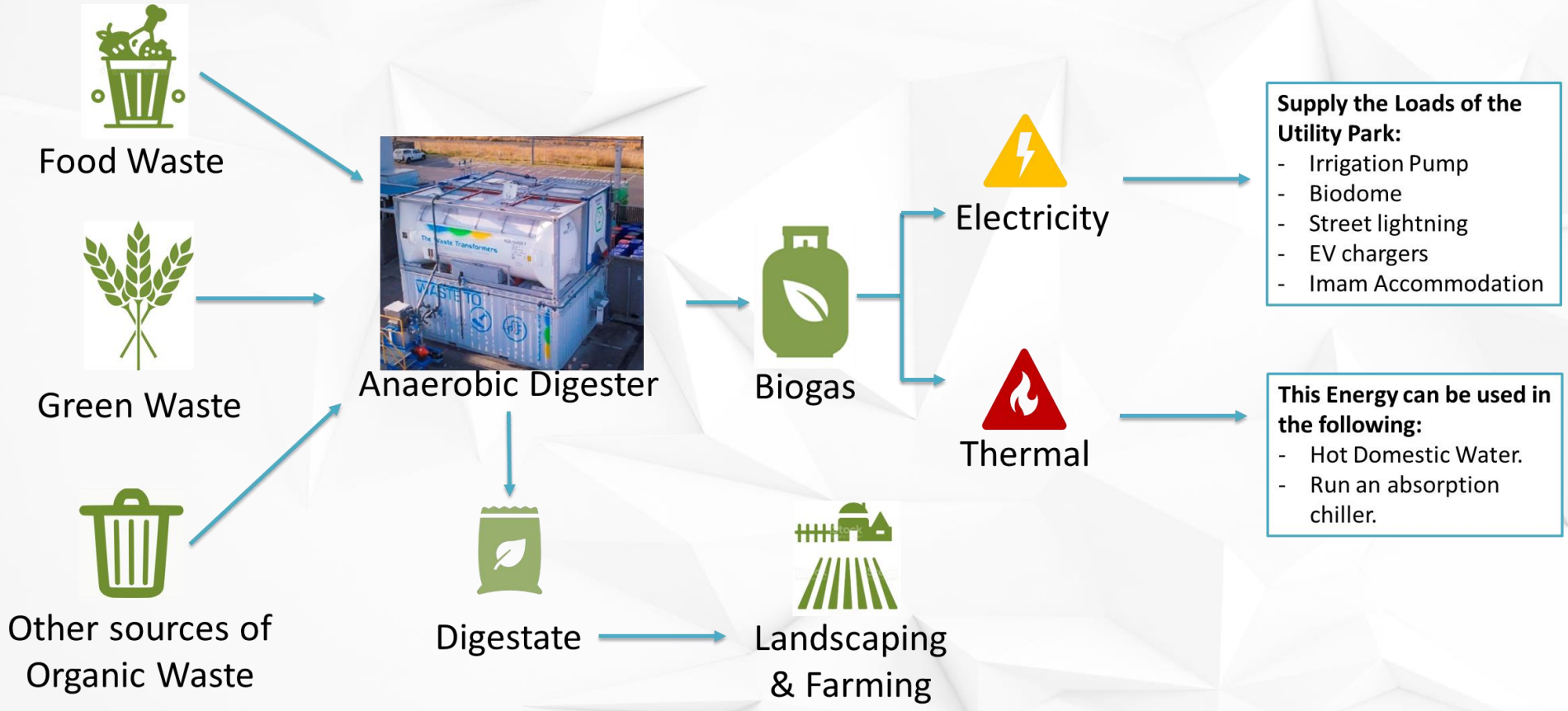
LEFT SIDE ELEVATION



SIDE SECTION (OPEN TOP)

NZE SOLUTIONS

The following simplified diagram illustrates the biogas process from feedstock to end products.



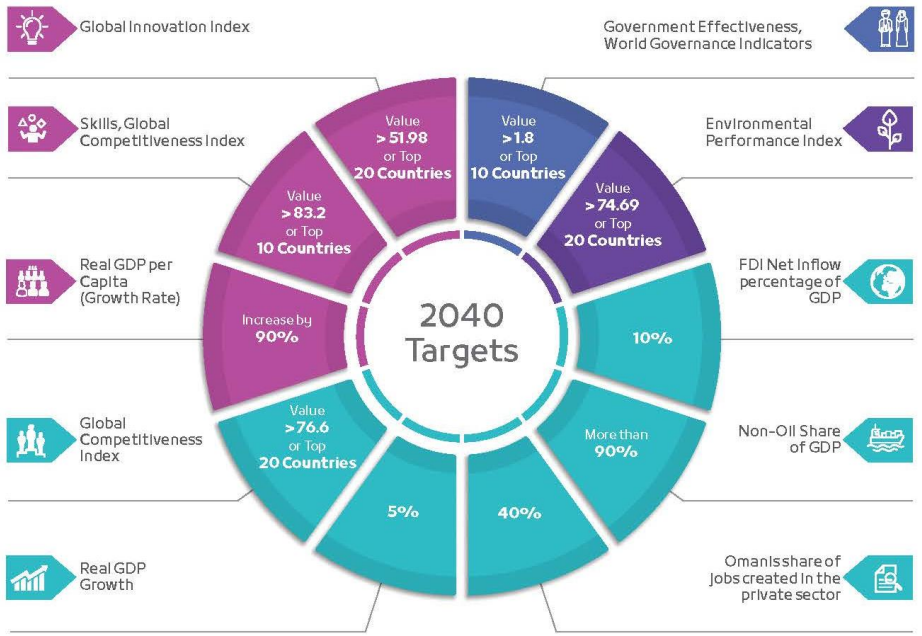
The Sustainable City – Yiti integrates the three pillars of sustainability to achieve a working mode for future cities.

TSCY is a cornerstone development for Oman Tourism Development Company (OTDC).

- TSCY contributes nationally towards achieving the Oman Vision 2040 objectives and indicators.
- TSCY, a successful public-private partnership, supports the pursuit of the Sultanate of Oman in attracting more FDI to Oman's green economy.
- TSCY complements national strategies for private sector engagement in tourism, national employment, fisheries, and green developments.
- TSCY enhances the positioning of the Sultanate of Oman as a global and responsible tourism destination.
- TSCY preserves the essence of the local culture and will, for example, incorporate a pre-existing low-income fishing community as part of the overall development.

Our Vision

Oman: Joining the World's Developed Countries



Main Oman 2040 Vision Indicators

THANK YOU