DR. AKHTAR HAMEED KHAN MEMORIAL TRUST RAWALPINDI

AHKMT

CASE STUDY

SUSTAINABLE WASTE MANAGEMENT MODLE

INTEGRATED RESOURCE RECOVERY CENTER (IRRC) Pakistan

CONSOLE Enterprises (PVT) LTD.

eggbird
solid waste management & recycling to save environment

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CONSOLE Enterprises (PVT) LTD.

Table of Content


IRRC
COMMITTEE SAKRAND


Integrated Resource Recovery Center (IRRC) MARDAN


INTEGRATED RESOURCE RECOVERY CENTER (IRRC)
Office

Preface

Solid waste management (SWM) is an integral component of human society. In developing countries like Pakistan, municipal authorities are facing many challenges to process solid waste due to lack of technical expertise. Only 60-70% of waste produced is being collected in some big cities of Pakistan while in other cities, most of the produced waste remains unattended. Local governments are therefore progresively looking for more environmentally, socially, and economically sustainable SWM methods.

Console Enterprises Pvt Ltd and **E-Guard** are private firms working in collaboration for the betterment of sanitation and waste management services in Pakistan. Our primary objective is to move towards zero waste society. We provide services of

- **Solid waste collection from municipal/institutional and commercial areas**
- **Resource recovery and processing of solid waste (90%)**
- **Safe disposal of remaining 10% to the landfill/dumping site**
- **Janitorial services in hospitals and municipalities**

E-guard and Console in a joint venture have introduced Integrated Resource Recovery Centre (IRRC), a south Asian model for effective solid waste management. IRRC is a facility where a significant portion (80-90%) of waste can be processed in a cost-effective way near the source of generation using decentralized approach. The model is flexible, can be implemented in urban and rural areas in municipalities and institutions on different scales depending upon the quantity of incoming solid waste. The main focus of IRRC is organic waste, which typically comes from kitchens, restaurants, plant trimmings, and wholesale vegetables or fruits markets and is converted to compost i.e., organic fertilizer.

The said model was introduced in Pakistan in 2015 by AHKMT and has now been successfully replicated in 3 localities of Islamabad, one in Mardan, KPK and one in Sakrand Town, Sindh. Considering financial and environmental viability of IRRC, E-guard and Console management now intend to implement it in all cities of Pakistan so that undying issue of solid waste could be resolved along with resource recovery mainly in the form of compost. This case study gives a detailed overview of IRRC, how it works, socio-economic benefits of installing an IRRC and how it could help in achieving sustainable development goals (SDGs). Furthermore, our all IRRC projects and their technical and financial aspects have been discussed in detail.


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Overview

Solid waste production is one of the biggest challenges not only for a developing country but also for the developed world. In Pakistan, about 48 million tons of solid waste is produced annually, and at a rate of is increasing more than two percent every year. This is the waste that we are throwing or littering on roads, streets, and buildings, and are giving to waste collectors and vendors. Vendors collect and throw it in open dumps. It is recycled, segregated, reduced or reused, or. Yet, most Pakistanis appear unconcerned. While garbage collection does occasionally appear on the national agenda in the context of governance failure, recycling or environmentally sustainable solid waste management is almost never discussed.

E-Guard and AHKMT have several successful ventures in different parts of the country including Islamabad, Sindh and Khyber Pakhtunkhwa on its resume. In Islamabad alone, e-Guard and AHKMT have established IRRCs at Jammu & Kashmir Cooperative Housing Society (JKCHS) in Sector G-15, FECHS-Jinnah Garden, F-17 (MPCHS) B-17 Islamabad.



An inexpensive and eco-friendly solution with many benefits, the integrated resource recovery centre (IRRC) is a small-scale, decentralized, community-based waste-to-resource model that uses simple techniques to capture the value of waste. IRRCs are inexpensive to build and relatively straightforward to operate because they require no or little mechanization. They can transform organic waste into compost or biogas; they can also process fecal sludge into compost. IRRCs can produce refuse-derived fuel and other waste-based products, and they can process recyclable inorganic materials. All these outputs have a potential market value as a resource. An IRRC creates a range of economic, social, and environmental benefits for municipalities, communities, businesses, and national governments while managing a waste problem.

What is IRRC?

Integrated Resource Recovery Centers (IRRCs) are aimed at recovering valuable resources from waste. Three major activities can be carried out by the IRRC: collection of segregated waste, processing of waste and sale of the resources generated. The main focus of IRRCs is on organic waste, which typically comes from kitchens, restaurants, and wholesale vegetables or fruits markets.

Background

AHKMT since its inception has developed; piloted and disseminated pioneering models in the fields of community based solid waste management and composting. After a long journey in the field of solid waste management, AHKMT in collaboration with other international organizations has developed IRRC that could be deemed as a final solution to solve solid wastely environmental problems in Pakistan.

Sustainabale Development Goals

A total of seventeen sustainable development goals had been set up by United Nations General Assembly in 2015 which are to be achieved by 2030. Their basic goal is to make a world healthy place to live for all.

SDG 11

"Make cities inclusive, safe, resilient and sustainable"

Over 50% of our total global population lives in cities. They are responsible for around 70% of global energy related emissions. They are on frontline on both climate impacts and the transition to a sustainable future for all. But our cities are changing. More than ever, cities around the world are leading the way to building a sustainable economy. But we need to move even faster. CDP provides the global platform for cities to measure, manage and disclose their environmental data. SDGs 11 work with over 810 cities measuring and disclosing environmental data each year to manage emissions, build resilience, protect themselves from climate impacts and create better places for people to live and work. These cities are disclosing over 8,000 urban sustainability actions, demonstrating their commitment to building a sustainable economy and tackling climate change. SDGs are nearing a tipping point in mainstreaming environmental action, and cities are at the heart of this transition. In this regards AHKMT and E-guard are working progressively in many cities of Pakistan and playing role to achieve the targeted goals of SDG 11.

SDG 12
"Ensure Sustainable Consumption and Production Patterns".

Our planet has provided us with an abundance of natural resources. But we have not utilized them responsibly and currently consume far beyond what our planet can provide. We must learn how to use and produce in sustainable ways that will reverse the harm that we have inflicted on the planet.

According to latest projections, the global population could grow to around 8.5 billion in 2030, 9.7 billion in 2050. The equivalent of almost three planets could be required to provide the natural resources needed to sustain current lifestyles.

SDG Goal 12 has further numerous targets to achieve, one of them which is closely related to our practices i.e. waste management is

"12.4: Responsible Management of Chemicals and Waste"

In the light of above statistic, it is dire need of the (hour) to act positively in order to preserve natural resources. Looking at the dilemma, E-guard decided to act i.e. it started to manage waste in different parts of the country. E-Guard is playing a significant role in achieving the target 12.4.

Principle

The IRRC is based on 3R principles (Reduce, Reuse and Recycle).

IRRC Idea & Design

Idea and design of IRRC were adopted from "Bangladesh" where two experts combined their efforts to install this plant, which was later-on replicated at different spots of "South Asia" by UN-ESCAPE. To understand this model, AHKMT team visited Bangladesh twice. First for orientation purposes of understanding the design and construction etc. and secondly to understand its operational procedures.

In Bengal, it is installed at small as well as at large scales (can process 100 ton daily). Waste is picked up by large loading vehicles and is brought to facility where it is segregated. Organic waste is then processed naturally and convert it into compost. Afterwards, final product is packed and marketed.

IRRC Approach (IRRC Replication in Pakistan)

AHKMT did all it can to replicate the IRRC model in Pakistan and UN-ESCAPE conducted a waste study in Mardan and Jammu and Kashmir Housing Society (JKCHS) in Sector G-15, Islamabad and their recommendation was to replicate the model in Islamabad. Therefore, AHKMT tried to convince JKCHS management which had its reservations. To allay their concerns, AHKMT arranged a visit of JKCHS's General Secretary Latif Qureshi and Executive Secretary Zaheer Khan to visit Bangladesh. The visit proved to be fruitful as the housing society gave the permission to install an IRRC in their premises, which became the first ever successful plant in Pakistan.

Steps and General Methodology

Steps of waste processing in IRRC are following

- **Waste collection and Transportation**
  (Waste is collected from assigned dumping points, weighted and unloaded at IRRC)
- **Waste Segregation and Weighing**
  (Collected waste segregated into three fractions i.e.)

  1. Organic Waste
  2. Recyclable Waste
  3. Rejected Waste

Organic waste is weighed before putting into composting box. The recyclable waste is sold to the vendor while the rejected waste is disposed of in a landfill.

Waste Transfer and Composting

After segregation and weighing, the organic waste is shifted to composting boxes where it is kept there for 45 days. Organic waste in decomposed in the presence of bacteria and other decomposers. Composting boxes could be designed in different sizes after waste study of the area.

Temperature Management and Mixing

To maintain temperature of the composting boxes, waste is mixed once a week for aeration. Temperature is checked twice a day in the morning and evening and record is kept in soft and hard copies.


Leachate Management

Leachate is collected through drains in leachate box. To maintain moisture, leachate is sprayed on compost.


Maturing

For further stabilization and breakdown of remaining complex organics, composting is shifted to the maturing boxes and kept for 15 days.


Screening and Grinding

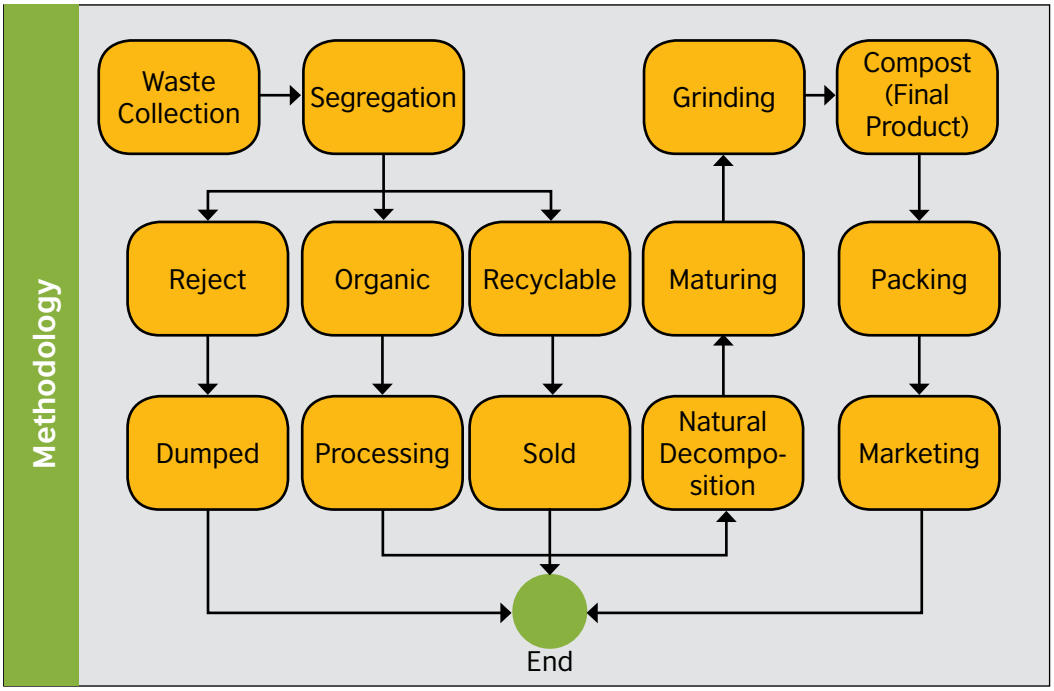
In screening process, non-biodegradable materials are removed manually. Compost is grinded to a suitable size through grinder or using strainer.

Bagging and Packing

The grinded compost in than packed in different sized bags.

Operational Tools Management

Many types of tools are used in IRRC during different processes i.e. temperature gauge, grinding machine, blowers, stitching and packing machine.



Methodology adopted in Integrated Resource Recovery Centers (IRRCs) is shown above in the flowchart.

Outputs

The established IRRC will be contributing towards the following outputs:

1. Develops mechanism for primary collection of solid waste from the

households, segregation, and sale of recyclable materials.
2. Improves environment of the area by cleaning and proper management of waste and reducing green-house emission.(GHGs)
3. Demonstrates viable methods that can sustain operational costs from community contribution and recycling profits.
4. Different stakeholders involved and are mobilized with the introduction of innovative techniques for solid waste management.
5. Waste reduction from the neighboring areas by converting the different waste streams into resources.

Benefits

IRRC Installation can serve the following benefits.

Economic Benefits

Value can be derived out of waste by converting waste into resources, while reducing and/or avoiding costs associated with end-of-pipe solutions.

Environmental Benefits

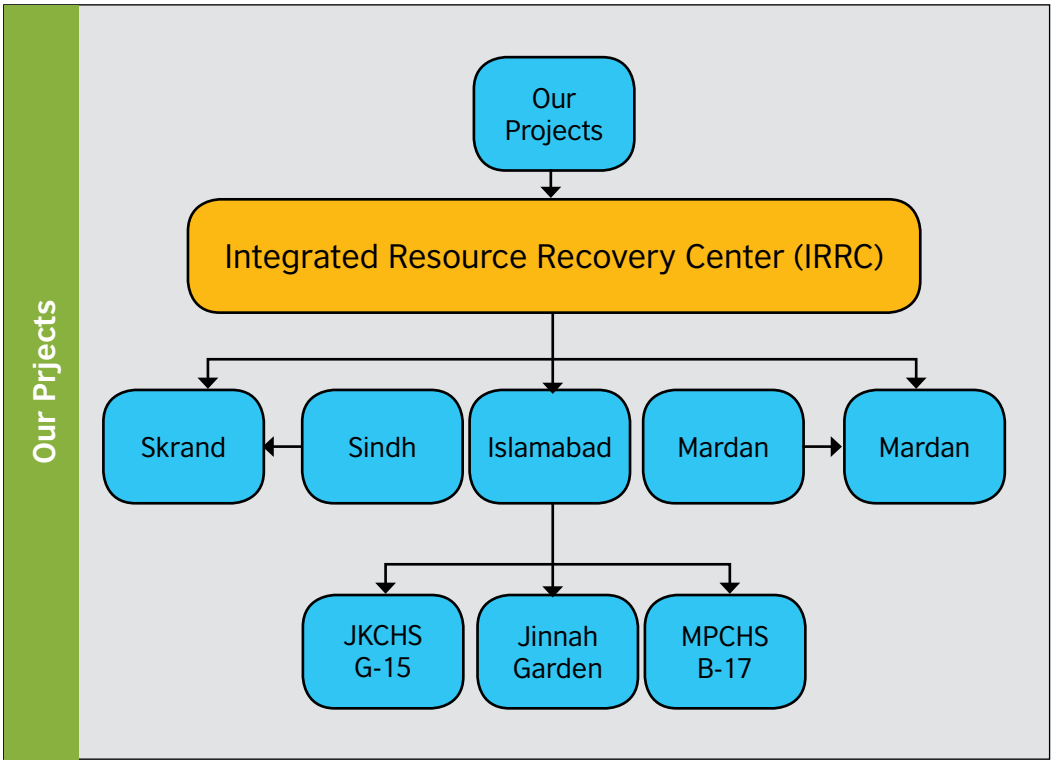
Reduction of greenhouse gas emissions by treating the organic fraction of waste; avoids the formation of leachate water and the spread of odor.

Social Benefits

- Creation of jobs for the urban poor, including waste pickers.
- Reduction of diseases from untreated waste.
- Increased community awareness to 3R principles.

Our Projects

AHKMT has several successful ventures in different parts of the country including Islamabad, Sindh, and Khyber Pakhtunkhwa on its resume. In Islamabad alone, e-guard and Dr Akhtar Hameed Khan Memorial Trust have established IRRCs at Jammu & Kashmir Cooperative Housing Society (JKCHS) in Sector G-15, FECHS-Jinnah Garden, F-17 (MPCHS) B-17 Islamabad. Whereas the organization has also worked on experimental basis at Fruits and Vegetables Market, I-11.



1. IRRC G-15, Islamabad

IRRC G-15, Islamabad

Background

Managing solid waste is one of biggest challenges of the urban areas of all sizes, from mega-cities to the small towns, large villages and housing societies. It is almost always in the top five of the most challenging problems for the managements of housing societies. The quality of waste management services is a good indicator of the management's governance. The way in which waste is produced and discarded gives us a key insight into how people live. In fact, if a housing society is dirty, the administration may be considered ineffective, or its residents may be accused of littering.

Jammu & Kashmir Cooperative Housing Society (JKCHS) in Sector G-15 like all housing societies had to face the issue of solid waste management since its inception.

The management of JKCHS shared their ordeal with Dr. Akhtar Hameed Khan Memorial Trust. They wanted to provide clean environment to the residents of their society. They wanted to introduce an informal sector's recycling, reduce, reuse and system in the housing society to benefit their community.

In 2010 e-guard management after thorough deliberations reached a Memorandum of Understanding to collect waste from JKCHS.

Afterwards, in 2015 e-guard team met the executive body of the society to mull over the plan of initiating solid waste management project in the society and after successful contemplation; it was decided to set up an IRRC in the society.

Overview

In the beginning, the services were provided to 500 households which were later expanded to 2,200 households as well as commercial units.

The JKCHS's IRRC provided door-to-door collection of solid waste services to around 3,000 households through a team including 8 workers for collection and 6 for segregation purpose. The operation was carried out using four vehicles. On daily basis, 3 tons of garbage was collected which resulted in production of 275 kilograms' compost.

Construction

IRRC Center was inaugurated on 17th September 2015 in the presence of representatives from United Nations (UN) and Ministry of Climate Change (MOCC).

Land

IRRC G-15 is installed at1.5 Kanal of land, which was given by the Society for the purpose.

Funding

It was a joint initiative of UN-Habitat and UN-ESCAPE in close collaboration with Dr. Akhtar Hameed khan Memorial Trust. In short, it was fully funded by the United Nations.

Operation

Number of Staff

24 Workers were appointed at IRRC performing specific duties including collection, segregation, turning compost pile, shifting organic waste from compost boxes to maturing boxes, grinding/ sieving of matured compost, packing and marketing of final product. Beside this, overall plant cleaning activities are also included.

Number of Vehicles

Four (4) Suzuki Pickups were used at the IRRC to collect waste from the society. Two workers and a driver were engaged with each vehicle.

Waste collection and segregation

For waste collection, e-guard firm provided door-to-door waste collection and processing service. IRRC had three waste collecting trolleys and staff who collected, segregated, and processed the waste material. Residents were provided with two colors of waste bins in which organic and other waste was placed separately.

After collection, it was segregated at the facility into three parts which were organic (60% of total waste), Recyclable (25% of total waste) and Reject (15% of total waste). Organic waste was processed at the facility, recyclable was sold while reject waste was dumped.

Income & Expenses

The project seemed to be self-sustained and was operated on profit basis since the first year of its inception. Center generated income from the following sources:

1. **Monthly Fee from Houses**
2. **Recyclable Waste**
3. **Compost**

The expenditures included staff salaries, the transportation cost of bringing solid waste from houses, electricity, and natural gas. It was observed that the cost for vegetable market waste transportation was very high and the income from the sale of compost was less. Keeping in view this logic, the idea of bringing green waste from vegetable market was dropped, therefore cluded the garden waste within the area of society. Only the labor and transportation cost was incurred. The findings of the baseline study for solid waste management in the locality determined capacity of 3tons organic waste per day of the JKCHS IRRC.

Waste to Energy

Inauguration

Secretary Climate Change Hassan Nasir Jamy inaugurated waste to energy (Biogas) plant at the IRRC, G-15.

Process Details

AHKMT Solid waste management professional done extensive research on waste to energy plant to produce methane gas. He used the raw materials that are considered as a waste in the society. Biogas was prepared from raw materials like food waste, vegetables waste, fruit waste, leachate collected during composting process and household wastewater. He used all the available wastes using anaerobic digestion technology to produce methane gas. Gas can be utilized for cooking, heating, and electricity generation. Its by-product, digestate (effluent), is a good fertilizer. The digestate can be mixed with compost during composting process at IRRC to enrich the compost quality or it could be used for lands directly. It is an eco-friendly technology. This waste to energy technology converts organic waste either in solid or liquid form into energy production and fertilizer. By producing methane gas, AHKMT has achieved the goal to

produce energy from household solid waste and wastewater.

Challenges Faced

After five years of successful operations when the IRRC was starting to generate income, a change in JKCHS management created disturbance in smooth functioning of the IRRC as the new management of JKCHS stopped e-guard service from collecting waste from the society.

However, after negotiations e-guard resumed the service from January 1, 2019 till September 20, 2019 where the housing society was providing 10 liter per day fuel for vehicles. But unfortunately, in the meantime JKCHS did not pay service charges to e-guard.

Earlier, AHKMT with the support of e-guard continued the waste collection and IRRC operations by implementing a new strategy under which workers, vehicles and operations' time was reduced drastically to sustain the IRRC processes. During the entire duration, the operation was carried out with 6 workers, 3 vehicles with 3 drivers and that too without being paid any service charges by the housing society. The workers for half time of their duty collected the waste and in the remaining time they segregated it. Meantime, the drivers drove their vehicles and picked waste from one sector and during the other half in other sector to manage the workload.

The AHKMT was able to run the IRRC in Sector G-15 sustainably through recycling and compost production without collecting any service charges from the households. It proved that the IRRC can be run sustainably without external budget.

In September 2019, JKCHS management stopped the e-guard from collecting waste. The new chairman and secretary have started their own system of waste collection. Now AHKMT is in process of negotiations with society management for supply of organic waste at IRRC for composting purposes.

This arrangement helped e-guard provide the collection services efficiently. Although the society management promised to pay the remaining bill, but till date the payment is pending.

Lesson Learned

In IRRC sector G-15 UN invested their money while land were provided by JKCHS society. After taking charge by new management, they stopped providing waste to e-guard. Effects were raised in investment. Thing learned while experiencing in G-15 that it is must that a separate budget should be provided for O&M. The report should be submitted to the requested authority.


IRRC
TOWN COMMITTEE S

2. IRRC SAKRAND

IRRC Sakrand

Background

Dr Akhtar Hameed Khan Memorial Trust (AHKMT) wrote a letter to different town committees in September 2016 apprising them of the benefits of solid waste management through a decentralized recycling and composting facility, which is built and operated at low costs by using limited mechanical technology, ensuring low operational costs and minimal equipment breakdowns. Every town committee was asked if they wanted to utilize this facility for proper solid waste management in their respective areas then a waste treatment plant can be developed and handed over to non-governmental organizations or other private local companies for safe disposal of solid waste.

Dr Akhtar Hameed Khan Memorial Trust's call was answered by Sakrand Town Committee and it invited AHKMT team for technical assistance. Sakrand Town is a Taluka of the district Shaheed Benazir Abad (erstwhile old Nawabshah), about 18 kilometres from the old Nawab Shah city. Its population is approximately 31,630.

The AHKMT team visited Sakrand Town and found out that the garbage generated by the town was dumped along National Highway and subsequently burned.

The Chairman of Sakrand Town Committee, Syed Muneer Shah, took the initiative to establish an IRRC in his town. Dr Akhtar Hameed Khan Memorial Trust signed a Memorandum of Understanding (MoU) with Sakrand Town Committee for bringing improvement in solid waste management of Sakrand Town. AHKMT team put down several proposals for perusal of Syed Muneer Shah among which one was weighing of the daily produced garbage in the city to understand as how much garbage the city is producing on daily basis.

Overview

In Sakrand Town, IRRC was replicated and initially two wards were selected for the process, but later the Centre was replicated in five wards. After the success of the project, now the services of waste collection are BEING provided to 15 wards. The situation became fruitful because of proper coordination between lane departments and well-planned strategies including a sanitation week, awareness campaign, painting contest for students, through training workshops and hygiene campaigns, the local journalists started writing on the IRRC and AHKMT used all the available tools of mobilization.

It merits mentioning here that Dr Akhtar Hameed Khan's students have formed a network of organization called Community Development Network (CDN). The meetings of the network are held thrice a year. In one such meeting some students from District Nawabshah were in present. One of them was Ijaz Kharlo who lived near Sakrand and when the talk of initiating the work in Sakrand arose, he willingly agreed to join the project. He was made in-charge of Solid Waste Management Centre, Sakrand Town. He hired services of a youth and that's how the project was initiated.

The work was initiated in a ward and its councilor, Allah Yar, who was also elected for the first time and was eager to do something for his community. His company led AHKMT to meet other councilors' Faiz Khanzada, Sher Ali and Haibat Khan. AHKMT evaluated the existing solid waste management system of

the town. It was found that the garbage collected by sanitary workers lacked green waste. After consultation with local councilors' and Mazda driver, it was decided that the garbage collection containers should be placed in Fruit and Vegetable Market and the vendors should be persuaded to dispose of their waste in these containers. Later the containers were shifted to the centre on daily basis which had 5-7 tons of waste that helped in preparation of organic compost.

Construction

The main objective of the agreement was to establish a proper waste collection system at the household level and setting up a waste processing unit in shape of Integrated Resource Recovery Centre. The agreement was signed in January 2017 and work on the project began in February 2017 where sanitary workers were trained for the IRRC initiative. Land were not available to construct IRRC. Then an area for establishing IRRC was identified, as in South Punjab and Sindh, the town committees have pieces of land where sewage treatment plants are established. After selection of the land for IRRC, Syed Muneer Shah initiated the work on the construction. In the first year, the boundary wall was constructed and open air composting began. A shelter was constructed during the second year of the agreement while the rest of the construction was complete in the third and final year of the agreement.

Its construction has been late but successfully completed in 2018 because funding was received partially in three years. The design was made by AHKMT. After complete construction of the infrastructure, the operational procedure and technical support has been taken over by AHKMT and e-guard. The selective staff visited Islamabad for getting practical training for operating the IRRC.

A training schedule for the sanitary staff was designed and AHKMT team provided them training.

Operation

- **Households**

Proper door to door collection was started. In the initial stages, e-guard provided services to around 4000 houses and later on to the entire town of 10,000 households.

Number of Staff

128 staff has been deputed for the solid waste collection in the town since July 2019, which continued till June 2020.

Number of Vehicles

A fleet of 9 vehicles was put into use to run the operation efficiently in the 15 wards of the town which collected around 30 tons solid waste from the town which included 10 tons organic waste.

The organic waste was converted to compost and for whole year 300 tons compost was produced from 3650 tons organic waste at the Sakrand IRRC. This compost was later distributed among the farmers of the Sakrand Town whereas the selected councilors of the town committee were also awarded the compost.

Door to Door Collection

It was for the first time in solid waste management history that a town committee or local government took the charge of door-to-door collection of solid waste. In the beginning the process of collection of garbage from 1000 households was initiated.

o Challenges Faced During Collection Phase

Meanwhile, it was learnt that the sanitary workers were not mopping the streets of the town efficiently.

AHKMT team discussed the matter with Syed Muneer Shah, and it was agreed that the town committee will monthly pay Rs100000 to e-guard, a subsidiary organization of AHKMT which will be responsible for cleaning of five wards of the town. However, after three months, an audit team objected over the agreement that the town committee cannot pay two separate people for same work. It brought the work to a grinding halt. But next year, Syed Muneer Shah divided the cleanliness work into two parts. Two separate contracts, including one for cleaning the streets and the other for door-door collection of garbage and solid waste management were awarded to separate contractors.

o Issue Resolved

E-guard participated in the bidding process and got the solid waste management contract. E-guard acquired eight loader pickups from JS Bank on installments and in each ward of Sakrand Town, a separate vehicle was assigned the task to pick the waste and transfer it to the centre. Meanwhile, the garbage was transported to the IRRC through Mazda and tractor trolley. However, the split of the contract and some technical issues did not yield good results. Therefore, next year the complete cleanliness contract of Sakrand Town was awarded to e-guard and since July 01, 2019 till June 30, 2020, e-guard with the help of 8 Suzuki pickups, one Ching Chi Rickshaw, one Mazda and two tractor trolleys has been collecting solid waste from 15 wards of the town. The town committee chairman installed a weighing machine right next to the gate of the IRRC which

helped AHKMT in maintaining the daily record of the solid waste brought at the IRRC and the waste used in preparing compost. It also helped in assessing the work carried out the sanitary workers in each ward and they were questioned on daily basis as why they failed to perform better than their colleagues.

Checking & Monitoring

Meanwhile, Syed Muneer Shah also paid surprise visits to the wards to monitor the performance of the sanitary staff, therefore e-guard always kept the workers on their heels by adopting a better evaluation and monitoring process, which led to improved performance of the staff and better sanitary situation of the town.

All the ward councilors' and social workers in every ward were mobilized by the AHKMT to evaluate the overall performance of the organization. AHKMT created a system of daily door-to-door collection of solid waste so that the culture of throwing garbage at corners of streets and roads could be discouraged and to create awareness among people about cleanliness and how they can question the performance of the organization responsible for cleanliness in their area.

Segregation

Waste after collection is brought to facility where it is segregated into three main parts that are Organic (80% of total waste), Recyclable (15% of total waste) and Reject (5% of total waste). The reason is why more organic waste is produced because people of Sakrand use to eat more organic food and more use of sugarcane.

Shelter for Workers

To facilitate the sanitary workers and provide them peace of mind, work on building 100 rooms shelter on a five-Kanal piece of land is in progress in collaboration with SALVIEP and Sakrand Town Committee.

Top Management Training

It merits mentioning here that on request of Town Committee (Sakrand Town) and Dr. Akhtar Hameed Khan Memorial Trust, UNESCAP Regional office Bangkok organized a two-day training and exposure visit of Faecal Sludge Management plant & IRRC Ratanpura Sri Lanka on December 29 and 30, 2018. A five-member delegation from Pakistan attended the training including Ms. Sumaira Gul, Mr. Abdul Haq, Mr. Khurram Arsalan and Mr. Hamid Ullah.

Appreciation Award to AHKMT& E-Guard

The Municipal Committee, Sakrand Town, also bestowed an award upon AHKMT and e-guard, acknowledging the services the two organizations provided in the city. AHKMT and e-guard although not physically handling the operations of the IRRC of waste management issues any more in Sakrand Town, but both organizations remain proud of setting up a legacy in the town which continues till date, as the new contractor has continued with the same team and the set up to run the operations. However, irony of the matter remains instead of utilizing the services of the vehicular fleet of Suzuki pickups owned by e-guard, the contractor hired services of Ching Chi Rickshaw, but the modus operandi of the door-to-door collection remains the same devised and implemented by AHKMT that is quite heartening for the e-guard and AHKMT.

Lesson Learned

The experience learned from managing solid waste in IRRC Sakrand town Sindh is that an IRCC could be constructed in low cost. Investment could be provided phase wise. By involving local community the process becomes reliable.

It is must that a separate, 2-3% of budget should be provided annually from sanitation budget.


INTEGRATED RESOURCE
RECOVERY CENTER (IRRC)
TOWN COMMITTEE SAKRAND

3. IRRC JINNAH GARDEN ISLAMABAD

IRRC Jinnah Garden Islamabad

Background

Islamabad like rest of Pakistan has been in a need of a sustainable solid waste management system to not only ensure climate resilience but also reduce the adverse impacts of solid waste on human health and environment and it could be done through decentralized approach of IRRC is a South Asian Model promoting public, private and community partnership. IRRC is a physical facility where organic waste is scientifically processed and converted into compost (Organic Fertilizer) which makes 10% by weight of the total organic waste used in a cost-effective way. It also recovers valuable material from waste and provides livelihood opportunities to poor communities through a decentralized approach.

Such approach has been adopted by Jinnah Garden, a private housing society spanned over 5700 Kanals in Zone V of the federal capital situated along Islamabad Expressway.

In its nearby vicinities, the housing projects like Bahria Town, Gulberg Greens, Naval Anchorage, Capital Enclave, Soan Gardens, and many upcoming housing projects are situated, however FECHS Jinnah Gardens took the lead in providing a proficient system of garbage disposal to its residents.

Overview

Federal Employees Cooperative Housing Society (FECHS) Jinnah Garden is situated along Islamabad Highway and between Naval Anchorage and Gulberg Green.

To improve the sanitary situation, the management of FECHS-Jinnah Garden through Ali Ahmad, one of the internees of Dr Akhtar Hameed Khan Memorial Trust approached Hamid Ullah, head of e-guard and after discussing the entire process in different sittings, the society agreed to hand over the contract of solid waste collection to e-guard.

After the conditions were set, a Memorandum of Understanding was inked between FECHS-Jinnah Garden and e-guard which was to be collectively run by the two companies.

After the agreement was signed in May 2019, work began in the society and the two companies started providing door-to-door collection and sweeping services to 2000 households for which three Suzuki pickups were hired on rent and sixteen sanitary workers along with the supervision of a manager were deputed on work. The society had to establish the centre for waste processing.

The E-guard and its team have been handling around 5 tons of waste on daily basis making the lives of the society residents quite easy, who before the establishment of IRRC in the society had to wait for several days before their garbage was lifted. The situation was deplorable and despite hectic efforts the society management was unable to pick the solid waste on daily basis.

It is because of the concerted efforts and hard work of the E-guard workers, the sanitary condition of the FECHS-Jinnah Garden has improved rapidly, and efforts are being made to improve it further.

Situation before IRRC

Mr Khalid, Site In charge said earlier they are facing problems in handling the solid waste generated by the society. In the beginning, garbage remained littered for days and around 2-3 tractor trolleys were used for 15 days in running to lift the garbage keeping the entire society under an impression of foul smell. However, since 2019, our garbage issues have been resolved. Thanks to IRRC management our garbage is disposed off efficiently on daily basis.

Construction

Keeping in view the needs of the society and being a resident of the society as well, Ali Ahmed approached the management of FECHS Jinnah Gardens for establishment of an IRRC. He roped in e-guard, a subsidiary of AHKMT. E-guard CEO, Hamid Ullah and Ali after deliberations with the society management launched the project in May 2019.

Land

Land has been given by the society for this noble cause. It is installed at about two (2) Kanals of land.

Construction Cost

Rs3.5 million

Operation

The operation has been run through a workforce of 21 men. Among them six workers and three drivers are solely deputed for waste collection, while the rest are providing sweeping and sewage cleaning services in the society. In total, 5.5 tons' solid waste is collected from the society. Waste is collected on daily basis among which recyclables are segregated and sold to recycling industry while green waste is turned into compost which is later sold to the nurseries on Islamabad Expressway.

Households

Waste from 2000 houses is collected and brought to the center for processing.

Number of Vehicles

Three Suzuki Pickups are reserved for collection. Each vehicle consists of one driver and two workers.

Workforce

Total of 21 individuals are deployed at the IRRC performing their specific duties. 9 for collection of garbage, 1 Manager, and others at center for segregation, turning compost pile, shifting of organic waste from compost boxes to maturing boxes, grinding of matured compost, packing, and marketing of final product and overall cleaning of the plant.

- **Service Fee**

Each house in the society is obliged to pay Rs.300 monthly as a service fee for waste collection.

Production and Marketing of final Product

We are handling the solid waste and producing around 1 ton compost that is mostly purchased by the nurseries along Islamabad Expressway. We are using appropriate environment friendly technologies for reducing burden of waste and creating economic opportunities.

Extension

We are confident to extend the scope of the existing IRRC to the FECHS-Jinnah Gardens Phase II as well.

Lesson Learned

For the construction of IRRC land was provided by one of the member of society from their own property. IRRC was constructed near but outside from FECHS Jinnah Gardens. Now they are shifting IRRC from there. So the lesson we learned from this experience is that land should be provided by the personal property of the sector/ organization etc. for whom IRRC constructed.


Integrated Resource R
NCA

4. IRRC MARDAN

IRRC MARDAN

Background

The City of Mardan

Mardan, the second populous city of Khyber Pakhtunkhwa, is a dynamic and fast-growing city. Mardan District is a part of the Peshawar Valley, the whole area was once part of the ancient kingdom of Gandhara. It is famous for its agro-based industries and famous World Heritage Site of Takht-e-Bhai. The city has the footprints of Greeks, Afghans, Mughals, and British Raj during different eras of its history.

Norwegian Church Aid (NCA)

Established in 1947, Norwegian Church Aid (NCA) is humanitarian and development organization working for global justice and poverty reduction together with partners around the globe. NCA works to help the poorest and those in need, regardless of their creed, race, political or religious affiliation. NCA provides emergency assistance in disasters, work for long-term development in/with local communities and address the root causes of poverty.

NCA Globally for long time has been involved in climate related program starting from Climate Change mitigation to adaptation programs and now most recently shifted its focus towards Climate Resilience initiative to improve preparedness, response, and recovery through community structures such as community task forces.

Water and Sanitation Services Company Mardan (WSSCM)

WSSCM was set up in the year 2016 by government of Khyber Pakhtunkhwa with the express task to take over the water supply, wastewater and solid waste management facilities from Tehsil Municipal Administration and registered under the companies' ordinance 1984. WSSCM is serving the population of 14 urban and 39 neighborhood councils having population about 420,000. WSSCM is 100% owned and funded by Government of Khyber Pakhtunkhwa (development and non-development).

Since its inception, WSSCM had been in touch with AHKMT and a team of WSSCM headed by CEO Nasir Khan visited AHKMT office, expressing keen interest in replication of Integrated Resource Recovery Centre in their city.

Overview

The IRRC has been established on a government owned piece of land attached with Wastewater Treatment Plant. A 5 tons capacity IRRC was designed. Twenty boxes for waste, five maturing boxes, and a leachate box were established. A storage house for compost, office, potable water, and toilets have been established. Two fully covered buildings have been built at the IRRC -- one for management and another for the staff. The building is run by solar energy and rainwater is utilized in bathrooms and washing purposes. A separate area has been allocated for car parking and small garden is also present in the premises of the IRRC. Trees have been planted all around the IRRC, while a small piece of land has been allocated for vegetation. For grinding and screening, an automatic machine has been installed at the IRRC. To maintain the reducing the level of moisture and maintaining the level of oxygen, blowing process is used.

Construction

To replicate the model into Mardan, collaboration was initiated as a joint venture between AHKMT, NCA and WSSCM. Construction began in 2019.

Land

Land for the project was provided by WSSCM.

Funding

It was funded by NCA.

Technical Assistance

AHKMT was having the task to provide technical assistance for the project.

It is the first ever IRRC in Khyber Pakhtunkhwa province for solid waste management and treatment installed in Mardan. The construction work was completed in February 2020.

Operation

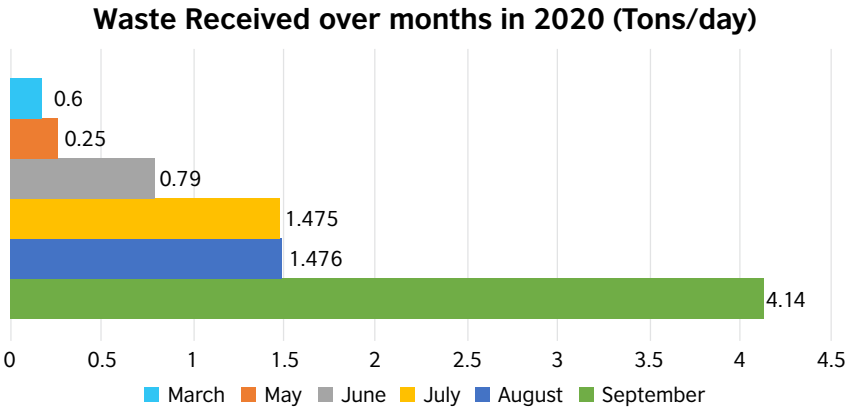
Operation began on March 01, 2020.

Staff

A staff of 10 sanitary workers and one Manager was deployed to start IRRC operations.

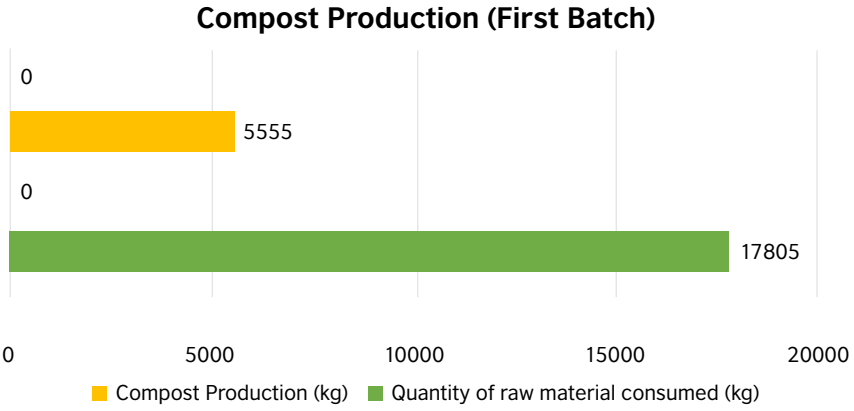
Waste Generation Over Time In 2020

In Mardan waste is collected form fruits and vegetable market and some selected areas where people used to dump their waste on daily basis. The quantity of organic waste received per day at IRRC Mardan was 0.6 tons/day in March when IRRC started operations. In May, it was 0.25 tons/ day and in June, it was 0.79 tons/day. The quantity of waste during the aforementioned months was found to be insufficient and below the set target which was 5 tons/ day. The reasons behind this were the pandemic of coronavirus and lesser amount of organic waste collection form the selective areas. E-guard changed its methodology for collection of waste and proposed and implemented it in the city named “3 Bins Concept” i.e. Organic (green waste) Bin, Recyclable Bin, Rejected Bin. These bins were installed in the selected areas. Supervisors were trained as per the new methodology, while pamphlets were designed on 3 bins concepts and distributed among the locals. The changed methodology helped improve the quantity of collected waste. It was recorded at 1.47 tons/ day in July and August and 4.14 tons/day in September, 2020. The graph below shows the generation of waste each day over the months from March 2020 till September 2020.



- **Production from First Batch**

In first batch, a total of 17,805 Kg raw materials were processed which includes: 15610 Kg organic waste, 100 Kg saw dust and 2095 Kg animal dung. Compost prepared from it was 5555 Kg, which is 31.19 % of the total weight. The minimum conversion rate for waste to compost is 10 %. It is believed as an achievement as the IRRC Mardan was delivering way above the targets. Graph below shows the compost production from first batch.



- **Marketing Strategy**

AHKMT team designed questionnaire for farmers, nursery owners and for fertilizer distributors in Mardan and questionnaire survey was conducted to collect information regarding organic farming and use of organic fertilizers in agriculture in the district. The task was to devise a marketing strategy for sale of compost in the city.

In the survey, 15 farmers, 5 nursery owners and 5 distributors were interviewed and up to 50 related questions were asked from them. Later, On one-day training program for farmers and nursery owners was arranged at IRRC Mardan to address those issues and create awareness regarding organic

farming and use of compost for agriculture in Mardan on July 1, 2020. During the orientation, 10 farmers and 2 nursery owners expressed their readiness to utilize organic compost in the farming.

Around 200 packets of 2 to 5 kg were given to nursery owners and around 25 kg compost was provided to 15 farmers while around 1 ton compost will be provided to each of the 10 farmers who agreed to model farming.

Impact of COVID-19

As the IRRC operational phase was initiated and waste processing kicked off, the management faced the problem of COVID-19 pandemic. Because of that, IRRC operations were stopped on 21st of March on the decision of all the stakeholders till the situation turns normal. During such period, the staff of IRRC was minimized and any kind of visits were limited to IRRC.

Staff & Sanitary workers working in IRRC were asked to strictly follow the preventive measures by using uniform and preventive kit (masks, gloves, safety shoes and caps) before entering the IRRC. They were specially asked not to throw used masks, gloves at IRRC or anywhere and dispose them of properly. They were told to clean or change their uniforms on daily basis. They were apprised that disposable masks and gloves can be used only once during duty hours.

Training On Adopting COVID-19 SOPs

The operations of IRRC were resumed on 15th April 2020, but before that AHKMT prepare a set of standard operating procedures (SOPs) in line with the World Health Organization SOPs for COVID-19 and later a training workshop

was arranged to train IRRC workers as how to work during corona pandemic and follow SOPs to work in safe and healthier environment.

Appreciation

The management of WSSCM is very grateful to Mr. Hameed Ullah & Ms Sumaira Gul for their technical support and imparting training to their staff. They also expressed their gratitude to NCA for its support. The WSSCM also reiterated its ambition of making the IRRC Mardan, a successful model.

Lesson Learned

From working in city of Mardan we learned that along with domestic waste we can use and process waste produced by the vegetable and fruits Mandi in IRRC by mixing it with some standardized ratio of animal waste.

5. IRRC B-17, Islamabad

IRRC B-17, Islamabad

About Society

Capital Development Authority (CDA), Islamabad is solely responsible for collection of solid waste in Zone 1 while the management of housing societies in zones 2 and 5 are responsible for solid waste management in their respective areas.

Multi Professional Cooperative Housing Society (MPCHS) is one of its kind housing societies of the federal capital developed on thousands of acres of land. Multi Professional Cooperative Housing Society which is usually called (MPCHS) was established in 1989. It comprises of five sectors including E-11/1, E-11/3 (Islamabad Gardens, Tele Gardens Sector F-17, B-17, ROSE, and Mansha Orchards Farmhouses Scheme.

It also boasts to be the only private housing society of the federal capital which follows Environment Protection Authority (EPA) by-laws and rules. No objection Certificates are issued to the housing societies to establish treatment plants for solid and liquid waste in their respective localities. Most of the housing societies pay little heed to the requirement, but do not follow the project and despite allocating land abandon the projects which are of major necessity. However, MPCHS has not only allocated the land but also issued funds for establishment of an IRRC in its premises while the work on a Sewage Treatment Plant (STP) is undergoing at rapid pace. They also have a door-to-door waste collection system and have been providing clean and green environment to their residents by engaging-e-guard. The major reason behind the success of the society is its founding father, Ch Abdul Majeed, who through his vision has

developed the society on modern lines making the lives of its inhabitants quite easy by providing state-of-the-art facilities to them at their doorsteps and the residents are reaping its benefits to the optimum.

Background

Since its inception, the MPCHS was managing the issues related to solid waste on its own; however, with passage of time the number of houses in the society rose to good numbers, a need to address the issues related to management of solid waste was felt. Therefore, the solid waste management services in each sector were outsourced. Three among the five sectors were outsourced and handed over to informal sector whereas in sectors F-17 and B-17, e-guard took charge of the solid waste management work. E-guard has been rendering its services in F-17 since 2016 and in B-17 since 2018. So far 1,200 households in F-17 and B-17 1,480 households are benefitting from the services of e-guard in F-17 and B-17 respectively.

E-guard has been providing the services of door-to-door collection in both the sectors through e-guard (loader pickups) while cleaning of streets and footpaths is also part of its agreement with the society. E-guard also collects and segregates the garbage littered in parks, playgrounds, mosques, schools, and commercial areas on daily basis. On daily basis more than 14 tons waste is collected from both sectors with the help of loader pickups.

Challenges

In 2016, e-guard services were also launched but the garbage collected from these housing societies posed serious challenges to e-guard in disposing of the garbage in a cost-effective manner.

In Islamabad, CDA does not possess a proper landfill and using temporary landfills which usually is the land allocated for new sectors. And the situation arose that the garbage was being dumped in one the major sectors of the

capital, I-12. E-guard started dumping its garbage in I-12, however, the cost incurred on the disposal of garbage to this location started getting higher with each passing day.

Way towards IRRC

After reaping the benefits of solid waste management system in Islamabad's G-15 Sector, and keeping in view the objective of managing the solid waste management issues of the city, AHKMT wrote a letter to different housing societies of the federal capital in September 2016 apprising them of the benefits of solid waste management through a decentralized recycling and composting facility, which is built and operated at low costs by using limited mechanical technology, ensuring low operational costs and minimal equipment breakdowns. Every housing society was asked if they wanted to utilize this facility for proper solid waste management in their respective areas then a waste treatment plant can be developed made sustainable and then handed over to the management of the housing society for proper disposal of solid waste.

AHKMT call was answered by Multi Professional Cooperative Housing Society (MPCHS) due to the challenges they faced in disposing of solid waste, and hence, MPCHS administration decided to replicate IRRC model as of G-15 in their sector B-17 as well, they then invited AHKMT team for technical assistance.

Construction

Land
In 2018, looking at the need of IRRC, a 5-kanal land was allocated by the society within the sector near STP.
Construction Cost
Project has incurred a cost of Rs 11 million.

Funding
Project was fully funded by the society.
Construction Duration
Construction work was finished within a span of one and a half year.

AHKMT Role During Construction
AHKMT team frequently visited the construction site to monitor the progress and quality of work. The contractor and MPCHS engineers were briefed as how the systems of the IRRC will be run. AHKMT provided its technical assistance to them and submitted its reports in MPCHS head office on regular basis. AHKMT provided BOQ and Map for the IRRC to the housing society. The hiccups were resolved on day to day basis by the AHKMT team to tweak the design for better results.

That was the reason all the affairs of establishing this IRRC were accomplished successfully and efficiently. Apart from technical assistance AHKMT also followed the Clean and Green initiative of Prime Minister Imran Khan to ensure biodiversity in the area by planting fruit and other saplings.

Overview

The residents of B-17 have a 3 tons capacity IRRC at their disposal which has the capacity of handling the garbage produced by around 3,500 households on daily basis. The organic component of the garbage will be turned into compost. The residents and management of the society are eager to make the IRRC a mega success.

The 5-kanal IRRC has 12 composting boxes, four maturing boxes and a proper rainwater harvesting system. A proper office for staff, storeroom, workers washrooms and parking lots for vehicles are present on the premises of the IRRC.

Takeover/Handover

AHKMT with the collaboration of e-guard has been given the task of running the project for three years and after making it sustainable, the IRRC will be handed over to the management of MPCHS.

Operation

Staff

Staff comprises 01 manager, 10-12 workers for collection and segregation, 01 Gardner, 01 worker for overall plant cleaning, 2 workers on contract for shifting waste from compost boxes to

maturing boxes, grinding of matured compost, packing and marketing of final product.

Number of Vehicles

Two Suzuki pickups and one loader rickshaw are there to collect waste from the houses.

One tractor trolley is also used to take the reject waste from the facility to the dumping site.

Lesson Learned

While looking at the experience and problems faced in Jinnah Garden, in sector B-17 the land and investment were provided by the society. A separate area for Buffer zone should be inside IRRC.

IRRCs Summary

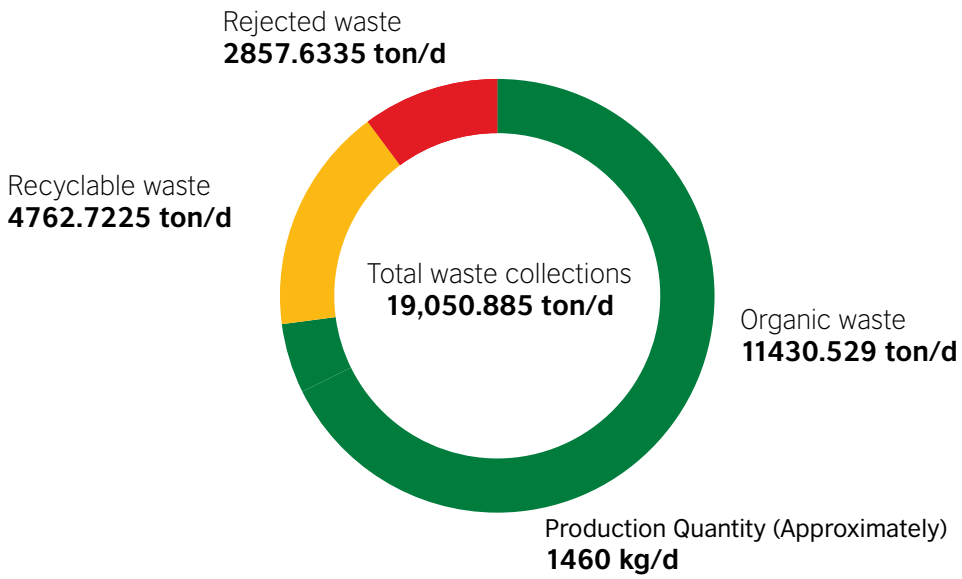
IRRC	JKCHS G-15, Islamabad
Date of Establishment	**17th September 2015**
Land Provided by	**Society**
Funding By	**UN-Habitat & UN-ESCAPE**
Designed By	**UN**
Capacity	**3 ton/day**
Standard	**State of the Art**
Waste Generation Source	**Residential & Commercial Units of G-15 Housing Society**
Plant Handed over to	**Is still with e-guard**
Running Expenses	**Salaries (Labor, Manager), Utilities.**
Production Quantity (Approximately)	**300 Kg/d**

IRRC	Skrand, Sindh
Date of Establishment	2018
Land Provided by	**Sakrand Town committee**
Funding By	**Sakrand Town committee**
Designed By	**AHKMT**
Capacity	**5-7 ton/day**
Standard	**Low Cost**
Waste Generation Source	**Residential Units of Skrand Town**
Plant Handed over to	**Skrand Town Committee**
Running Expenses	**Salaries (Labor, Manager), Utilities**
Production Quantity (Approximately)	**360 Kg/d**

IRRC	Mardan, KPK
Date of Establishment	**Jan 2019**
Land Provided by	**Water & Sanitation Services Company Mardan (WSSCM)**
Funding By	**Norwegian Church Aid (NCA)**
Designed By	**NCA**
Capacity	**5 ton/day**
Standard	**State of the Art**
Waste Generation Source	**Fruit & Vegetable Market, Mardan**
Plant Handed over to	**Water & Sanitation Services Company Mardan (WSSCM)**
Running Expenses	**Salaries (Labor, Manager), Utilities**
Production Quantity (Approximately)	**400 Kg/d**

IRRC	FECHS-Jinnah Garden, Islamabad
Date of Establishment	**May 2019**
Land Provided by	**Society**
Funding By	**Society**
Designed By	**AHKMT**
Capacity	**5 ton/day**
Standard	**Low Cost**
Waste Generation Source	**Residential & Commercial Units of Jinnah Garden Housing Society**
Plant Handed over to	**Is still with e-guard**
Running Expenses	**Salaries (Labor, Manager), Utilities**
Production Quantity (Approximately)	**300 Kg/d**

IRRC	MPCHS B-17, Islamabad
Date of Establishment	**Nov 2020**
Land Provided by	**Society**
Funding By	**Society**
Designed By	**AHKMT**
Capacity	**3 ton/day**
Standard	**State of the Art**
Waste Generation Source	**Residential & Commercial Units of Multi Gardens Housing Society B-17**
Plant Handed over to	**Is still with e-guard**
Running Expenses	**Salaries (Labor, Manager), Utilities**
Production Quantity (Approximately)	**100 Kg/d**



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Eguard
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