

ORGANO'S NAANDI

CASE STUDY OF A SUSTAINABLE DEVELOPMENT



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ABOUT THE AUTHOR

This article is written by Shruthi Srinivas. She has a background in architecture with a specialization in Sustainability. Shruthi is passionate about creating sustainable built environments through the integration of ecosystem services and engaging design. She holds a Master of Science degree in Integrated Sustainable Design from NUS, Singapore. At EDS, her work includes green building certification, daylight simulations and writing.



CONTEXT

In the context of climate change and global warming, it is always inspiring to see examples of new development that are sensitive, sustainable and leading by example. In a developing world, where most of the new building stock is yet to be built, this opportunity should be used to create centres of sustainability.

Organo Naandi is a fully sustainable collective organic farming community where the residents actively participate and benefit from a cycle of self-sufficient living. The residents are professionals on the weekday and community farmers on the weekend. They believe in the concept of 'farm to table' and want to lead a self-reliant sustainable lifestyle.

Designed on the outskirts of a bustling city in India, the design facilitates a dialogue between humans and Nature resulting in a new-age urban community. It features community farming, personal kitchen gardens, plant nursery, animal husbandry, forest plantation, aqua farming, apiculture. All of this helps create a micro climate that is distinctly better from the city and creates an ecological hub.

While organic farming is central to the concept, the entire project is designed to integrate climate responsive approach towards creating the built environment including managing waste on site, being self-reliant in terms of water and energy and having systems in place to ensure residents also practice sustainability in their everyday lives.

The project is a net-zero energy site development. All the storm water and waste water is managed on-site resulting in a zero-discharge campus. The cradle-to-cradle approach has been implemented at various levels. The project has also been awarded Platinum certification under the Green Homes rating system by the Indian Green Building Council.

Everything put together makes this an interesting and inspiring case study.

INTRODUCTION TO ORGANO NAANDI

The project is a residential development covering an area of 35 acres, situated on the outskirts of the city of Hyderabad in India. The vision of Organo Naandi is to promote community living and social welfare through the concept of collective farming in a sustainable manner.

Previously a barren zone, the site has been transformed into an ecologically rich parcel of land through many thoughtful interventions. The residents can stroll through the lush green mini-forests while breathing fresh, clean air. The site is laden with a diverse variety of birds and butterflies in all forms and colours in the midst of dense plantations. A *slow-paced lifestyle* rooted in traditional values is encouraged where people become farmers in their own kitchen gardens while being involved in the community activities. The development also caters to the sustenance of local farmers through the urban farms. Not just the built environment, but the lifestyle of the residents is also enriched.

PROJECT DETAILS

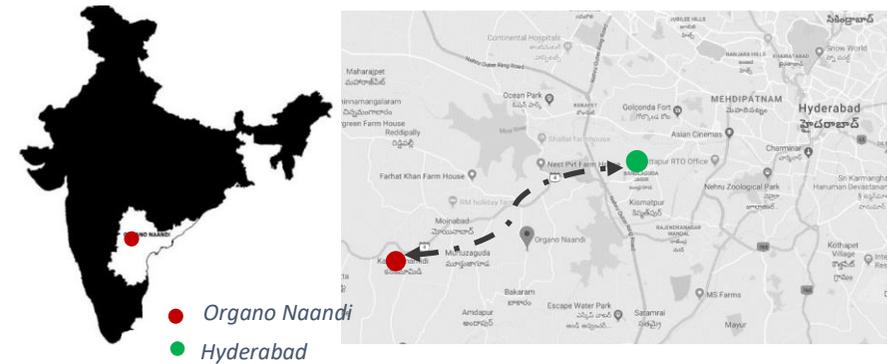


Figure 1: Location Map- 25kms from Hyderabad City

Location	Hyderabad, Telangana State, India
Latitude & Longitude	17.3850° N, 78.4867° E
Site area	35 acres
Farm Land area	16.5 acres
Programme	Residential Development
Architect	FountainHead Design Private Limited (FHD group)
Occupancy	75 villas
Context	Farm Land and Villages

CONCEPT

The design merges the [traditional Indian elements of creation i.e. the 'Pancha-mahabhootas' and the Triple Bottom Line \(TBL\) concept](#).

Ancient Indian philosophy has always propagated the concept that the earth and all its living beings are fundamentally made up of 5 elements i.e. air, water, earth, void(ether) and energy. These were collectively termed as 'Pancha-mahabhootas' or the 'Five Great Elements.' At end of life, the elements are returned to the environment after disintegration. This sets a base for other living organisms to thrive, thus forming a closed-loop cyclic process which is in harmony with nature. The concept of Triple Bottom Line advocates that for a building to be truly sustainable, it should create a comfortable and healthy environment for occupants as well as contribute to the overall economic development of the community while having the least impact on the environment.

Drawing on these lines, the design envisions to create a self-sustaining development wherein the building and its contextual surroundings engage the hydrological and ecological services of Nature while laying

importance to human aspirations and activities. It emphasizes on a closed looped [cradle to cradle](#) approach wherein the by-product of one process becomes an important resource for another. Example: organic waste generated by kitchen activities, farm animals etc is returned to the soil as nutrient for new plants.

[This concept was further translated through each of the following seven systems into the design:](#)

Food: Fresh crops, vegetables & fruits to be organically grown at the site and consumed by the residents. Practice of apiculture and production of dairy products to complement the farm.

Water: Watershed management techniques to harvest and treat water.

Shelter: Climate responsive design in harmony with Nature.

People: The interactions of people within as well as outside the community with an element of social welfare.

Air: Clean air supplied to the individual residential units through earth tunnel system.

Earth: Enrichment of soil through organic farming practices.

Energy: Use of Energy efficiency techniques coupled with energy generation mechanisms.

THE DESIGN APPROACH

The design of the masterplan (Figure 2) has been envisioned to allow maximum interactions between the seven systems which are interconnected to each other ensuring that the development thrives as a whole.

The periphery of the site is sprinkled with the individual villa farmhouses with a personal garden provided for each of the villas. The collective farms are sandwiched between the villas along with a bio-pond in the centre of the development which is also a biodiversity hub successfully attracting different species of birds and insects. The bio-pond also serves as an aquaculture zone. An animal husbandry facility is provided on the site from where fresh milk and eggs are obtained. The organic wastes are converted to manure and electric power by the bio-gas plant present on the site. Additionally, solar photovoltaic panels are provided on the rooftops for electricity generation.

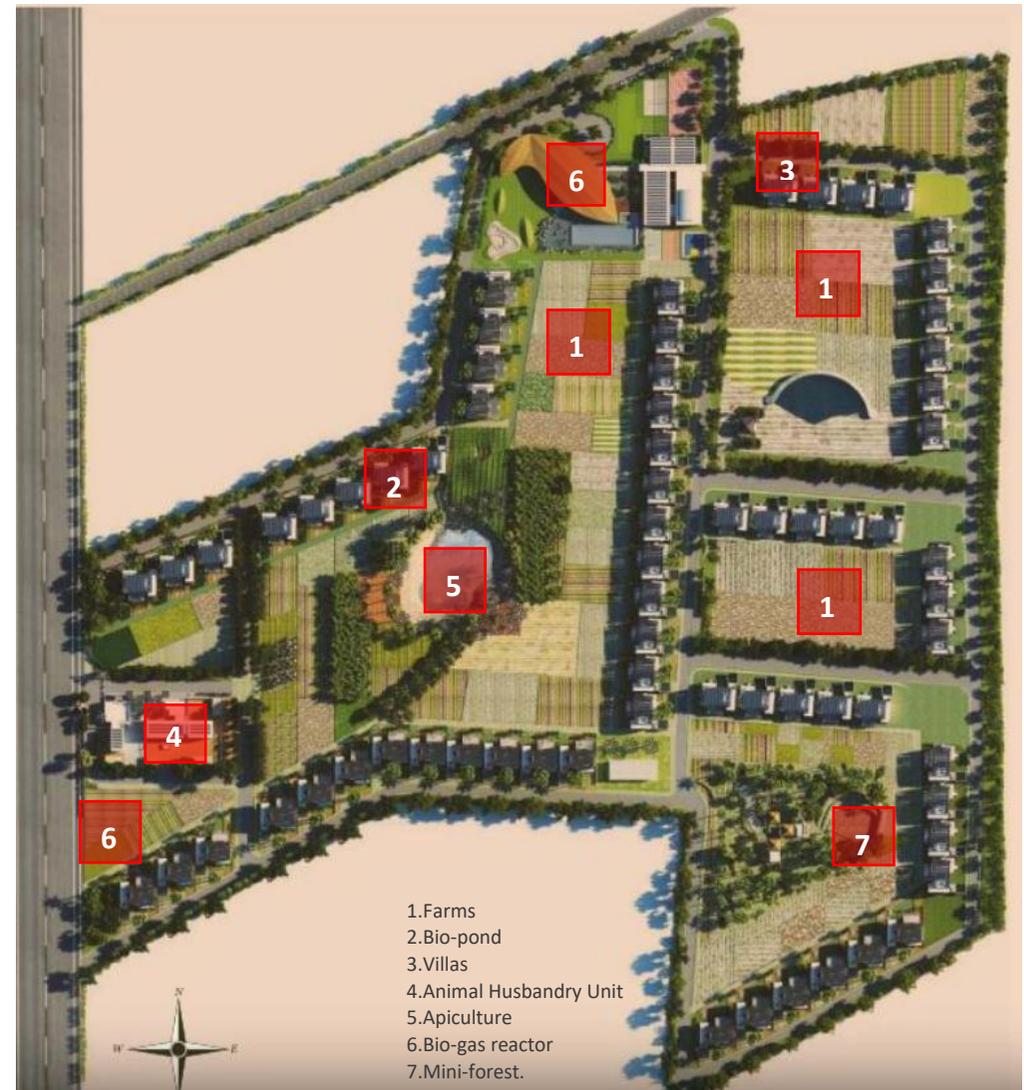


Figure 2: Masterplan
Image Credit: Used with permission from Organo's Naandi



Figure 3: View of the site
Image Credit: Used with permission from Organo's Naandi

Clubhouse

Farms

Villas

Mini-Forests

Apiculture

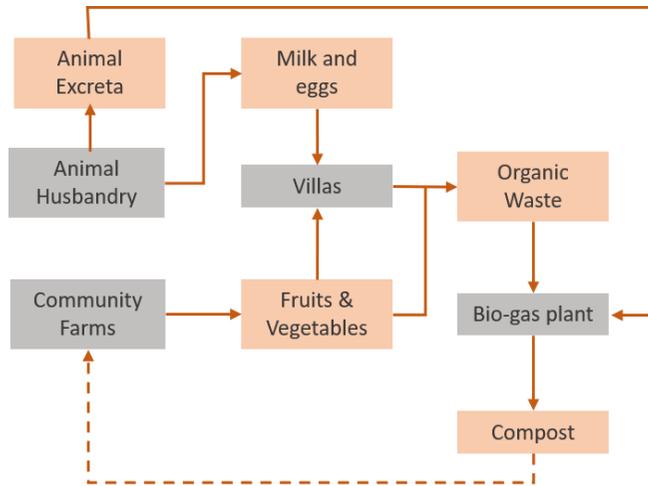
Farms

Animal
Husbandry Unit

Bio-pond

THE SEVEN SYSTEMS

1. FOOD



India has always been an agro-based economy and culturally, food is revered and considered divine. The harmful impact of industrial farming on the environment and human health due to increased use of pesticides and fertilizers has led to a movement about organic farming practices in various parts of the world. Today India is home to 30% of the total organic producers in the world¹.

¹<https://www.downtoearth.org.in/news/agriculture/india-has-the-highest-number-of-organic-farmers-globally-but-most-of-them-are-struggling-61289>

The vision of Organo Naandi is to provide fresh, organic produce to the residents which is locally grown on the site while enhancing human interactions and promote well-being. There are two main types of farms on the campus: Personal and Community.

Community farm: Farmers from nearby villages are trained on the latest farming practices and technologies by the Organo group and then employed to manage the community farms. The fruits & vegetables from the farm is equally divided among the residents. This provides economic opportunity to the farmers and also creates a platform for the farmers to directly interact with the consumers.

Personal farm: On the other hand, each resident owns a combined share of about 0.5 acres of the personal and community farms. This provides them an opportunity to grow their own food and understand the ecological cycles in a hands-on method. This activity also encourages eating seasonal produce and consequently adopting a healthier lifestyle. Further, forest and medicinal plantations are also grown on the campus. The animal husbandry facility compliments the farm with the production of dairy products and eggs. .

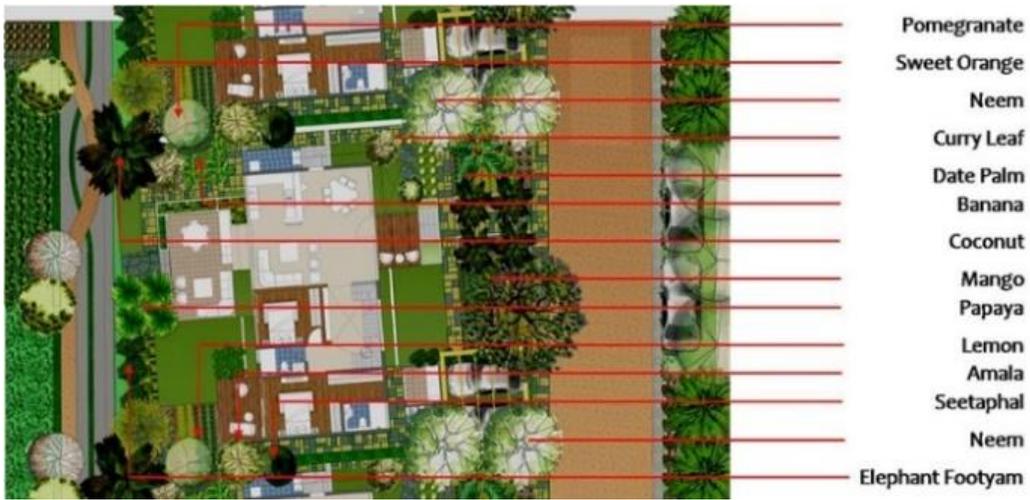


Figure 4: Personal Farms
 Image Credit: Used with permission from Organo's Naandi

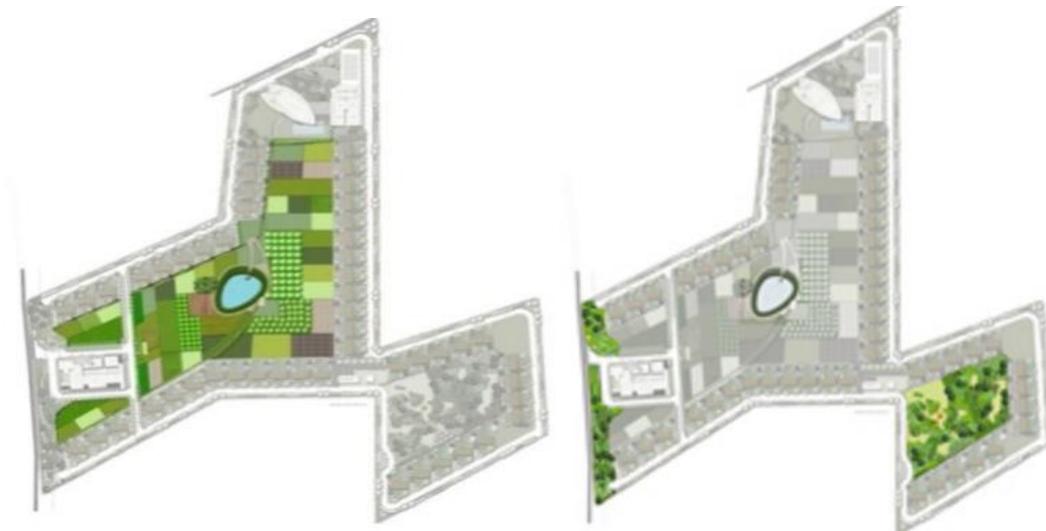


Figure 5: Community Farms (left) and Medicinal Plantations (right)
 Image Credit: Used with permission from Organo's Naandi

2. WATER

The goal of the project is to ensure zero discharge i.e. the captured stormwater and the generated greywater at the site is recycled, treated and utilized within the site.

Greywater: A sewage treatment plant – SBR (Sequential Batch Reactor Technology) is installed in each villa to treat the waste water from the homes. This further goes through an aerobic filter bed. The treated water is subsequently used for farm irrigation.

Stormwater: Trenches and bioswales are created throughout the site to capture stormwater. The site grading is such that stormwater also drains into the bio-pond which has a capacity of around 1500 kL (396,258 gallons). Aquaculture practiced in the pond also helps in stormwater treatment. An aquaponic cycle is created wherein the bacteria in the pond acts as a carburettor and converts the fish excreta into fertilizer which is diverted to the farms as manure. The treated water is used for irrigation purposes.

The stormwater management systems such as the wetlands and bio-ponds create a rich habitat ideal for attracting diverse species of birds,

butterflies and bees. Through this effort, the project attempts to ‘bring back the sparrow’. Organo Naandi has thus established itself as a magnet for bird watchers and ornithologists.

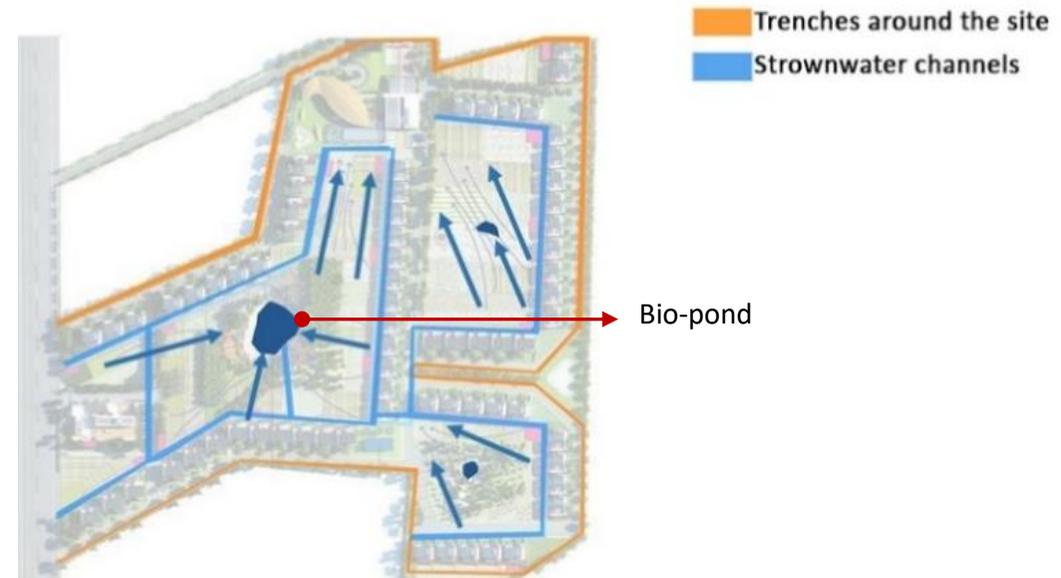


Figure 6: Stormwater management plan
Information Source: Organo's Naandi



Figure 7: Bio-pond

Image Credit: Used with permission from Organo's Naandi



Figure 8: Birds of Organo Naandi

Image Credit: Used with permission from Organo's Naandi



3. PEOPLE

The project attempts to imbibe inclusivity among all residents while fostering a sense of social welfare. The site and its activities are designed to ensure high levels of human interaction within its periphery as well as outside the community. The Bio-pond, bamboo clubhouse and the community farms which are ecological spaces deeply rooted in Nature, serve as magnets for human interactions.

Along with the privileges associated, there are mandatory and social responsibilities which the residents must carry out. Social responsibilities constitute educational programs and healthcare drives by utilizing the facilities provided inside the development. Healthcare drives are conducted frequently for the nearby villagers. Credits are earned by performing the mandatory responsibilities which mainly include maintenance activities. This system quantifies the consumption and the contribution of each family unit in all the seven categories i.e. air, water, food, energy, earth, people and shelter. The system is devised so as to ensure that the residents are committed to the cause of sustainability.

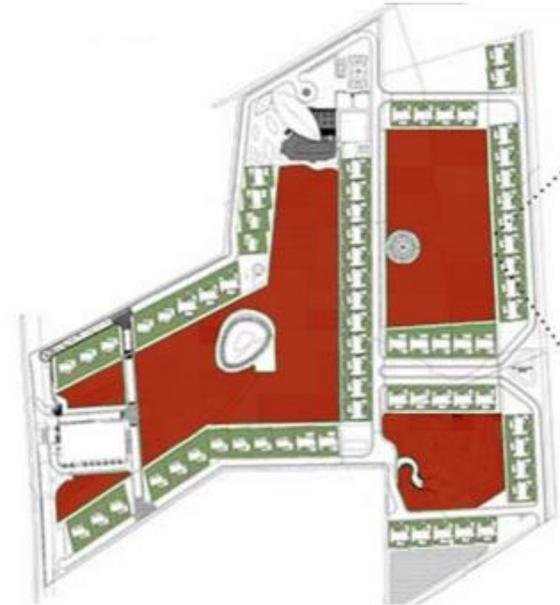


Figure 9: Public Spaces on the site
Image Credit: Used with permission from Organo's Naandi



Figure 10: Plantation drive on the site
Image Credit: Used with permission from Organo's Naandi

Element	Provisional Benchmark	Credit Weightage	Measure
Food	20kgs of fruits and vegetables per month per household	10%	Give and Take
Water	30,000 litres/household	TBA	Water meter and record usage/savings
People	1) Community participation such as voting, sales, upkeep, reviewing accounts, attending meetings. 2) Social: Conducting healthcare or educational programs.	20%	Attendance and log sheets
Shelter	Shelter is designed based on green norms. The upkeep of the home will fall under the Naandi norms.	15%	Periodic maintenance checks
Energy	900 units per month. AC consumption to be 18kW/day/villa	TBA	Two way metering
Air	Use of earth tunnels to reduce the energy consumption	5%	Data collected via automation

Figure 12: Credit system
Information Source: Organo's Naandi

4. SHELTER

The villas are designed to incorporate climate responsive design strategies such as appropriate orientation, shading and ventilation. Fenestrations are provided to facilitate double sided cross ventilation across the rooms. The structure uses a pre-engineered combination of steel and pre-cast members which decreases the construction time while reducing waste. In the semi-open spaces, bamboo screens are installed which act as shading devices while allowing for breeze as well. Further, they can also be utilized for the installation of vertical landscape. In the master plan (Figure 2), all villas overlook the community farmlands located in the centre. The low density development with abundant landscape creates a relatively cooler micro climate that in turn improves the outdoor as well as indoor thermal comfort.

Covering an area of around 10,750 sq.ft, the clubhouse at Organo Naandi boasts of the largest structural bamboo roof construction in the country consisting of ridges, purlins and trusses. The structure which creates a very natural and rustic look, overlooks the bio-pool and the outdoors spaces thus establishing a connection between Nature and humans.

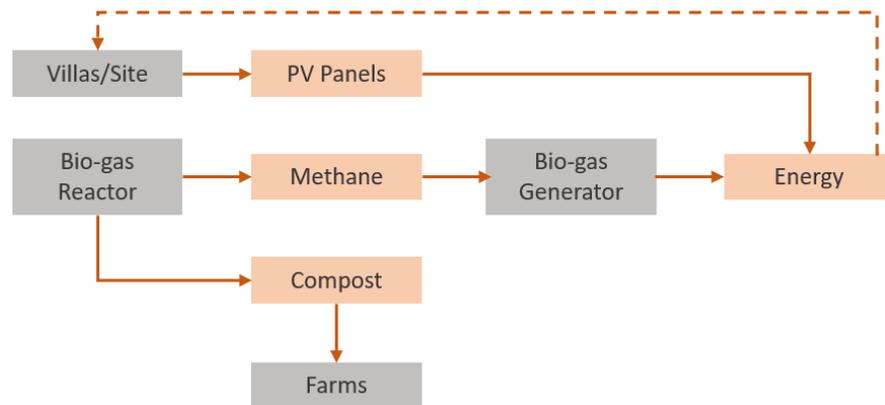


Figure 13: Pre-engineered villas with bamboo screens.
Image Credit: Used with permission from Organo's Naandi



Figure 14: Connection between Nature and humans
Image Credit: Used with permission from Organo's Naandi

5. ENERGY



The goal in terms of energy is to create a self-sufficient community. For this, the first step towards reducing energy demand is achieved through good building design and further by employing energy efficient cooling systems and lastly through on-site energy generation systems. All electricity requirement of the project is taken care of by on-site solar renewable systems. The power requirement for the entire site is around 911 MWh/yr while the energy generation on the site is around 950 MWh/yr, thus creating a net-positive scenario.

Space conditioning: Space cooling is one of the largest energy end-use in a predominantly warm country like India. Owing to the fact that the site is a farmland, the temperatures are cooler below the ground.

Taking advantage of this phenomenon, earth tunnels are installed at a depth of 1.8m (6ft) below the ground to supply cool air to the residences (Figure 15). The fresh air intake will be surrounded by oxygen generating vegetation. Moreover, the presence of mini-forests, abundant greenery and vast areas of farm lands contribute in creating a comfortable micro-climate on site.

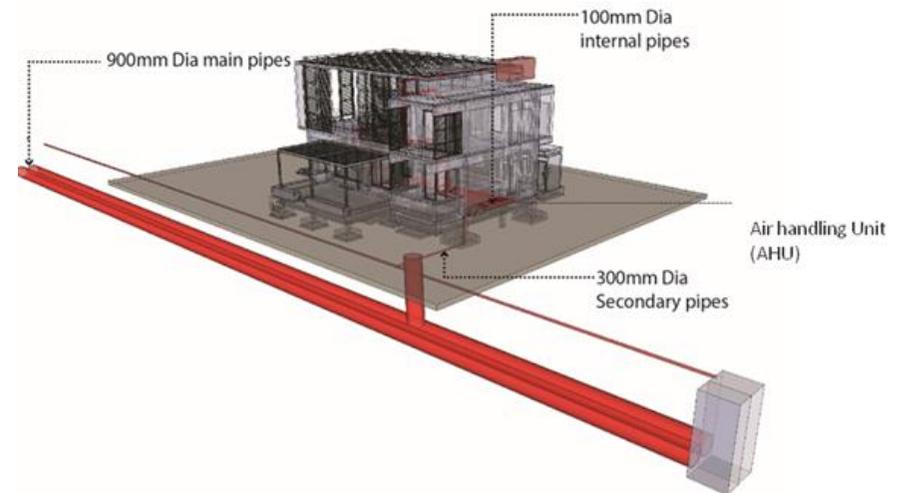


Figure 15: Installation of earth tunnels
Image Credit: Used with permission from Organo's Naandi

Renewables: Photovoltaic panels of 10kW capacity are installed on the rooftop of every residence that is enough to power the appliances. The energy produced by these panels is sent to a micro-grid that connects all solar installations whenever required to maximize the

efficiency. The excess energy produced is traded with the local utility. The site also has a PV canopy through which electricity is produced. This reduces the annual CO₂ emission by around 500 tonnes.

Bio-gas reactor: The organic waste collected from the farms, animal husbandry and the residences is fed into the bio-gas reactor which has a capacity of around 2 tonnes. The anaerobic digestion in this facility releases methane which is collected, scrubbed and sent to the bio-gas generator which has a capacity of around 24kW, where three phase electric power is produced. The sludge collected in the bottom of the bio-gas reactor is used as manure for the vegetation in the farms. The animals feed on the grass grown on the farms, thus completing the cycle.



Figure 16: Floating Dome (Bio-gas reactor) on the site
Image Credit: Used with permission from Organo's Naandi



Figure 17: Solar Canopy
Image Credit: Used with permission from Organo's Naandi



Figure 18: PV Panels on roof
Image Credit: Used with permission from Organo's Naandi

6. AIR

Rapid urbanisation has led to a steep rise in air pollution lowering the air quality index in cities. The site development with farms, vegetation and water bodies creates a better micro climate at Organo Naandi and hence a better air quality.

7. EARTH

The vision was to re-establish a relationship with soil. For this purpose, various strategies have been implemented such as:

1. Organic manure recovered by the bio-gas reactors.
2. Biological pest control
3. Permaculture and crop rotation.
4. Vermicomposting where earthworms enrich the soil.

Another practice carried out on the site is to leave the soil undisturbed for a period of time after harvesting a batch of crops to allow the soil to recover.

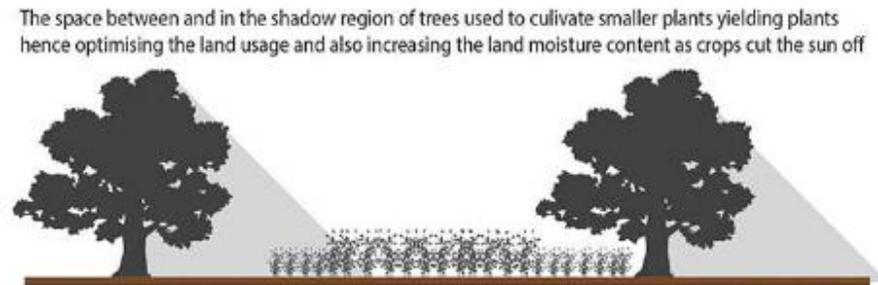
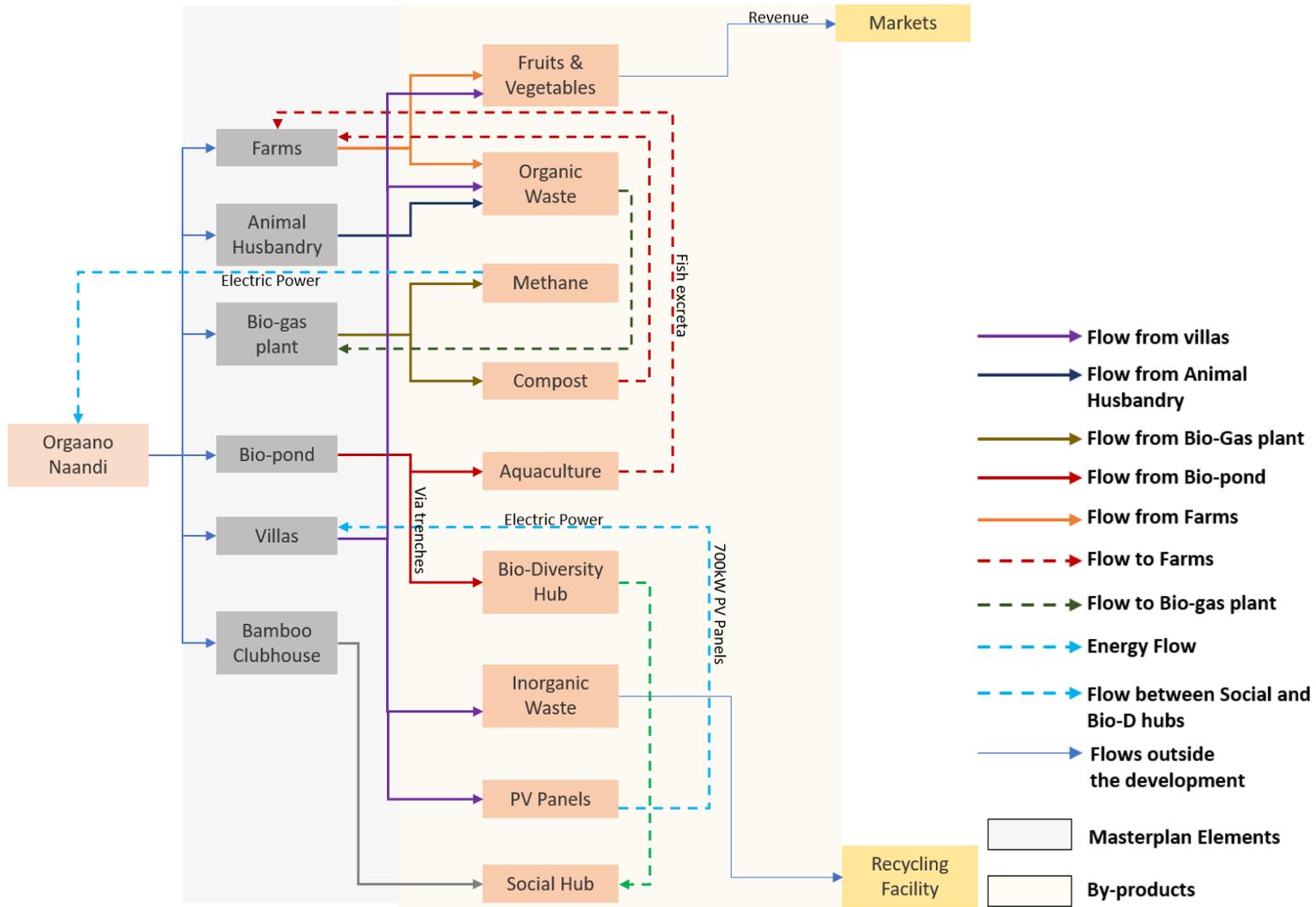


Figure 19: Organic Farming

Image Credit: Used with permission from Organo's Naandi

Thus, the entire campus employs cradle-to-cradle approaches to several aspects. It takes a lot of effort and detailed planning to ensure all the systems work in harmony and in a truly sustainable development. A summary of the eco-system flow is given in the diagram below.

SUMMARY OF THE ECO-SYSTEM FLOW



CONCLUSION

For a healthier and safer planet, a paradigm shift is required in how we build and how we live. The built environment has tremendous potential to emerge as a centre of resource production rather than being a resource guzzler. Organo's Naandi offers a fresh perspective to sustainability in backdrop of a developing country. It has strategically become a resource producer while developing a delicate ecological balance. Not only has Organo created a beautiful and inspirational environment, it has developed a system for the residents to embrace a

sustainable lifestyle that will provide long term benefits to the health and wellbeing of the people while creating a regenerative ecosystem. The development redefines 'luxury' which is marked by breathing fresh air, growing your own food, eating local and seasonal produce and being close to nature. People living in such a community need to embrace this by leading a sustainable lifestyle.

This model can be successfully emulated elsewhere. Creating more of such developments will go a long way in protecting the natural environment while living a comfortable and responsible lifestyle.

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