উদ্ভাবনীমূলক ধারণা

“কড্ডা ১৫০মেঃওঃ ডুয়েল ফুয়েল বিদ্যুৎ কেন্দ্রে বৃষ্টির পানির ফায়ার ফাইটিং, অন্যান্য কাজে ব্যবহার ও বৃষ্টির পানির উপর বিদ্যুৎ কেন্দ্র এলাকায় বায়ু দূষণের প্রভাব যাচাইকরনের নিমিত্ত প্রয়োজনীয় সরঞ্জামাদি স্থাপন।”

B-R Powergen Ltd.

Kodda 150 MW D/F Power Plant

Kodda, Gazipur, Bangladesh.

Introduction:

B-R Powergen Ltd is a state-owned power generation company. Kodda 150 MW Dual Fuel power plant is owned and operated by B-R Powergen Ltd with HFO fuel. The plant has been supplying uninterrupted power to the national grid since 16 Aug 2015, the date of Initial Commercial Operation (ICO) following the national demand (NLDC) of Bangladesh. Nine (9) Generator sets, along with a wide range of machinery were installed during the project period to operate the plant. Other major equipment includes five exhaust gas boilers, one diesel-fired boiler, nine lube oil separators, four heavy fuel oil separators, and fire fighting systems. The plant consists of different buildings, sheds, and rooms, such as an engine hall, fuel treatment room, workshop, warehouse, WTU, EDG room, and auxiliary room. A large volume of water is required daily for smooth operation of the power plant, especially for engines, boilers, HFO, and lube oil separators. Other small uses of water cannot be avoided; we need to use a considerable amount of water daily for domestic and gardening purposes. Substantial amount of electricity, machinery spares, and manpower costs impact significantly on the overall power generation cost, which burdens the customer at the long end. For instance, two submersible pumps with 11 KW power ratings run for two hours on average every day throughout the year to meet the consumption of water, which costs 44 kWh of power daily. Also, day by day, the level of underground water is getting down, especially in the power hub area, as a massive quantity of underground water is being used to operate several power plants. The electricity consumption by the pumps directly increases the power plant's overall auxiliary power consumption.

Considering the above, we came up with an innovative idea to install a rainwater collection system for harvesting rainwater, which will reduce the use of underground water and decrease auxiliary consumption to limit the adverse impact on the nature.

Importance of using Rainwater in Industries:

1. Reduces Electricity Bill

Electric energy is a unique energy in the modern world of daily life. The source of energy, especially fossil fuel, has reduced through daily consumption. So, it is our prime responsibility to

use minimum electricity energy. In this innovation where underground water will be saved, the principle of the invention is “no pump and no electricity”; use rainwater. Hence, the most significant benefit of the innovation is that we do not need electrical power for submersible pumps to draw underground water, especially in the rainy season.

2. Less Use of Underground water

Groundwater depletion is an alarming global issue, primarily caused by groundwater pumping.

Some of the adverse effects of groundwater depletion are given below:

a. **Lowering of the Water Table.** Excessive pumping can lower the groundwater level to a low which will cause wells to no longer be able to reach groundwater.

b. **Reduced Surface Water Supplies.** Groundwater and surface water are interconnected. When groundwater is overused, lakes, streams, and rivers connected to groundwater will also diminish their supply.

c. **Land Subsidence.** Land subsidence occurs when there is a loss of upward pressure below the ground. This is most oftenly caused by human activities, mainly from the over use of groundwater, when the soil collapses, compacts, and drops.

d. **Water Quality Concerns**. Excessive pumping in coastal areas can cause salt water to move into the inland and upward, contaminating the freshwater supply.

Using rainwater for industrial consumption can save us from extreme groundwater use.

3. Quick and Practical Installation

According to the estimated time frame and schedule of project activities, total work will be completed in a week only by one single experienced worker.

4. Low Installation Cost

The cost and benefit have been calculated, and the project is found viable. Successful implementation of the project will provide not only financial benefits but also allow additional

remarkable economic benefits. However, including all materials, erection, and testing, total costs are estimated at BDT 2,90,000.00

5. Detail of the Project

A system has been constructed for rainwater collection from the firefighting pump shed and Fire Pond shed with the help of Metal structures and PVC pipes. Few numbers of materials, like GP Sheets, angles, Roping Screws, Clamps, Clips, Silicon Gum, Filters, and other accessories, are essential to develop the process of rainwater collection. After completing this project, the system was tested by pouring water on the roof of the firefighting pump and pond sheds. Adjustments and necessary rectifications were made on PVC joints, GP sheets, and other objectives in the system. After final checking, the system was found to be healthy and upright. Presently, rainwater collection arrangements from firefighting pump and pond sheds are ready to use in other areas where this water can be used for different purposes.

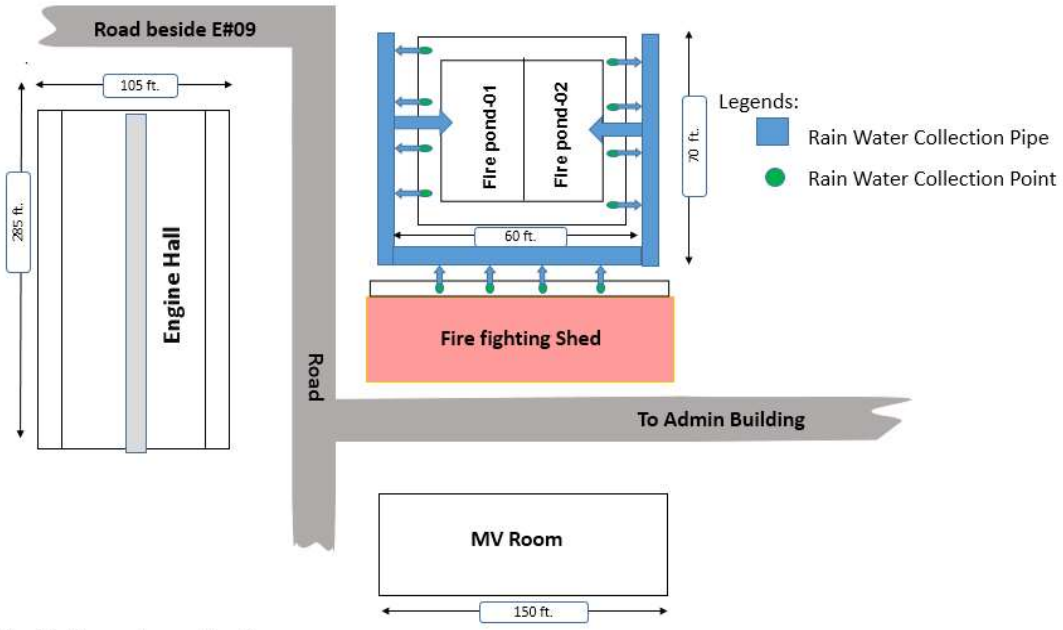


Fig: Rain water collection

Work Process/Flow Diagram:

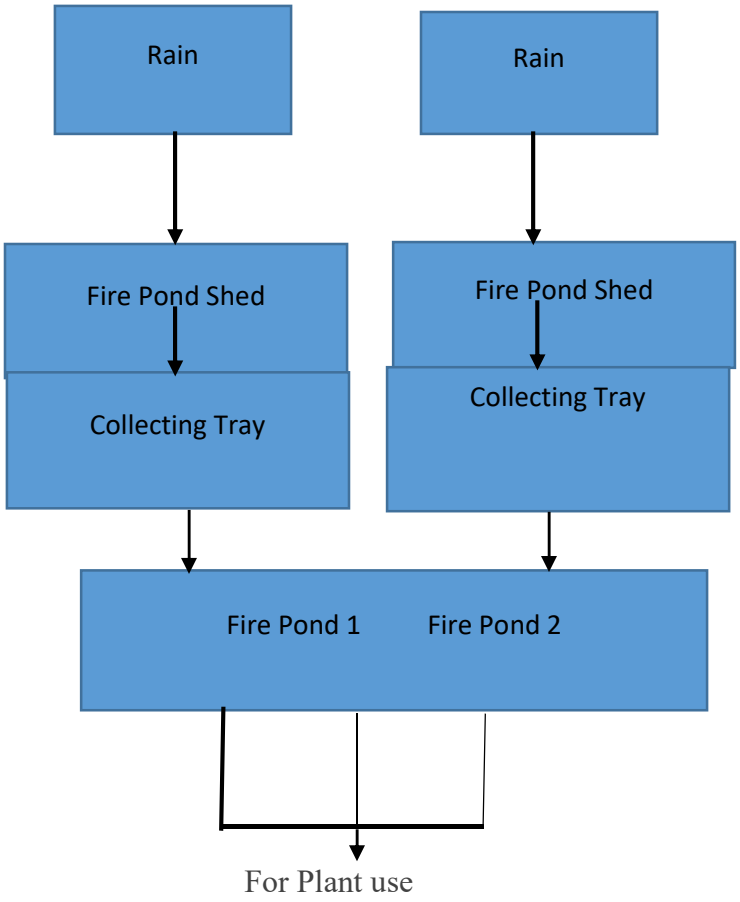


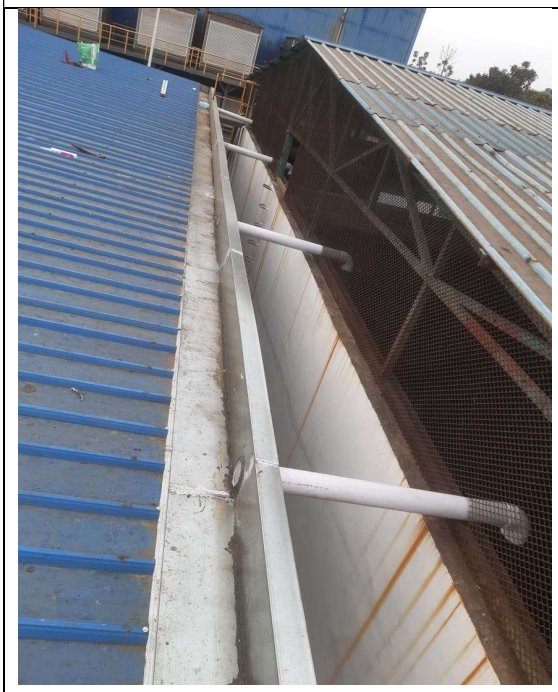
Fig: *Flow Diagram of Project working process*

6. Working Principle:

The rainwater collection system comprises pipe-fitting, GP sheet, collection points, filter, fire pond, and fire pond shed. The system works on a very simple method. When rain starts, rainwater will fall on the firefighting pump and pond sheds. This rainwater will fall on the metallic structure or the casing to accumulate water. The collected water will go to the firefighting shed through the installed pipes. However, filters are installed at the inlet end of pipes to filter solid objects contained in the water. Later on, this water will be used in different power plant systems on requirement basis.

7. Installation Details:

After complete installation of the water collection system, we depicted several parts of the system which are shown here:

Picture	Picture
	
	

8. BOQ and Cost:

Sl	Description of Item	Unit	Qty	Unit Rate	Total Price (BDT)
1	GP Sheet-2mm	Sft	700	250.00	175000.00
2	Angle-1.5inch *1.5inch*3mm	Ft	200	135.00	27000.00
3	UPVC pipe 4 inch thickness 3mm	Ft	60	165.00	9900.00
4	UPVC Plan band 4-inch	Pcs	25	385.00	9625.00
5	PVC grating 4-inch	Pcs	14	300.00	4200.00
6	Solvent Cement 500 ML	Pcs	3	1200.00	3600.00
7	Fitting and fixing charge of rainwater & Downpipe	Lot	1	58500.00	58500.00
8	Total Cost:				BDT 2,87,825.00

9. Financial Cost and Benefits (TCV Analysis):

Let, this system runs four months a year without using a submersible pump. Each Submersible pump consumes 11kW of power and runs two hrs. daily.

So, daily electric power saved: = 11x2x2 kWh = 44 kWh

(Pump unit = 2 Nos, Pump capacity=11 kW, Daily average running=2 hours)

Electric Power saved in a year (for four months, no use of Submersible P/P) = 4x30x44 kWh
= 5280 kWh

(Pump Running four months per Year, One month=30 days, Daily Consumption = 44 kWh)

If per unit rate is BDT 14.98, cost saved in a year = 14.98x5280 = BDT 79094.00

[Levelized Tariff for Kodda Plant as per contract =BDT 14.98]

So, payback period = 3.75 years = BDT 2,96,604.00 will be saved.

So, the project will give return after around 4.00 years (after adding 10% unforeseen period)

10. Conclusion:

As it is known to all that rainwater comes from nature, it does not require any electric power or other costly items to harvest. Rainwater use will save underground water, electric energy, and machinery spares. Hence, effective use of the system will reduce plant auxiliary power consumption, which belongs to one of the targets of APA goal. However, the system is entirely dependent on rainfall, which is beyond the control of human beings. So, cost-saving completely depends on the nature of the rainy season each year.

Prepared By	Checked By	Noted By
12.03.2024	12.03.2024	12.03.2024
Md. Masum Hossain Sub-Assistant Engineer (Operation) Kodda 150 MW Power Plant B-R Powergen Ltd.	Md. Ataur Rahman Executive Engineer (Addi. Charge) Kodda 150 MW Power Plant B-R Powergen Ltd.	Muhammad Al Amin Superintending Engineer (PM) Kodda 150 MW Power Plant B-R Powergen Ltd.