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DEVELOPMENT OF VILLAGE AS A SMART VILLAGE

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ABSTRACT

Over recent decades, people's (rural and urban) communities are facing numerous socialand economic changes and challenges. Some of those challenges have been increasingly addressedthrough the lenses of technological developments and digitalization. In this paper, we have made a review of already existing practices while focusing on the existing implementations of the Smart Village concept and the importance of digital transformation for rural areas. We give special attention to EU policies that we are using as an already existing framework for understanding our own forthcoming examples. We have shown the parallels between the findings and insights from different regions and made an evaluation of presented practices. Our main argument stems from our ownprevious experiences and experiences of other research approaches, and is grounded on the argument that rural areas are not uniform, and that smart rural development has to be applied in combination with place-based approach. We present the cases of

Slovenian pilot practices and support our argument by proposing the FabVillage concept.

CHAPTER ONE

INTRODUCTION

1.1. Introduction of the Project.

In India there are 6,64,369 villages out of them around 1,25,000.Villages are backward so there is a need for designing and building the village as a smart village. With modernization and urbanization. People migrate from one place to another place for different facilities such as education, employment and affinity of people towards the locality or cityThe smart village corrects the social oversight by providing accommodations for sustainable family relationships without disturbing the lifestyle of different generations. Migration leads to overcrowding of cities in no time, it runs out of resources to cater everyone's needs. Infrastructure, deforestation and pollution is increasing at a faster rate. To deal with this situation, Government of India (GOI) launched 'Smart Cities Mission' across country with 100 cities in 2015.

1.2 Problem Statement :-

As India is developing country, development of villages plays an major role in development of country. Hence, it is necessary to develop a village as a smart village. Also lack of facilities such as education, public transportation facilities is a major issue. The main focus of this project is to develop a village which will produce less waste and negligible pollution to create India as a developed country

1.3. Objectives.

- To aware about proper plan and management to develope a village which will achieve following aim :-

1. To aware about the facilities to the people who are not aware of modern technique.
2. To avoid migration towards city
3. With the help of modern technique improving the facilities in village.
4. To create a village which will produce a less pollution and waste

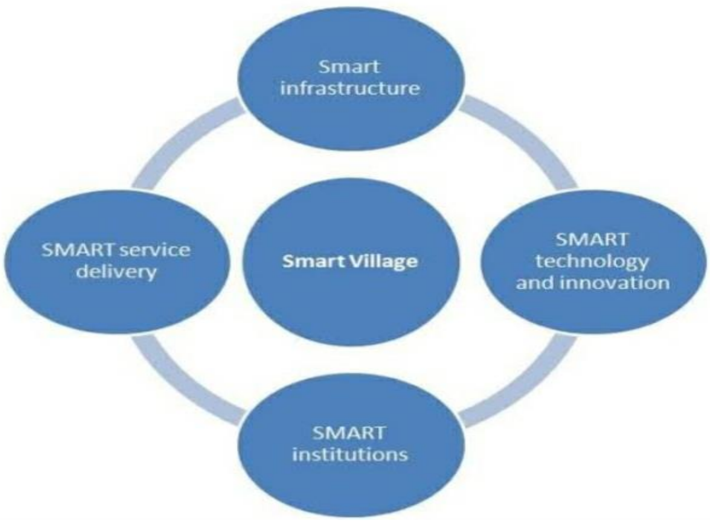


Figure 1.2. Types Of Infiltration

1.4. Scope.

- The project can be helpful at controlling the illiteracy and preventing the wastage of Potable Water.
- The effect of addition of modern techniques into the villages to further improve the smart villages can be studied.

- The effect of providing different facilities and techniques can be studied by other villages on example basis.

CHAPTER TWO

Methodology

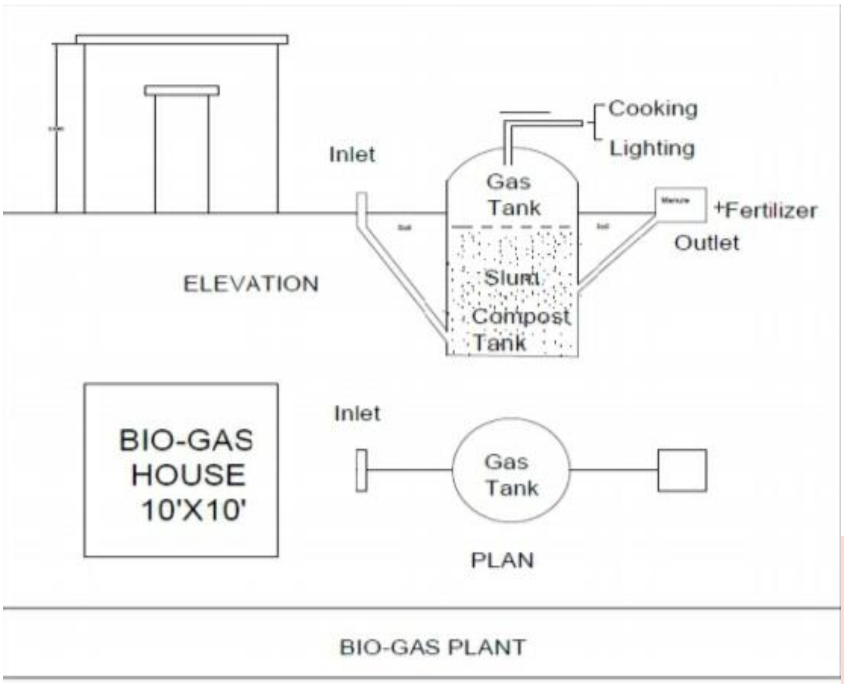
Sr.No.	Free Lands	Planning structure	Size (In Meter)
1	Location one	Market and Bio-gas plant	13.7x75.5 17.8x54.5
2	Location two	Sewage Treatment plant	26x13.7
3	Location three	Grain Storage house	17.5x22.3
4	Location four	Public Toilet & Park	16.5x41.5
5	Location five	Water treatment Plant	37.5x14.5
6	Location six	Bank & Hospital	15x34
7	Location seven	Reading Hall	12x19
8	Location eight	Police Station	11x12.8
9	Location nine	School	34x38
10	Location ten	Grampanchayat and Post office	14x38

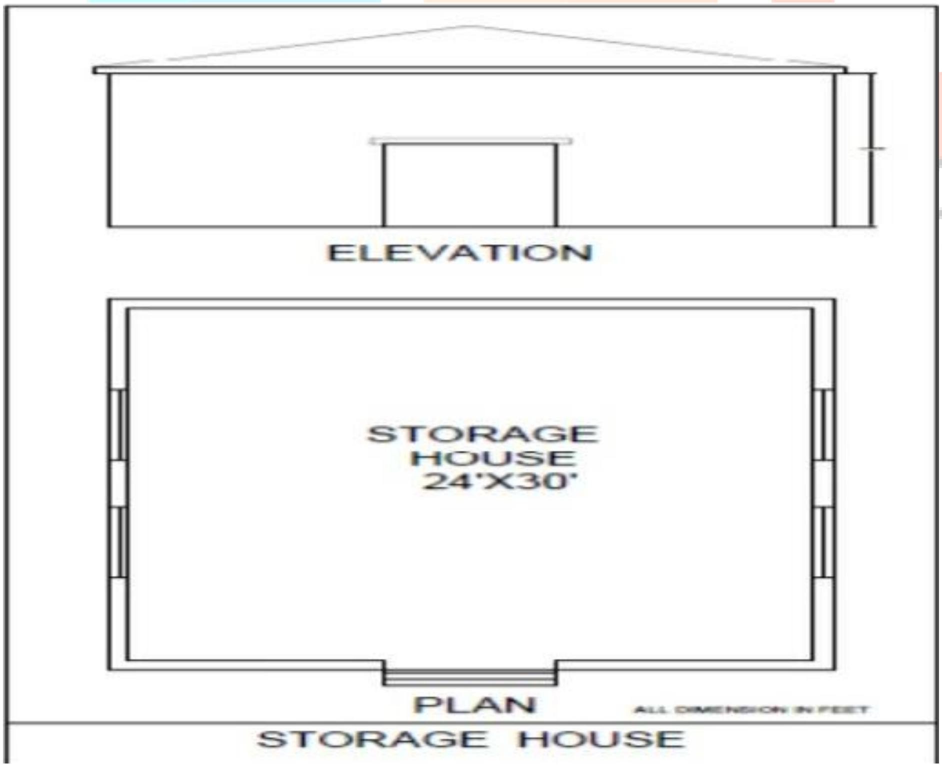
GROUND SURVEY

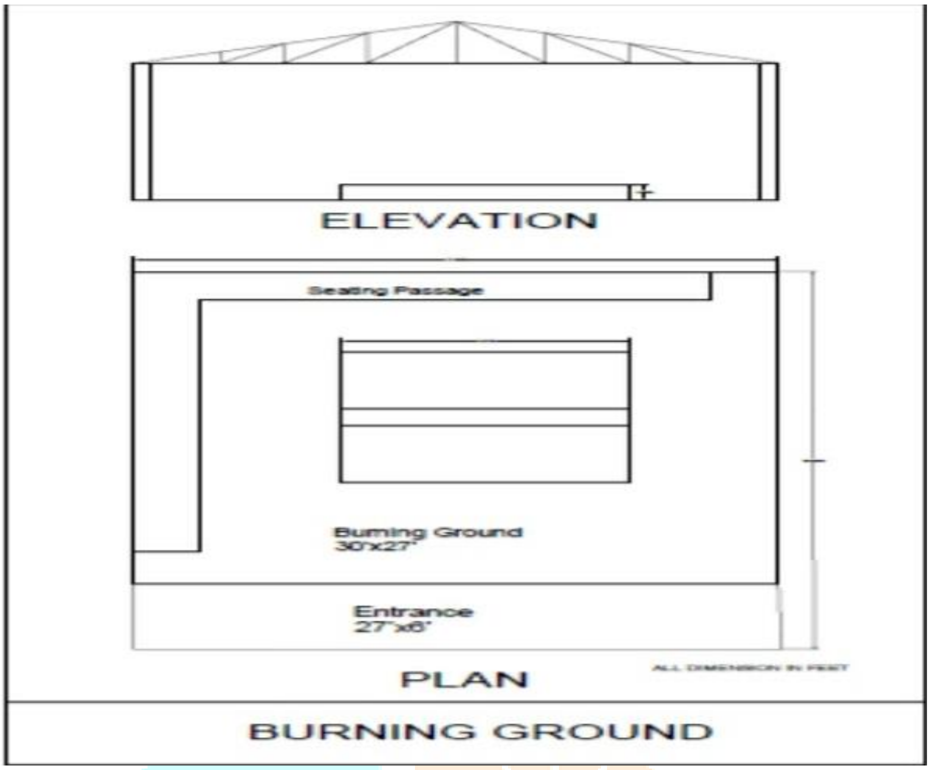

Google

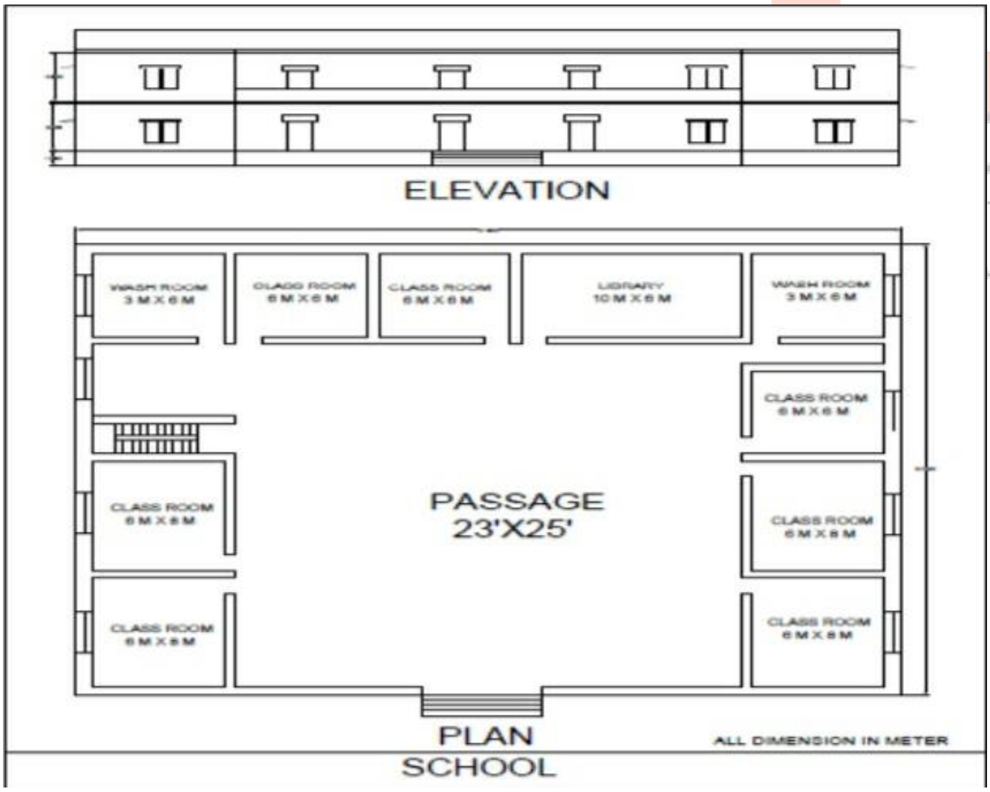
SR.NO	NAME OF CONSTRUCTION WORK	APPROXIMATE COST
1	Bank Plan	8,85,075
2	Biogas Plant	62,30,000
3	Burning Ground Plan	11,76,000
4	Bus Stop Plan	4,05,600
5	Gram Panchayat Office	8,42,700
6	Post Office	5,72,718
7	Hospital Plan	19,27,341
8	Police Station Plan	14,93,712
9	Library Plan	8,09,123
10	Market Plan	5,10,300
11	School Plan	84,31,896
12	Public Toilet A	2,27,396
13	Public Toilet B	1,90,817
14	Storage House	9,63,900
15	Water Treatment Plan	1,11,57,737
16	Sewage Treatment Plan	1,40,00,000
17	Solar Roof	1,50,00,000
18	Total	6,48,24,315

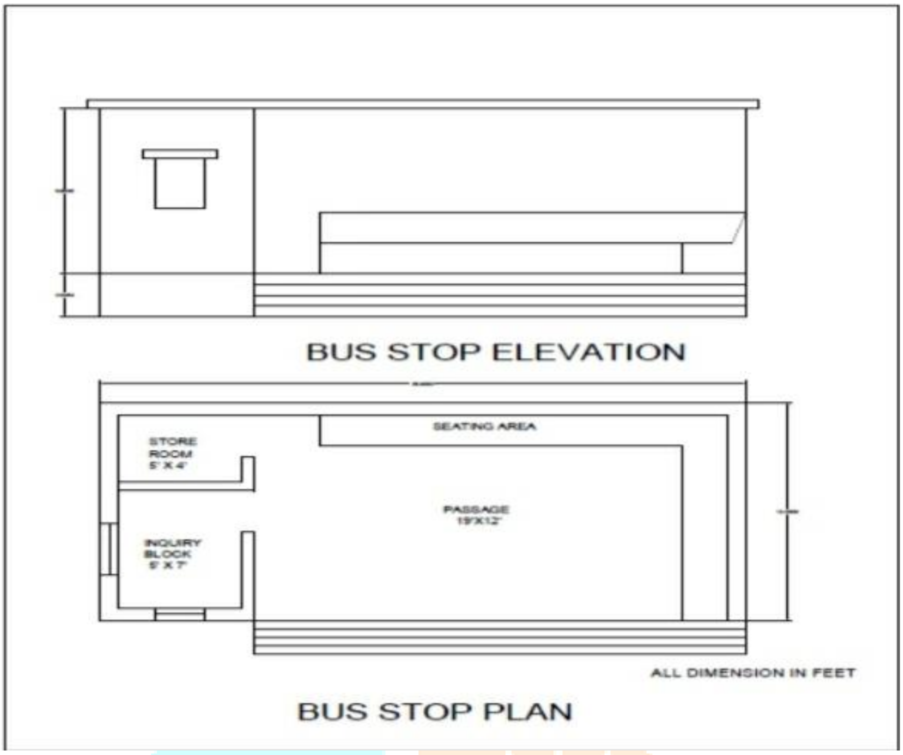
The following are the designed plans for various locations :-

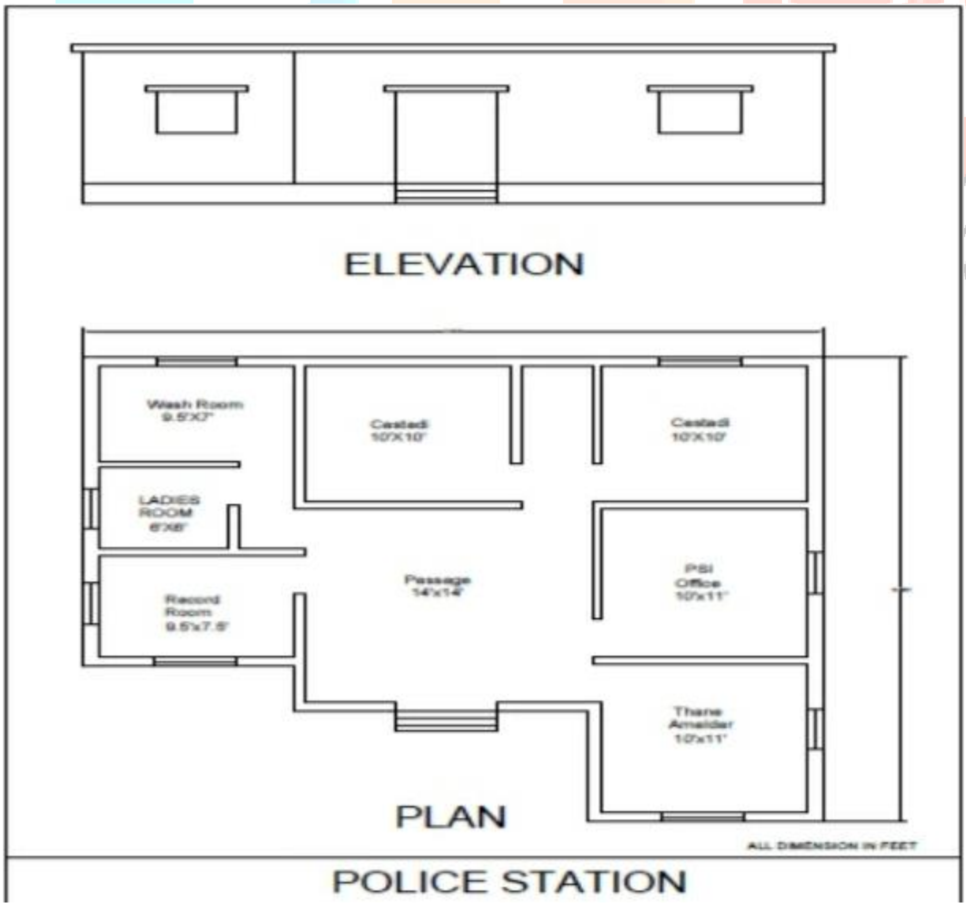


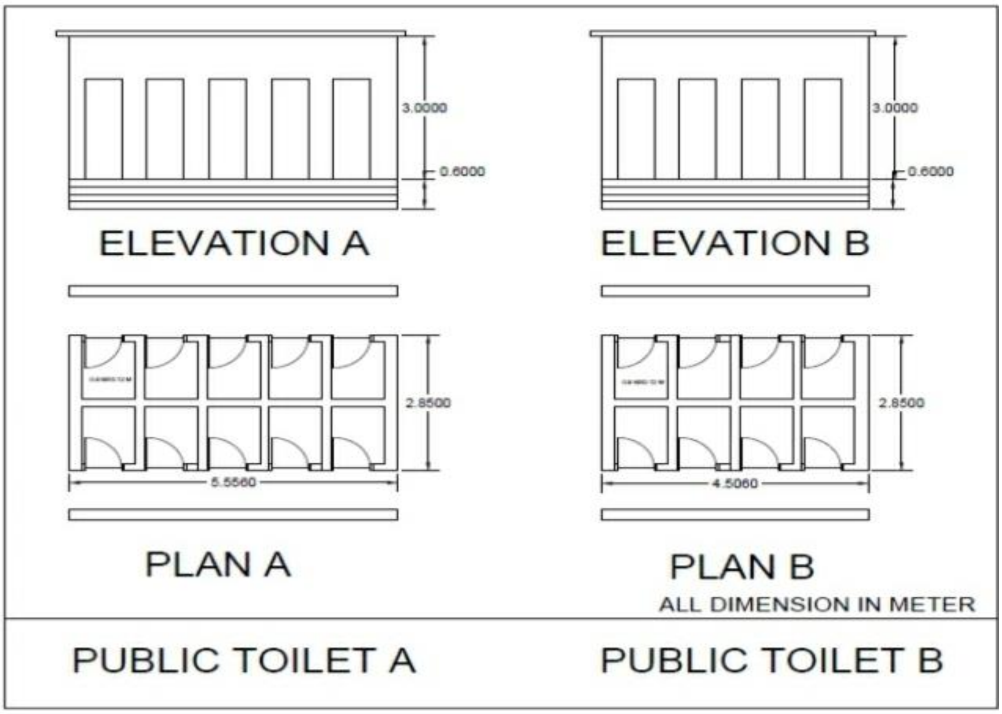



ELEVATION
Seating Passage
Burning Ground
30'x27'
Entrance
27'x8'
PLAN
ALL DIMENSION IN FEET
BURNING GROUND

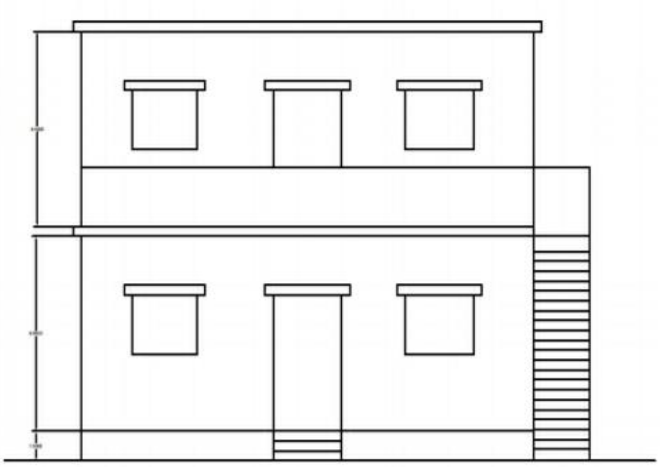

ELEVATION
WASH ROOM
3 M X 6 M
CLASS ROOM
6 M X 6 M
CLASS ROOM
6 M X 6 M
LIBRARY
10 M X 6 M
WASH ROOM
3 M X 6 M
CLASS ROOM
6 M X 6 M
CLASS ROOM
6 M X 8 M
CLASS ROOM
6 M X 8 M
CLASS ROOM
6 M X 8 M
CLASS ROOM
6 M X 8 M
PASSAGE
23'X25'
PLAN
ALL DIMENSION IN METER
SCHOOL


BUS STOP ELEVATION
SEATING AREA
STORE ROOM 5' X 4'
PASSAGE 19'X12'
INQUIRY BLOCK 5' X 7'
ALL DIMENSION IN FEET
BUS STOP PLAN

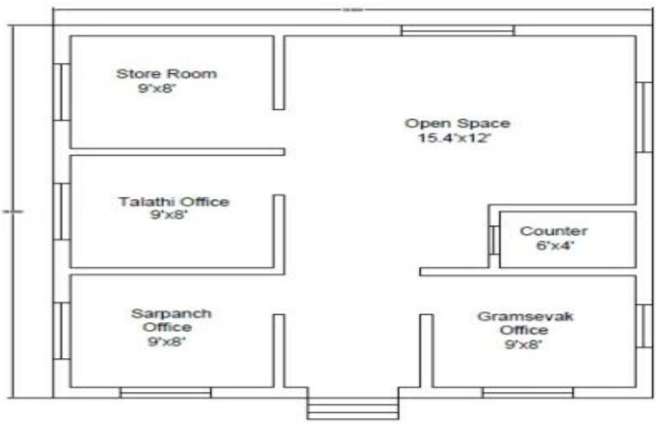

ELEVATION
Wash Room 9.5'X7'
Castadi 10'X10'
Castadi 10'X10'
LADIES ROOM 6'X8'
Passage 14'x14'
PSI Office 10'x11'
Record Room 9.5'x7.5'
Thane Amaldar 10'x11'
PLAN
ALL DIMENSION IN FEET
POLICE STATION



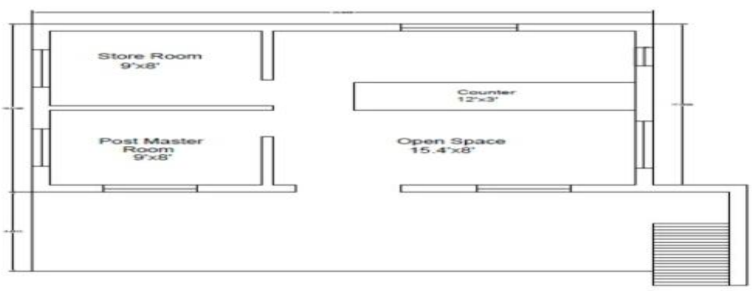
GRAMPANCHAYAT OFFICE:-



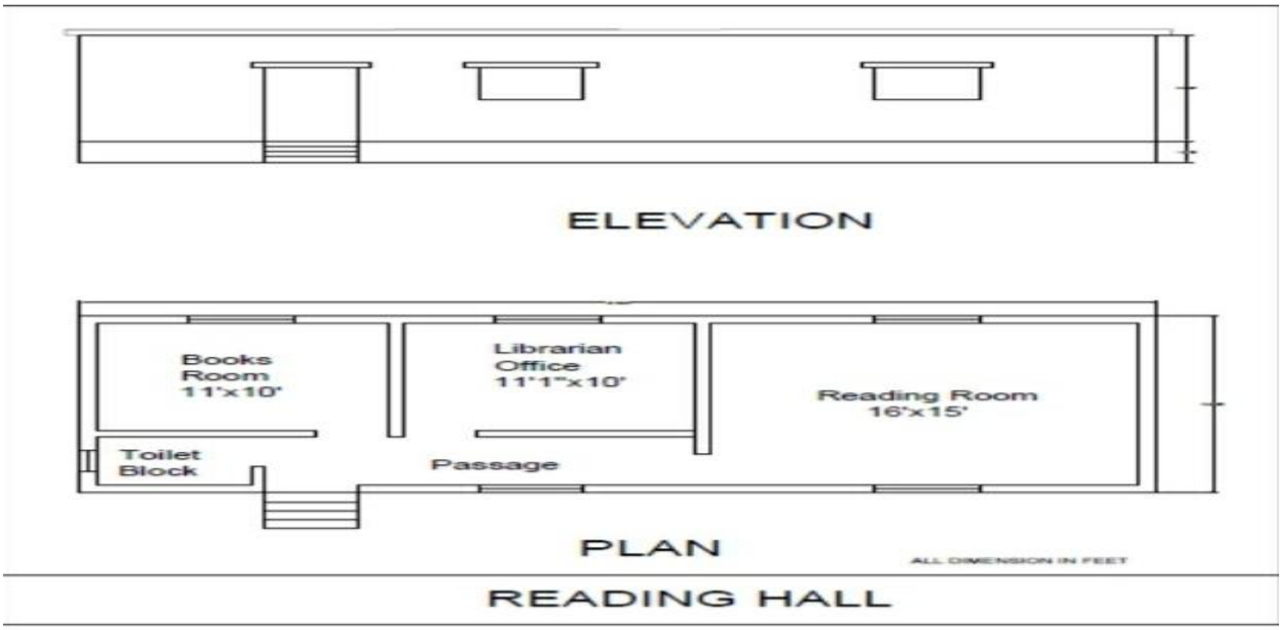
Elevation

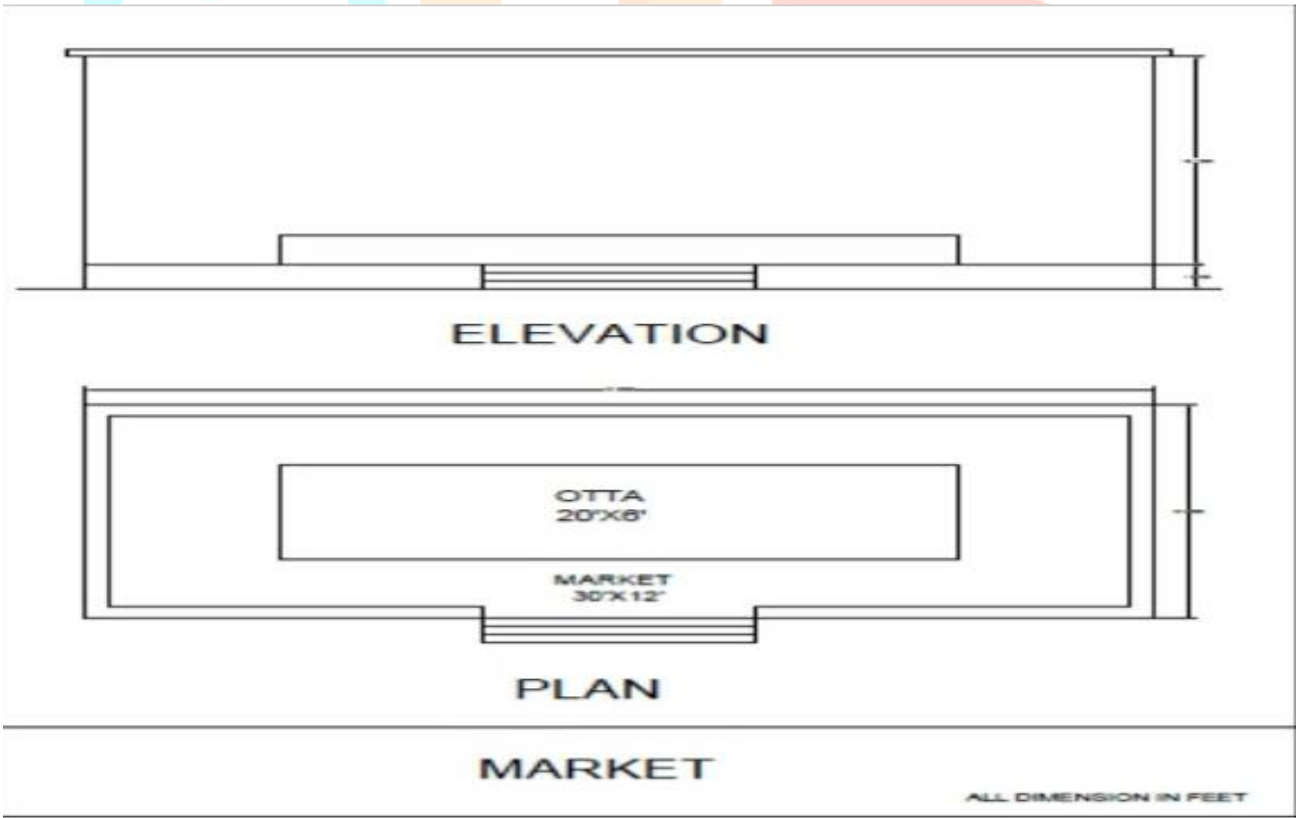


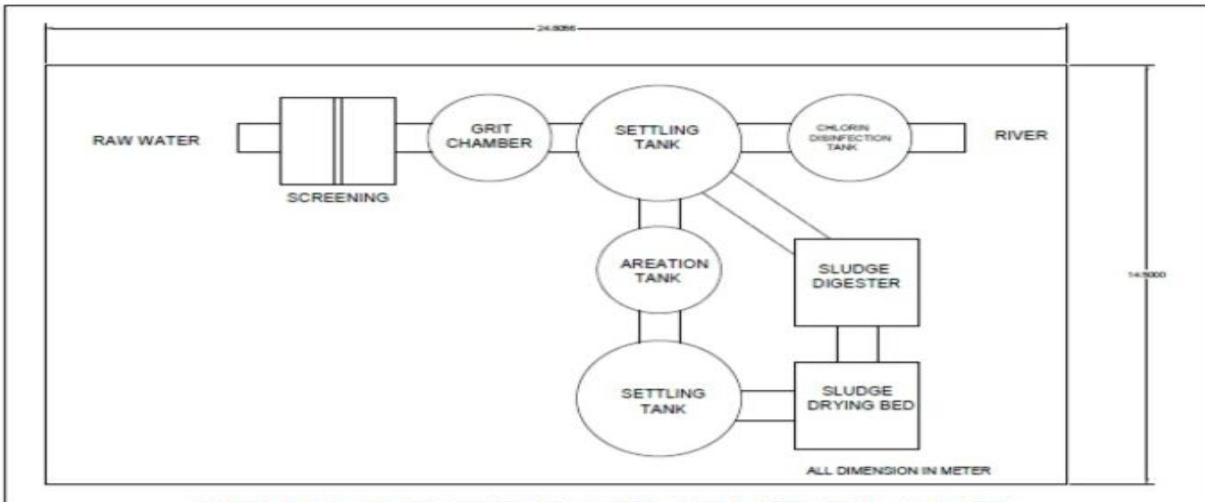
Ground Floor



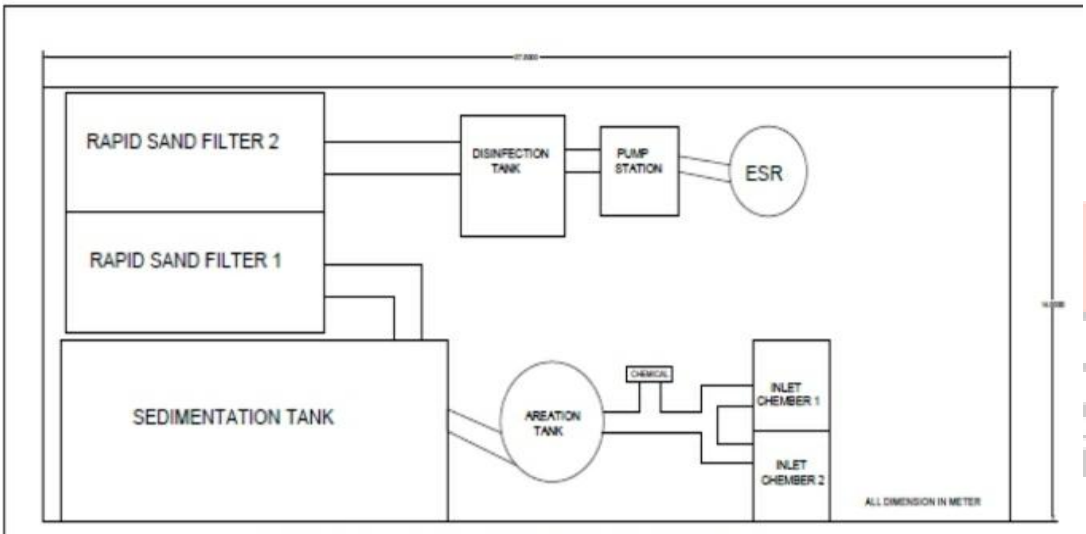
First Floor


ELEVATION
Books Room 11'x10'
Librarian Office 11'1"x10'
Reading Room 16'x15'
Toilet Block
Passage
PLAN
ALL DIMENSION IN FEET
READING HALL


ELEVATION
OTTA 20'X6'
MARKET 30'X12'
PLAN
MARKET
ALL DIMENSION IN FEET



SEWAGE TREATMENT PLANT



WATER TREATMENT PLANT

CHAPTER THREE

LITERATURE REVIEW

3.1. Literature Survey.

3.1.1 Utilization of Plastic Waste in Construction of Roads (Vatsal patel,snehal popli,Drashti Bhatt)

The plastic waste quantity in municipal solid waste is increasing due to increase in population and changes in life style. Thus disposal of waste plastic is a hazardous and become a serious problem globally due to their non-biodegradability. Plastic roads are found to perform better than ordinary roads and therefore use of plastic road construction

has gained importance these days. Disposal of waste plastic bags has become a serious problem and waste plastics are burnt for disposal which causes environmental pollution. Utilization of waste plastic bituminous mixes has proved that these enhance the properties of mix in addition to solving disposal problems. Waste like plastic bottles, polymers, cups, etc. can be re-used by powdering or blending it with crusher and can be coated over aggregate and bitumen by any heating process. This paper describes the various aspects of utilization of plastic waste in construction of roads.

SALIENT FEATURES OF ROAD :

In India more than 4.25 million Km of road is available. If only some of them are constructed or repaired using this technique, there will be less waste plastic littered on the road. The process is eco friendly. Segregating plastic from the MSW at municipal yard involves application of resources, the cost of which runs into crores of rupees. A substantial amount of this can be saved. Lab tests and real time tests have revealed that the life expec-

tancy of a plastic road, compared to a normal road is at least 100% more. This technique adds a cumulative benefit to National Economy also gives contribution to environmental benefits, employment generation and agricultural efficiency [10].Figure 3 shows some of the roads in Delhi region made with plastic waste.

i) Stronger road with increased Marshall Stability value.

ii) Better resistance towards rain water and water stagnation so no stripping and no potholes.

iii) Increase binding and better bonding of the mix thus reduc-tion in pores in aggregate and hence less rutting a raveling.

iv) No leaching of plastics. No effect of radiation like UV.

v) The load withstanding property increases. It helps to satisfy today's need of increased road transport.

vi) Value addition to the waste plastics (cost per kg. increases from Rs. 4 to Rs. 12).

vii) The cost of road construction is also decreased and the maintenance cost is almost nil.

As road pavement life is doubled when we use this novel technique for road construction, we have to pay only Rs. 25000/- more, instead of spending Rs. 10,80,000/- for its up gradation in just 2-3 years, thus saving Rs.10,50,000/- per Km.

3.1.2. Construction of plastic roads: An effective way to utilize wastes (Akhilesh Yadav,Ruchi Chandrakar)

The population growth, industrialization, consumerism and technological development have led to uncontrollable accumulation of waste. Proper waste disposal is of great importance in both rural and urban areas, as it increases environmental pollution and occupies land around industrial plants. One of the solutions is to use these recycled materials in pavement construction. Today the majority of roads are constructed using bitumen, tar or cement. Another kind of road has been suggested: Plastic road. This provides a solution to the problem of effective disposal of plastic waste at the same time increases the strength and durability of the road, addresses the environmental, economic and most importantly safety issue.

Methodology

Waste plastic is made powder and varying percent plastic is mixed with bitumen. Plastic increase the melting point of the bitumen and makes the road flexible during winters resulting in its long life. By mixing plastic with bitumen the brittleness overcomes and elastic nature enhances. The plastic waste is melted and mixed with bitumen in a particular ratio. There are two important processes used for bitumen mix flexible pavement, they are

(i) Dry process

(ii) Wet process

(i)Dry process :-For the flexible pavement, hot stone aggregate (170°C) is mixed with hot bitumen (160°C) and the mix is used for road laying. The aggregate is chosen on the basis of its strength, porosity and moisture absorption capacity as per IS coding. The bitumen is chosen on the basis of its binding property, penetration value and viscous-elastic property. The aggregate, when coated with plastics improved its quality with respect to voids, moisture absorption and soundness. Figure-4: Flow chart of dry process.In this process the shredded plastics are poured over the heated aggregates, thus forming plastic coated aggregates which are then mixed with hot bitumen to form plastic coated aggregate bitumen mixture for laying roads. The coating of plastic decreases the porosity and helps to improve the quality of the aggregate and its performance in the flexible

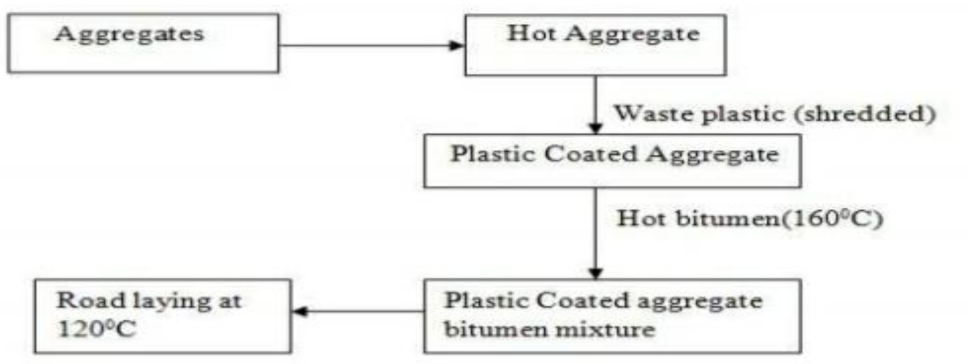


Figure-4: Flow chart of dry process

pavement.

(ii) Wet Process:

These are the method used for formation of polymer based modified bitumen, in which the waste polymer directly added with bitumen and heated upto temperature of 1700C so that proper blend is to be formed with proper dispersion of waste polymer into bitumen, then the hot mix is then cooled upto 1200C into another chamber, which is then added to the aggregate in paddling chamber. The mix is to be cooled because when hot mix poured on aggregate then there are chances to form air pocket into small gap of aggregate and chances in lower the strength of rods and chances of rutting of roads. After addition of modified bitumen at 1100C on

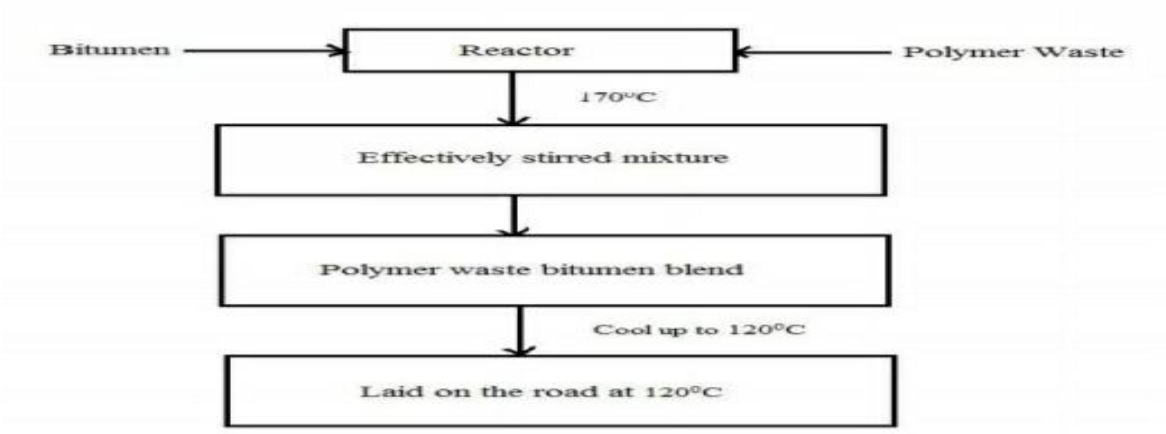


Figure-5: Flow chart for wet process

aggregate, it is then laid on the road and then spreader material is compacted by 8 ton roller.

3.1.3. Biogas plant dissemination: success story of Sirsi,India (P.R. Bhat, H.N. Chanakya and N.H. Ravindranath)

India, like many other developing countries,limited conventional energy supply is therefore forced to look for alternative and renewable energy routes to foster its development programmes, especially in rural India where more than 70% of the population lives. Currently fuel-wood is the dominant energy source for cooking. Scarcity of fuelwood is very well recognised. Cooking with fuel-wood and other solid biomass fuels is associated with low efficiency of use in the traditional stoves, drudgery in gathering the fuels, health hazards from smoke and resultant low quality of life. Cooking accounts for 60% of the overall energy and 80% of the non-commercial energy used in rural India [Ravindranath and Chanakya, 1986;Ravindranath et al., 1994; Ravindranath and Hall, 1995].There has been a realization of the need to provide clean gaseous fuel for cooking to rural households to promote the quality of life. Biogas is one of the environmentally sound options to provide quality fuel in a sustainable way.Thus, the National Programme on Biogas Development (NPBD) was launched with this objective in 1982. At the time of its initiation, it was envisaged that a majority of the rural households could meet their cooking energy re-quirements through the biogas route. This then required disseminating and popularizing family-size biogas plants (c. 2-4 m3 gas/day) which use bovine dung as the major feedstock (generated by the family bovine stock). Biogas programmes have been launched in over 50 countries,those in China and India being the largest. The success levels achieved in many countries have been low owing to several technical and non-technical factors and there is a perception that biogas dissemination programmes are largely a failure [BORDA, 1990; Ni and Nyns, 1995].

3.1.4. Evaluation of a biogas plant from life cycle assessment (LCA)(S. Ishikawa , S. Hoshiba ,T. Hinata ,T Hishinuma ,S. Morita)

Nowadays, the biogas plant (BGP) with anaerobic digestion is receiving high attention as a facility for both livestock manure treatment and electric power generation. Generally speaking, the BGP reduces odor from raw manure and produces the digested slurry with rich manure components similar to the fertilizer. The typical interest is generating electricity. The two main types of manure-based BGP in Japan, on-farm BGP and the large-scale centralized BGP represent integrated systems of renewable energy production, manure and organic waste treatment and nutrient recycling, emphasizing the environ-
mental, energy and agricultural benefits of anaerobic digestion. However, the evaluation on the BGP has been made only on the on-farm BGP. It was found that on-farm BGP indicates utilization of digested slurry as fertilizer is the indispensable element for practical feasibility at the BGP. In other words, the primary essence to improve the BGP for facility of manure treatment is the presence of enough fields for digested slurry utilization [1]. On the other hand, the centralized BGP is able to expect the scale merit of a building. However, the centralized BGP needs to consider original problem of collection of a material, sanitation processing of digested manure, a janitor and so on.The objective of the study was to compare an on-farm BGP with a centralized BGP system totally from the energetic point of view. Materials and methods

2.1. Investigation object of on-farm BGP and a centralized BGP

The BGP, which is the object of on-farm BGP, was constructed in March 2000 at Rakuno Gakuen University (RGU) (Fig. 1a). This BGP is a research plant of the first practical size in Japan. Therefore, on-farm BGP was evaluated by the same calculation based on the evaluation of the RGU BGP. The basic data for a centralized BGP were obtained from BGP in Betsukai, Hokkaido,which was built in May 2001 for experimental purposes by the Civil Engineering Research Institute of Hokkaido (Table 1, Fig. 1b). From October 2001, continuous methane fermentation in the Betsukai BGP has commenced.

. Methods

We used two evaluation methods. First, to estimate how global warming gas is influenced by BGP systems, we use life cycle assessment (LCA) [2]. According to the IPCC data [3], CH4 affects global warming by 23 times more than CO2. In other words 1 kg-CH4 is con-
verted into 23 kg-CO2 in global warming effect. The total global warming effect in this study is measured as the total quantity of CO2 [4]. We need to consider carbon neutral that is the official concept of IPCC. The concept of carbon neutral is that CO2 of the biomass resource origin depends on the breathing of a plant originally, and do not contribute to the increase of CO2. LCA is a method that takes into consideration all inputs and outputs. Evaluation range of this study is shown on energy flows of the BGP system (e.g., constructing, transport,product use and waste treatment). We estimate each global warming gas emission.The second evaluation method was made by comparing fossil energy input for constructing, running and maintaining a BGP with energy outputs by producing electric power, heat and digested manure. The energy output from digested manure was obtained by estimating energy consumption for producing chemical fertilizer having equivalent contents of N, P2O5 and K2O. The energy pay-back time (EPT) base on the centralized
BGP was calculated from the energy inputs and outputs.

3.1.5. Use of plastic in solar energy applications (A. Blag)Division of Building Research, National Research Council of Canada, Ottawa Canada KIA 0R6

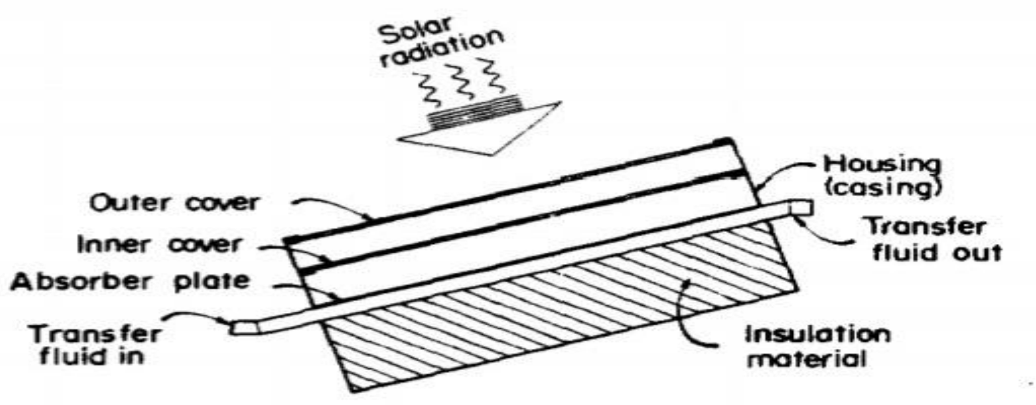


Fig. 1. Schematic cross-section of flat-plate collector unit.

Solar energy is the ideal source of energy for space heating and power generation: it is practically inexhaustible, is easily converted and its use does not result in pollution. Efforts to harness solar energy have been accelerated during the last decade as world demand for energy grows. Although solar energy is "free", the cost of making and installing the systems to harness it was, until recently, too high to be considered for residential space heating or cooling. Although the cost disadvantage still exists, each year the economics of solar heating installations become more attractive. One reason for this is the increasing use of plastic materials in the manufacture of various components of solar heating devices. The purpose of the present article is to present a critical discussion of the state-of-the-art on the use of plastics in solar energy installations, with particular emphasis on their suitability and durability. A complete solar energy heating and cooling installation consists of an energy conversion system or collector, a transfer fluid (e.g. water, air, glycol), storage tanks and pipe work. There are two main types of design of collectors: the fiat-plate collector and the concentrating collector. The fiat-plate collector is best suited for limited heating-cooling installations, for example, in residential buildings or small industrial or community applications; the concentrating collector is designed for use in large-scale power generation. A flat-plate collector generally consists of live components (Fig. I): one or more covers; an absorber plate, generally metallic; a tube or pipe for conducting or directing the heat transfer fluid; insulation to minimize the downward heat loss from the absorbing plate; and housing or casing which encloses the foregoing components and keeps them free of dust and moisture as 331 well as reduces the heat loss. Generally, fiat-plate collectors are framed sandwich structures and are mounted on roofs or sloping walls. A large number of types and variations of experimental and practical fiat-plate collectors are available[l-6], A concentrating (focusing) collector operates as an optical system in which the solar radiation received is concentrated onto a small area (absorber) to produce thermal or electrical energy[4--6]. It is believed that at least one type of concentrating solar collector[7] could be used for space heating and cooling at an initial installation cost only marginally higher than for a conventional fiat-plate collector. Although there are many designs for concentrating collectors[2, 6, 8, 9], they can be classified into two types, depending on the method used for increasing the flux of solar energy on the absorber. In one type, the concentration of solar energy is accomplished by reflecting it from a mirror-like surface. The other type is equipped with a lens system in which the radiation passing through is focused on the absorber.

3.1.6. Electricity yield simulation for the building integrated photovoltaic system installed in the main building roof of the Fraunhofer Institutefor Solar Energy Systems ISE (Wendelin Sprenger , Helen Rose Wilson, Tilmann E. Kuhn)

During the last few years, substantial efforts have been under-taken to develop an electricity yield simulation program with the aim of understanding the consequences of partial shading, the_layer structure of the BIPV module, the electrical connection of_the PV cells to each other, the choice of inverter and many other_effects on the generated electrical power of a BIPV system_(Sprenger, 2013). The efforts were motivated by the awareness that a BIPV system can best be optimized when the DC power output_can be reproduced in a simulation. Also, the functionality of_already installed PV cells and modules of a BIPV system can be_verified most easily if the generated electricity is compared to_the results of a detailed electricity yield simulation program. Also,the sensitivity of BIPV system optimization to different material_parameters can best be analyzed with the help of a complete computer simulation chain. To illustrate the achieved degree of understanding of the factors that determine the generated electricity, a_rather complex BIPV system is analyzed in detail in this paper.2. State of the art in simulating BIPV systems_For free-standing PV systems, many commercially available_simulation programs exist to calculate the time-dependent_electricity yield, typically for a whole year. Generally, the accuracy_of these programs when applied to building-integrated photovoltaic systems is limited due to the fact that simplified models_had to be used in order to minimize the computation time. Most_of these PV simulation programs restrict the calculation of the irradiation to one value per time step, which allows accurate determination of the electricity yield for most free-standing PV systems but makes it impossible to accurately represent the consequences of partial shading. Some commercially available PV simulation programs allow partial shading calculations on the level of PV modules, which at least provides the possibility to optimize the electrical interconnection of the PV modules. An accurate representation of the power output under partial shading conditions is not the intention, as this calculation would exceed practicable calculation duration limits. Furthermore, the agreement of the assumed power output with measurements strongly depends on the shadow pattern. The assumptions implemented by commercial PV simulation programs are generally not accessible .A good review of the specific physical properties that need to be analyzed for BIPV systems can be found in Norton et al. (2011). In addition to the aspects discussed above, a simulation procedure with the purpose of calculating the electricity yield for the general case of building-integrated photovoltaics needs to take into account at least four further topics. First, a BIPV system is almost always in homogeneously irradiated, either due to several different module orientations, due to partial shading or due to higher irradiation caused by reflections from surrounding buildings or inhomogeneous optical properties of the ground. The results described in Sprenger et al.(2011) strongly suggest that a ray-tracing procedure is needed to analyze the irradiation on the PV cells involved in a BIPV system, and the results also implicitly recommend the application of CAD programs to define the geometrical configuration of the building and the surroundings. The required processing the calculated irradiance data leads to the second additional topic, the necessity of calculating the I-V Characteristic curves at the PV cell, PV module and PV system

levels. An accurate simulation approach for the I–V curves is especially necessary due to the fact that the operating conditions of the PV cells in BIPV applications deviate more from standard test conditions than for free-standing PV plants.

3.1.7. Upgrading of sewage treatment plant by sustainable and cost-effective separate treatment of industrial wastewater W. R. Abma, W. Driessen, R. Haarhuis and M.C.M.van Loosdrecht

The Olburgen sewage treatment plant has been upgraded to improve the effluent quality by implementing a separate and dedicated treatment for industrial (potato)wastewaterandreject water. The separate industrial treatment has been realized within a beneficial public-privatepartnership. The separate treatment of the concentrated flows of industrial wastewater and sludge treatment effluent proved to be more cost-efficient and area and energy efficient than a combined traditional treatment process. The industrial wastewater was first treated in a UASB reactor for biogas production. The UASB reactor effluent was combined with the reject water and treated in a struvite reactor (Phospaq process) followed by a one stage granular sludge nitration/anammox process. For the first time both reactors where demonstrated on full scale and have been operated stable over a period of 3 years. The recovered struvite has been tested as a suitable substitute for commercial fertilizers. Prolonged exposure of granular anammox biomass to nitrite levels up to 30 mg/l did not result in inhibition of the anammox bacteria in this reactor configuration. The chosen option required a 17 times smaller reactorvolume (20,000 m3 less volume) and saves electric power by approximately 1.5 GWh per year.Key words | anammox, nitritation, potato processing, reject water, struvite, wastewater The sewage treatment plant (STP) of Olburgen has been upgraded recently. The plant has a capacity of 90,000 population equivalents (p.e.). Before reconstruction, the plant discharged concentrations of up to 50 mg N/l nitrogen and up to 15 mg P/l phosphorus to the river IJssel. Waterboard Rijn & IJssel had to take measures to be able to reach compliance with the European Water Framework Directive. For compliance, the discharge of N and P had to be reduced to 10 mg N/l and 1 mg P/l. Waterstromen BV owns and operates industrial waste-water treatment plants. Waterstromen is an affiliate of the waterboard. One of the operations of Waterstromen is a wastewater treatment of a potato processing plant.The effluent of this plant made a big contribution of wastewater and nutrients to the wwtp. The potato processing (plant capacity 100 tons potatoes/hour) is accompanied by the production of wastewater containing proteins, starch and phosphate. The quantity equals an amount of 160,000 p.e. Since 1982 the organic components were already largely removed and converted into biogas by UASB reactors located at the site of the STP.

3.1.8. Fate of estrogens in a municipal sewage treatment plant(Henrik Andersen, Hansruedi Siegrist, Bent Halling-Sørensen, Thomas A Ternes)

Estrogens were analyzed in water according to the method reported by Ternes et al. (19). The analytes were extracted from filtered water samples onto RP-C18 cartridges. Extracts were cleaned with a deactivated silica gel column. The estrogens were trimethylsilylized before analyzing with GC-ion trap-MS. As against the original
method, however, the brand of the RP-C18 solid-phase material was changed to RP-C18 Bulk Sorbent from Separtis GmbH (Grenzach-Wyhlen, Germany). Furthermore, an ad-
ditional cleanup step based on gel permeation chromatography (GPC) was introduced to remove matrix interference from raw sewage extracts. Details of the GPC method and evaluation of the GPC procedure are reported by Ternes etal. A 10-point calibration was performed over the whole procedure after spiking groundwater with the respective estrogens at concentrations between 0.25 and 100 ng/L. In each analysis series, a blank sample of deep groundwater was run in parallel. According to the evaluation method originally described the recovery of the steroid estrogens was g93%, and the relative standard deviation (RSD) of the method was e14%. A further quality parameter designed to ensure that matrix effects did not influence the extraction or cleanup, not mentioned in the original description was the ratio between the surrogate standard, 17â-estradiol-17-acetate, and the instrumental standard, Mirex (CAS Registry No. 2385-85-5). The average of this ratio was determined as a mean of all calibration samples. The quantitative result of a real sample was only considered valid if this ratio deviated less than 30% from the average value of the calibrations. The newly included GPC cleanup step exhibited a systematic loss of 11%. This loss was effectively corrected by the surrogate standard, 17â-estradiol-17-acetate.Estrogens in Sludge. The method used for measuring estrogens in sludge was recently described in Ternes et al. Sludge was freeze-dried, and aliquots of 0.5 g were successively extracted twice with methanol and subsequently twice with acetone. For each extraction step, the slurry of the sample in solvent was ultrasonicated for 10 min. The four solvent fractions were combined, and a cleanup was carried out with GPC and silica gel. The extracts were then derivatized and analyzed by GC-ion trap-MS. Standards for the calibration curve and a blank for each analysis series were made by spiking the combined solvent mixture used for extraction followed by the full cleanup procedure described for native samples. The 9-point calibration curve was performed with the respective estrogens at concentrations between 1 and 200 ng/g. The recoveries of the analytes were g83% with an RSD ofe19%. As in the water analysis described above, the ratio of the surrogate standard 17estradiol-17acetate and the instrument standard Mirex was used as the quality parameter for the analysis. Furthermore, as sewage sludges vary considerably between different STPs, the suitability of the method was confirmed for each type of sludge (at each sampling location) by spiking 100 ng/g of the estrogens in an individual recovery experiment. The main quality criterion was that the recovery was within the 95% confidence interval range found for the different types of sludge used in the original evaluation method.

3.1.9. Smart Villages: Comprehensive Review of Initiatives and Practices (Veronika Zavratnik, Andrej Kos and Emilija Stojmenova Duh)

Over recent decades, people's (rural and urban) communities are facing numerous social

and economic changes and challenges. Some of those challenges have been increasingly addressed through the lenses of technological developments and digitalization. In this paper, we have made a review of already existing practices while focusing on the existing implementations of the Smart Village concept and the importance of digital transformation for rural areas. We give special attention to EU policies that we are using as an already existing framework for understanding our own forthcoming examples. We have shown the parallels between the findings and insights from different regions and made an evaluation of presented practices. Our main argument stems from our own previous experiences and experiences of other research approaches, and is grounded on the argument that rural areas are not uniform, and that smart rural development has to be applied in combination with place-based approach. We present the cases of Slovenian pilot practices and support our

argument by proposing the FabVillage concept One of the most important and accurate questions that contemporary societies have to address is how to make people's communities and their settlements more sustainable. An ever growing number of aspects of most societies and their economies are inextricably linked to changes brought forward by technological developments that are transforming people's everyday routines, perceptions of the environment, access to the electricity, food, health, education and many other. To properly address those changes in 2015, the 2030 Agenda for Sustainable Development (the so-called #Envision2030) was adopted by the General Assembly of the United Nations, and it included seventeen Sustainable Development Goals (SDGs) [1]. As will be detailed later on, the agenda took a holistic approach to sustainable development for everyone and in every segment of life, including education, employment,inequality, accessibility of settlements, etc.One part of the answer towards achieving higher levels of sustainability and SDGs is to find the right ways on how to deal with economic disparities, climate changes, accessibility to modern technologies and other necessary infrastructure. Considering the (dis)advantages of some already existing practical approaches, one of the most promising ways is to make them smart(er). Disregarding the somehow vogue meaning of the "smartness" in general [2,3] that will be explained later on, it is important to note that the concept for urban smart communities is already very well established—e.g.,Smart Cities, but less so for rural communities as the concept Smart Village has only recently gained momentum; for example, in the EU, the Smart Village Initiative was launched by the European Parliament in 2017, and the EU Action for Smart Villages document was published by the European Commission together with the European Parliament. Moreover, 'Smart Villages' was initiated as a subtheme within the European Network for Rural Development (ERND) work on 'Smart and competitive rural areas' between September 2017 and July 2018

3.1.10. Achieving inclusive development through smart village (Anand Singh, Megha Patel, pandit Deendayal Petroleum University, Gandhinagar, 2019)

Out of 6,50,000 villages in India, most of them have inadequate and rudimentary infrastructure which fails to fulfill the primary need of villagers. Villages and other remote locations have poor educational facilities, irregular water supply, electricity supply, improper sanitation, transport, road connectivity and infrastructure. India being a billion-strong nation has 68.84% of villagers less than 30 years old. Thus, a huge resource pool is underutilized and left with poor standard of living with meager wages. All these factors push villagers to migrate to towns and cities in search of better employment opportunities and quality of life.Agriculture has been a major contributor to India's GDP since independence. It is decreasing year by year from 45.48% in 1950 to 15.79% in 2013 ("Sector-wise contribution of GDP of India", 2017) because of lack of strong policies and its execution at grass-root level. It has been the primary source of livelihood for villagers, which creates 50% employment followed by Small and Medium Enterprise (SME) sector with a share of 40%. Employment in India's agriculture sector has decreased considerably, from 60% in 1994 to 50% in 2013 (World Development Report, 2013).

Migration leads to overcrowding of cities in no time, it runs out of resources to cater everyone's needs. Infrastructure, deforestation and pollution is increasing at a faster rate. To deal with this situation, Government of India (GoI) launched 'Smart Cities Mission' across country with 100 cities in 2015. Infrastructure cannot be improved beyond a certain level so every existing and upcoming city has a limitation to deal with population problem. To avoid migration "smart village" is one of the most suitable options, which can be easily implemented with lesser-cost and small gestation period.Rural development through investment in infrastructure will improve the situation. It will create platform to
develop local entrepreneurship in villages to boost the rural economy. Electricity access in villages has been a

3.2. Summary of Literature Review

From all of these research papers we can get an idea about how we can execute modern techniques in villages. And also what are the essential factors required to execute these techniques.

Various methods , processes, sources are also explained in these research papers. We can also take reference of result and cost of products to determine our project economy .

CHAPTER FOUR

CONCLUSION

Over recent years, the challenges arising from the social and economic, but also wider changes of people's communities—rural and urban—have been increasingly addressed through the lenses of technological developments and digitalization. In this paper, we have focused on the applications of the Smart Village concept and the importance of digital transformation for rural areas, always drawing parallels between the findings and insights from different regions. We aim to use these new insights in developing the framework of the international project Smart digital transformation of villages in the Alpine Space. One of the aims of our paper was also to make a qualitative evaluation of the projects and initiatives presented. Considering the initiatives active worldwide, we have made a comparison of the territories they cover and areas of actions they are focusing to and concluded that the most important issue to address when making the development strategies for the so-called un-developed countries is the access to the sources of energy. Furthermore, in order to make the concept of "smart development" more accessible and useful for our case of Smart Villages, we have made an evaluation of the projects and programs based on criteria that define "smartness" in the broader sense

CHAPTER FIVE

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