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# Best Environmental Practices of Township at Electronics City

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**ABSTRACT –** This paper presents the "Case study on Best Environmental practices which are adopted in environmental management system at Electronics city Township". ELCITA applied the most appropriate combination of environmental control measures and strategies to achieve smart sustainable water, waste & Air and Energy management systems. Township compressed with centralized water supply and demand management system, Waste management system and liquid waste treatment facility systems, Smart city etc., which helps to maintain the township in true sense of clean and sustainable township.

In 2013, the GoK, in a first in the state, declared Electronics City as an industrial township area to be governed by its members under the Karnataka Municipalities Act, 1964 and constituted the Electronics City Industrial Township Authority (ELCITA). ELCITA is responsible for executing the various municipal functions of the township, such as town planning, building approval, water and waste management, collection of property tax etc. There are a total of 293 companies in Electronics City. The population of Electronics City is 2,00, 000, including support staff, housekeeping, and security.

ELCITA operating and monitoring all the functions on I-Connect Platform in Centralized command Center dashboard


Fig 1. Functions of ELCITA

**Key Words: Environment, Water, Wastewater, Energy, Dashboard etc.,**

## I. INTRODUCTION

ELCITA (Electronics City Industrial Township Authority) was formed to administer Electronics City Industrial Township Area. Its mandate includes maintenance of municipal services of estate including estate maintenance, safety, traffic management, regulation of construction by granting building approvals, Khata, trade licenses, town planning and ensuring a 'future safe' estate. It collects all statutory taxes and other levies covering property tax and charges for Safety, Traffic Management, and other municipal services.

ELCITA has set upon itself an ambitious vision of becoming one of the best administered smarts, green, sustainable industrial Townships, which aligns itself with the Global and National goals of becoming water positive, sending zero waste to land fill, preventing open defecation, having clean air, becoming carbon neutral by adopting energy consumption reduction measures, adopting alternate energy options and providing a safe environment for our operational requirements.

ELCITA, partnering with various technology-based infrastructure providers has developed a smart and sustainable eco-system focusing on various aspects -institutional, physical, governance, social, environmental as also basic infrastructure to ensure comprehensive development of the township.

For more details visit:

**https://www.elcita.in/a-futuristic-industrial-township/**

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IoTs have been used extensively to monitor all aspects of ELCITA's operations with a view of achieving our objectives. A brief of the same has been enumerated below:

**1.1 ELCITA Water Management System**

ELCITA has been successfully running the water supply to companies in Electronics City since 2013. We are closely working on water distribution process to various small- and large-scale companies (132 companies) to meet their daily consumption demand.

ELCITA set a vision to Become Water Positive by 2025; under the vision umbrella, ELCITA has adopted following initiatives

Vision: **Becoming Water Positive: Adopting an Integrated approach to Manage water**: Make ELCITA water positive by year 2025 through water conservation, wastewater recycling, reuse, and rainwater harvesting

**1.1.1 Fresh Water management**: With a focus on enhancement of quality of water being supplied and reduction of wastages

**a. Reduction of Non-Revenue Water by monitoring water supply:**

Electromagnetic flow meters have been installed and integrated with CCC dashboard to monitor consumption:

i Helps monitor leakages during storage and supply BWSSB water. Wastage is presently less than 3%

ii. Monitor consumption of Borewell water by companies

b. Installed & Monitored 74Nos. of IOT based flowmeters for entire BWSSB Water network system for track real time data assessment

c. Established IOT based Quality Monitoring Systems (QMS) for both BWSSB and borewell water

d. Installed softener to enhance quality of Borewell water to BIS standards of potable water

e. Established 52 Nos. of flowmeters for companies borewell and 4Nos. of Hydrostatic level sensors to assess Groundwater level

f. Energy Meters and health monitoring sensors are installed to check the health conditions & functions of Equipments

**1.1.2. Rainwater Management:**

a. Established Rainwater harvesting pits with a cumulative potential of approximately 2 MLD

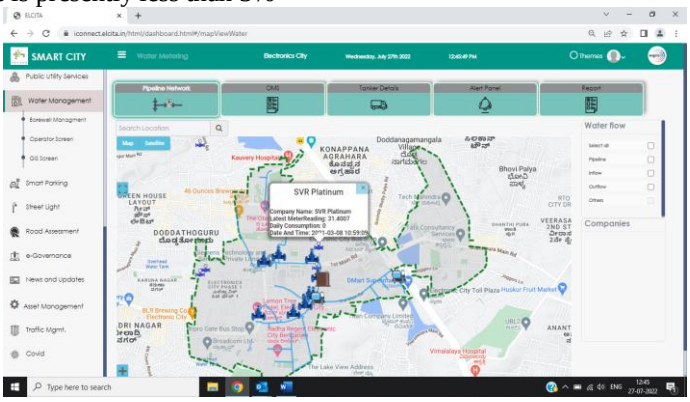
b. Established 95 Rainwater Recharge wells with a cumulative potential of 142.4 MLD

c. Established 5 aquifer recharge system for non-working borewells

d. Established 350 Sq.m perforated pavers with turf grass

**SCREEN SHOTS OF WATER MANAGEMENT**

**a. Showing pipeline connectivity and smart water meters installed to companies, with consumption monitoring.**




**b. Online monitoring system – water quality check.**

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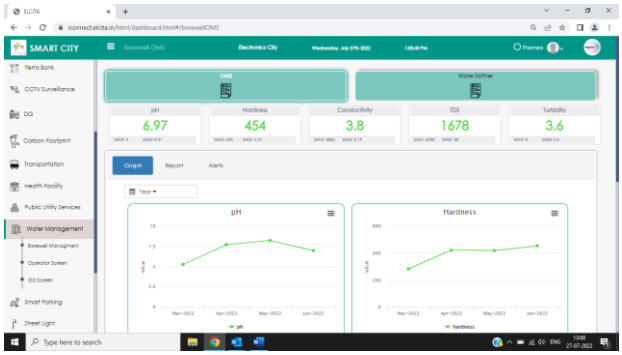
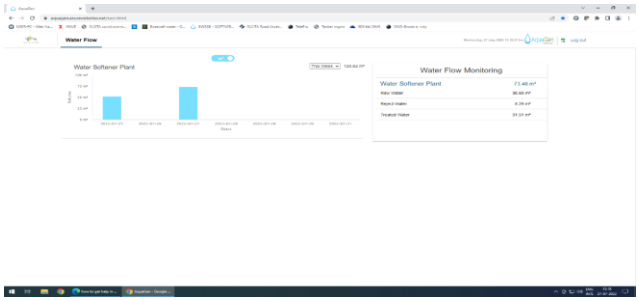



**C. Borewell water Softner plant.**




**1. 2. ELCITA Wastewater Management System**

**1.2.1 ELCITA initiative towards unauthorized sewage disposal**

Total consumption of fresh water within Electronics city is 6.700 MLD (as per Eco-first report -2014). Only 87% of the wastewater generated is treated, and 52% of treated wastewater is reused.

As per KSPCB Norms, all demand centers sewage generation over than 10 KLD should install their own STP's. Demand centers generating less than 10 KLD are required to have septic tanks.

ELCITA has taken initiative to build network. Industries using the network will dump untreated water into a wastewater collection network that will convey this water to the STP currently, no such collection network exists. KAM-AVIDA tankers are used to transport wastewater from the demand centers to treatment plant. This network has designed and constructed to make this model sustainable.

The system is running with economy. ELCITA has fixed the rate for sewage Service of Rs. 75 per KL and treated water supply for 1 KL of Rs. 65/- based on the operation and maintenance of vehicles, distance and respective Laboure expenses.

ELCITA Established Underground Drainage system:

To Ensure proper sewer line from 450 KLD capacity KSSIDC Septic tank to 300 KLD CSTP, ELCITA established UGD system with following technical specifications (a) Lying of 90mm HDPE Pipe of 1.5 KM length (b) Sewage submersible cutter pumps with level sensors of 2Nos. of 7.5 HP pump (1w+1s) (c) PLC Based panel of auto pump switching on/off system operation

ROUTE FROM KSSIDC SEPTIC TANK TO ELCIA CLUSTER 300 KLD STP - 1500 M

**1.2.2. Sewage and treated water management: With a focus on enhancement of quality and quantity of sewage water being treated and reused.**

ELCITA established centralized sewage treatment facility of capacity 325 KLD and All the STP's treated effluent meets the KSPCB quality tolerance Limits (Ref. Table 1)

Infrastructure Development: Enhanced 300KLD CSTP Infrastructure by replacing highly corroded MS sheet and pipes to Highly non corroded

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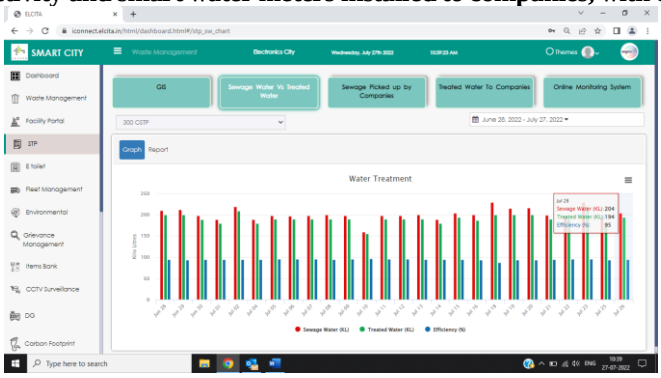
SS304 Materials to provide safety and hygienic to operators.
Established standards for Operation & maintenance of STP's & Equipment preventive maintenance , awareness programs and trainings to achieve high functional efficiency not less than 95%.
a. Quantity Assessment: Electromagnetic flowmeters are installed @ all STP's to assess the quantity
b. Quality Assessment: UV -Spectroscopy technology based "Online monitoring sensor" has installed to monitor real time health conditions of STP
c. Energy Monitoring system: Smart energy monitoring system technique tracks the usage of energy of different regions of the plant throughout round-the-clock.
d. Data Analytics: A software has been developed for management of wastewater like (a) Quantity of sewage picked up (b) Quantity of Treated water treated /supplied (c) No. and details of clients subscribing to services.
e. Established Air quality Monitoring systems to measure particulate maters like PM1, PM2.5 & PM10 and Gasses pollutants like NOx, Sox and CO, $CO_2$ & $O_3$
f. Following all the KSPCB Compliance like monthly report submission, Environmental statement, Quality assessment and Stack monitoring assessment reports submission etc.,
g. Established Energy monitoring system and health monitoring sensors for all the STP Equipments to track energy consumptions to reduce carbon footprint
Data is represented graphically to provide insights to the working and help enhance efficiencies.

**Table -1:** KSPCB Quality Parameters

| | |
|---|---|
| PH | 6.5-8.5 |
| BOD | Not more than 10 |
| COD | Not more than 50 |
| TSS | Not more than 20 |
| Total Nitrogen | Not more than 10 |
| Ammoniacal Nitrogen | Not more than 5 |
| Fecal coliform | Not more than 100MPN/1ML |

**SCREEN SHOTS OF WASTEWATER MANAGEMENT**
**Showing pipeline connectivity and smart water meters installed to companies, with consumption monitoring**




**1.3 ELCITA Solid Waste Management System**

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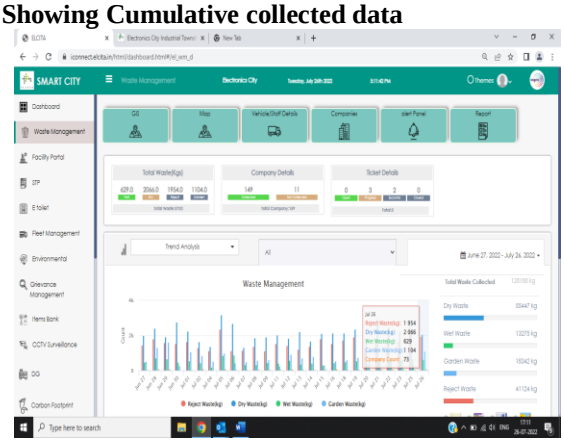
ELCITA started the Solid waste Management collection and storage and disposal system in 2013 with 500 Kg of waste collection and Currently, ELCITA handling mainly 3 categories of waste from around 110 companies of around 5Tones.

**ELCITA Set an SWM Vision: Zero Waste to land fill**

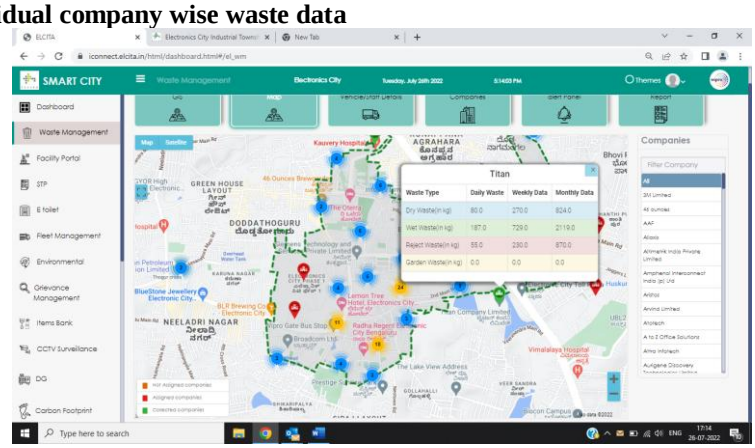
1.3.1 **Solid Waste Management Software** – An application has been developed to cater to the specific requirements of ELCITA, this application helps collect live company wise data like type, quantity of solid waste under different categories such as wet, dry and reject waste. The data helps in monitoring efficiency of segregations and reduction of quantity of waste being sent to the land fill.

**SCREEN SHOTS OF Solid WATER MANAGEMENT**

**Showing Cumulative collected data**



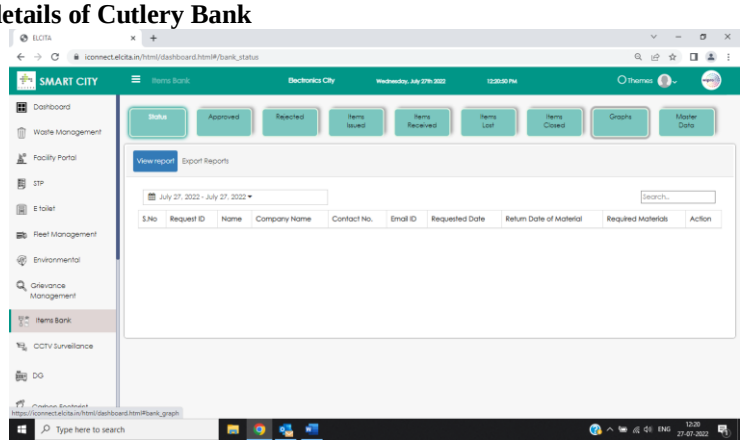

**Capturing of Individual company wise waste data**




1.3.2. **Cutlery Bank:** To avoid usage of single use plastics, ELCITA established "Free Steel Cutlery Bank".

**Items bank screen – tracking of Cutlery bank all details**

**Capturing of User details of Cutlery Bank**



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**1.3.3.** **Waste To Energy** -ELCITA established IOT Based Decentralized Biogas of 100 Kg/day capacity to convert organic waste into methane and biofertilizers to reduce the dependency of Fossil fuels.

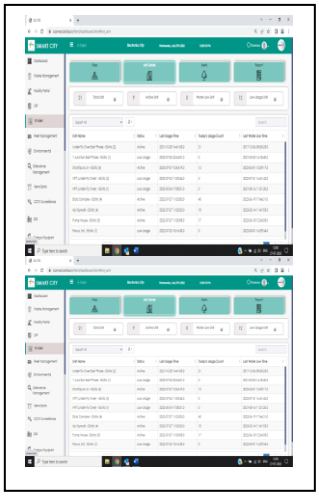
**Capturing of Biogas Usage**


**1.4 ELCITA Smart Sustainable Sanitation system**

ELCITA has sent an Vision**:** **No open defecation in E City**

**E-Toilets –** 20 no's E- toilets have been established to provide clean facilities to citizen. Sensors installed help keep a track of the real time health conditions of E-Toilets, its usage status, water level and Power issues etc that are monitored and displayed on Dashboard, and alerts are given to the supervisors to take appropriate action.

**E - Toilets Utilization and tracking of health condition of all toilets – usage, alerts etc.**



1.5 **ELCITA Air Quality Monitoring System**
ELCITA has sent an Vision**: Ensuring good quality air**

**Air quality monitoring** –ELCITA has deployed three environmental sensors for monitoring air quality parameters such as $NO_x$, $So_x$ and $PM_{10}$, $PM_{20\ and}$ CO, O3, Humidity and Noise.

**Environmental Parameters – installed 3 no's sensors for monitoring of temperature, humidity, $PM_{2.5}$, CO, noise .**

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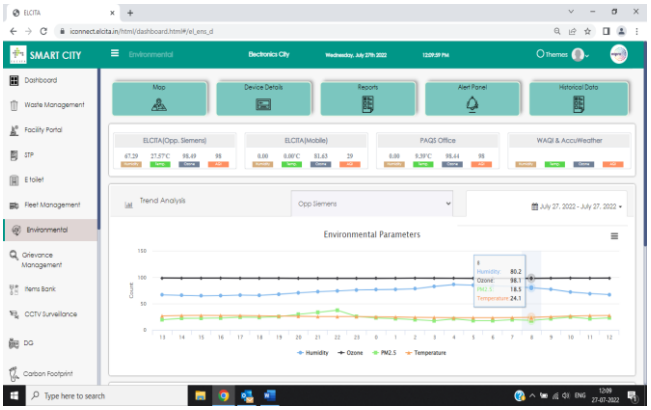
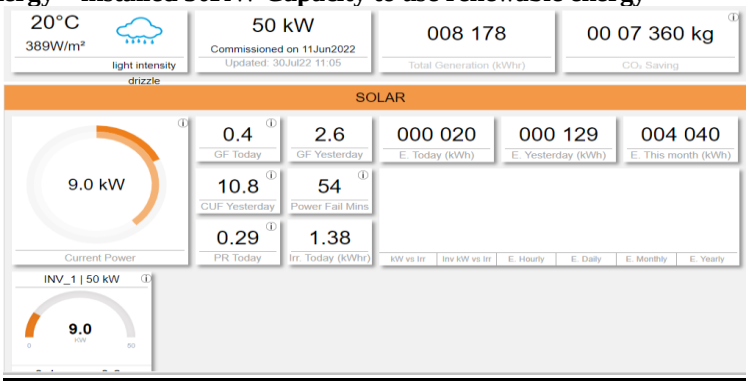



**1.6 ELCITA Energy Monitoring System**
**Vision: <u>Energy reduction</u>**

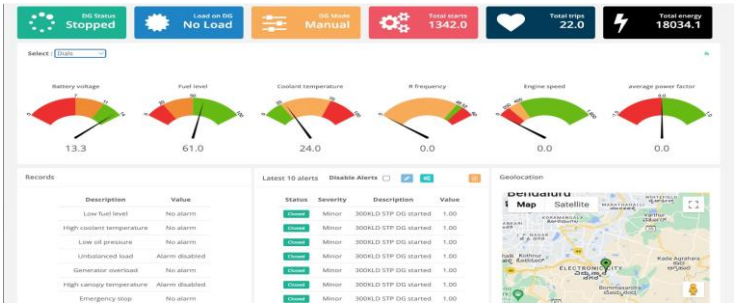
**1.6.1. IOT Based Solar Energy:** ELCITA installed system refers to the online display of the power usage of solar energy as a renewable energy. As a renewable energy it is replacing 83.33% of electrical energy @ ELCITA office Building

**IOT Based Solar Energy – installed 50KW Capacity to use renewable energy**




**1.6.2. Smart Energy Monitoring:** ELCITA installed 38nos. of smart energy meters, health sensors and temperature, vibration sensors in ELCITA facilities to monitor, control, measure, and optimize energy consumption.

**IOT Based Smart Energy Meters**




**1.7 ELCITA Carbon Reduction**
**Vision: <u>Carbon Neutral E City</u>**

**1.7.1. Smart DG**: Installed controller in all 4 DG sets and integrated with ELCITA CCC-system, Ability to monitor status of individual DG sets and able to monitor and get reports of electrical parameters like Load voltage, Load current, Frequency, Battery voltage, etc., can Monitor maintenance perspective parameters like Oil pressure, Temperature, Diesel level, Operating hours, etc. Alert and notification about faulty and abnormal condition

**Monitoring battery level and fuel level with many electrical parameters, alerts etc. On dashboard**

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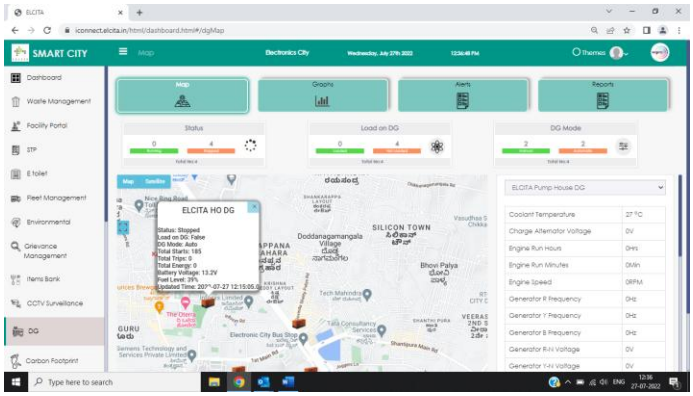
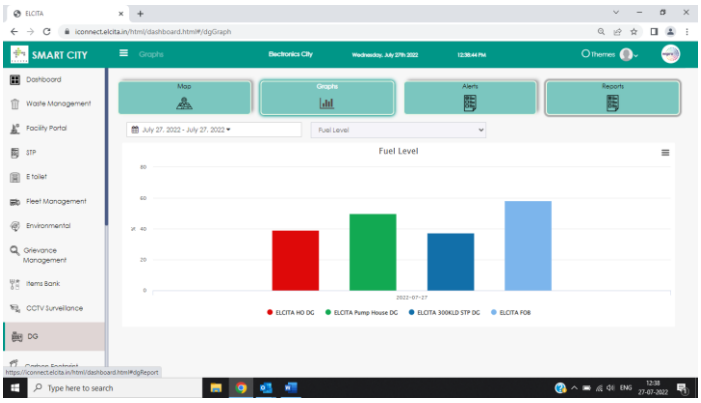



**Capturing Fuel level**




## II. CONCLUSIONS

All the above Best practices of Environment have been successfully implemented, measured and monitored on real time bases and also channelized into a dashboard, where all the reports of various smart initiatives all corroborated and collaborated on to a single "Dashboard".

**ACKNOWLEDGEMENT**

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My parents to whom I am indebted to and hope to make them proud of me always.

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