ENERGY SAVINGS REPORT

Product – HYDROMX Energy Saving Solution

Company – Suzuki Motor Gujarat Pvt Ltd

Site Address – 105/109, GJSH 221, Hansalpur Becharaji village of Mandal Taluka in Ahmedabad District

Installtion Date – 12th June 2023

For Design2Occupancy Services LLP

Authorised Signatory

Ankur Mantri

Certified Energy Auditor

GALAXY ENERGY SOLUTIONS LLP
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Executive Summary

On the basis of observations made through a data logger installed on the system for 62 days when system was running on water (before upgrade) and 88 days after upgrade to Hydromx, it was seen that about 27.4% reduction in power consumption for the given load was achieved and the system efficiency (COP) of the system was improved by 37.7%.

For a better understanding of the data, observations are divided in two different durations so that an overall pattern of saving vis-a-vis changes in consumption can be outlined.

Highlights

27.4%	SAVINGS IN ENERGY CONSUMPTION (KW/TR)
37.7%	IMPROVEMENT IN SYSTEM EFFICIENCY (COP)
533150.01	kWh ENERGY SAVINGS PER YEAR
426520.0 Kg	Co2 REDUCTION PER YEAR
0.90	RETURN OF INVESTMENT IN YEARS

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The following are the points which have been taken during the testing –

1. Chilled water flow rate is assumed to be constant, i.e., 400 gpm or 90.84 m^3/hr.
2. The total quantity of water in the chilled water line is 7000 liters.
3. The total quantity of Hydromx used is 3500 liters.
4. Rate of Electricity is taken as Rs. 9.25 per/ unit.

Executive Summary (Savings Table)		
Parameters	**Value**	**UOM**
IKW/TRH on water as Heat Exchanger	1.78	
IKW/TRH on Hydromx as Heat Exchanger	1.29	
Savings	**27.4**	%
Average TRH per day required (125 TR x 24 hrs)	3000	
Power consumed per TRH on water	1.78	
Average kW per day on water (3000 x 1.78)	5331.11	
Average kW per annum on water (5331.11 x 365)	19,45,855.8	
Power consumed per TRH on Hydromx	1.29	
Average kW per day on Hydromx (3000 x 1.29)	3870.43	
Average kW per annum on Hydromx (3870.43 x 365)	14,12,705.74	
kW saved per annum	5,33,150.01	
Co2 reduced per annum (533150.01 x 0.8 kg)	**426520.0**	Kg
Amount saved (INR)	4931637.59	
ROI	**0.90 Year**	

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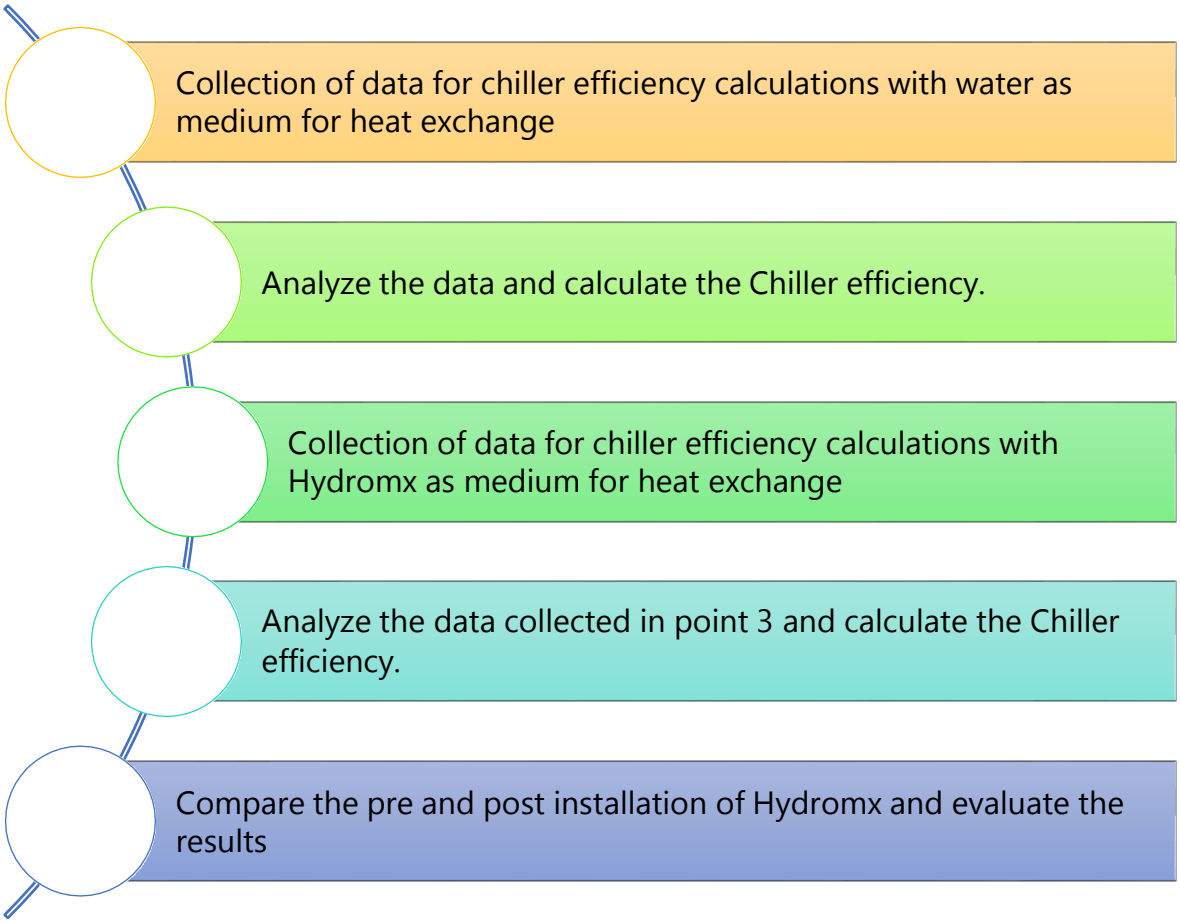
As per the above table, a total of **Rs. 4931637.59 will** be saved per year after the installation of Hydromx. The **Return on Investment** (ROI) will be **0.90 years.**

Scope of Work

The following is the scope of work for the third-party energy savings analysis for the energy savings solution, Hydromx –



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About HYDROMX

What is HYDROMX?

Hydromx-an energy saving solution is essentially a Heat Transfer NANO Fluid. This Nano fluid's heat transfer coefficient is better than water by 37.4%. Hence, what water can achieve in 60mins, Hydromx can achieve the same in close to 45 minutes, thereby resulting in up to 35% energy savings. Hydromx is installed in 50:50 concentrations with water and can be used in any closed loop circuit for better heat transfer. It gives best results in Chillers, Boilers, Heat Pump and Hot water generation equipment.

- HYDROMX contains stably suspended Nano-particles to increase the speed of heat transfer.
- HYDROMX is the only patented energy saving heat transfer fluid across the globe.
- HYDROMX is most suitable for closed-loop hydronic heating and Cooling systems
- pH value: 8.2 – 8.6
- Freezing point: -61 °C
- Boiling point: 118 °C
- Density: 6% denser than water

USP

1. Only heat transfer fluid based on Nanotechnology with Toxicology clearance.
2. Life cycle of 15+ years. Limited Company warranty for 8 years
3. Heat transfer coefficient better than water by 37.4%
4. HYDROMX is secured by the second-largest insurance company in the world (Till date no claim).

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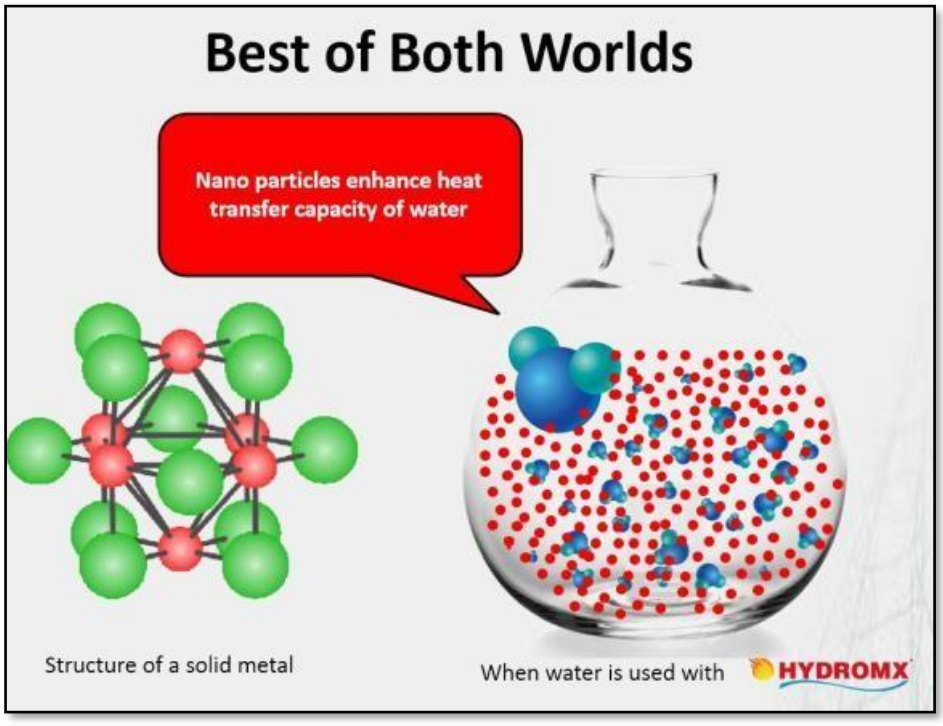
How it works?

Hydromx® uses leading-edge Nano-Thermo TM Technology and a protected formulation to improve heat transfer. It rearranges the molecular structure of the fluid improve overall heat transfer process and works in concert with the room/radiator thermostats and the boilers controls to reduce energy consumption. By transferring heat more efficiently the system heats up more quickly. As a result, thermostats turn off sooner and the boiler modulates or changes its on/off cycle to save energy. There is a lot of complex science operating at the nanotechnology level, but in summary it really is that simple. It is used with water (Hydromx: water as 50:50).



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Benefit

The following are the benefits of using Hydromx –

Lesser Energy Consumption

Reduced CO_2 Emission

Recylcable

Environment Friendly

Life Expectancy 20 years

Protects Against, Corrosion, calcification, Bacteria & Frost

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Product

Hydromx is best suited for closed loop heating and cooling systems. The efficiency of the system increases due to diminishing run-time of associated equipment. Hence drastic increase in equipment life is achieved along with lesser maintenance cost.

The Hydromx provides the multiple benefits mentioned in the table given below; in addition to the fact that it is a better heat transfer medium in comparison to water.

One Solution – Many Solutions				
Features	**Water**	**Chemical Inhibitor**	**Anti - Freeze**	**Hydromx**
Energy Savings Up to 35%	✗	✗	✗	✓
System Protection	✗	✓	✗	✓
Freezing Protection	✗	✗	✓	✓
Bacteria, Corrosion, Calcification	✗	✓	✗	✓

Hydromx provides great benefits on environmental impacts calculated when compared to brine/water and ethylene glycol systems due to energy savings achieved during the use phase.

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Hydromx when used with water in the ratio of 50:50 enhances the capacity of water to transfer heat. Thus, makes it more efficient in terms of energy consumption.

The Schematic diagram showing the working of Hydromx in the chiller is presented in the figure given below.

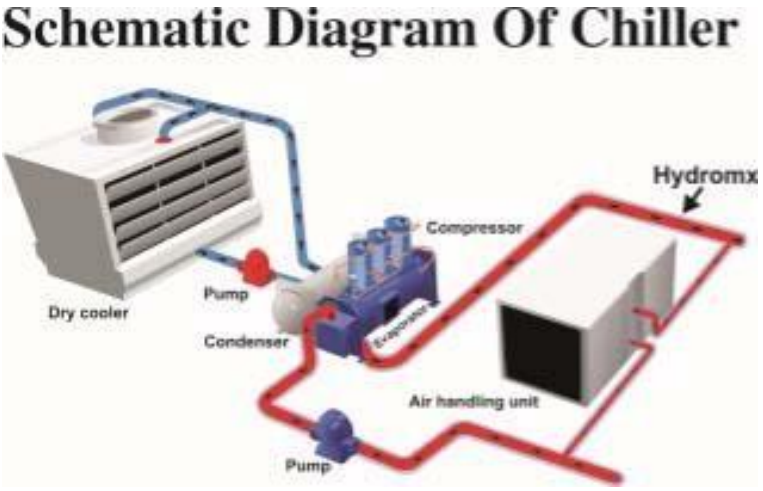

Figure 1 - Schematic Diagram of Hydromx – Chillers

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The team behind the Implementation of Hydromx

Team Member	
Name	**Designation**
Kosei Taira	**DPM**
Ravi Jariwal	**Manager**
Neeraj Kumar	**Manager**
Arjun Dev	**Assistant Manager**
Ankit Sharma	**Junior Manager**

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About Galaxy Energy Solutions LLP

Galaxy Energy Solutions, is an organization that intends to bring to India products that are energy-efficient and environmentally friendly. GES have a vision to keep this planet green and optimize resources, they aim to bring cutting edge technology to our country. In this direction, Galaxy ENS brings HYDROMX, a Nano technology-based product that results in energy savings for use in closed loop hydronic systems.

GALAXY ENERGY SOLUTIONS LLP, (GES) is the exclusive distributor of Hydromx across India.

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About Project

Suzuki Motor Gujarat Private Limited (SMGPL) is an automotive manufacturing plant owned by Suzuki Motor Corporation. Located in Hansalpur Becharaji village of Mandal Taluka in Ahmedabad District, it is the first and the only Suzuki automobile manufacturing plant in India that is wholly owned directly by Suzuki as a foreign company, as the other plants are owned by Maruti Suzuki. The plant supplies vehicles to Maruti Suzuki in the domestic market and to overseas markets. The plant was opened on 1 February 2017 and has a total annual capacity of 750,000 units. The plant has helped Suzuki achieve exports of 2 million units from India.

Img 1 – Hansalpur Plant View

Suzuki Motor Gujarat currently consists of four plants, Plant A, which opened in February 2017, has a total annual capacity of 250,000 and is currently assembling the Baleno. Plant B was operational in January 2019 and has a total vehicle-producing capacity of 250,000 and it is currently assembling the Swift. Plant C started production in April 2021.

annual capacity of 250,000 and is currently assembling the Dzire. The powertrain plant has an annual capacity of producing 500,000 engines and 500,000 powertrains. The plant crossed 1 million production mark on 21 October 2020, just 3 years and 9 months since it started production in February 2017. It is the fastest production site of Suzuki to reach the milestone.[7] It crossed production mark of two million units on 20 August 2022. It has achieved this milestone in 5 years and 6 months after having started production in February 2017 and this is the fastest in any Suzuki production plant. The 2 millionth vehicles produced was a Baleno with South African specifications

Img 2 - Plant Production Area

It is the manufacturing plant, spread over 1984344.87 sq. meters, and fulfil the Company's goal of making India an export hub for the world. There are total 3 Hitachi (Air Cooled Modular Chiller) installed at site.

About Hitachi Chillers

Hitachi's Air-Cooled Chiller combines high-efficiency performance and stable operation. New model chiller lineup featuring a G-type semi-hermetic twin-screw compressor using the environmentally-friendly R134a refrigerant.

Img 3 - HITACHI Chillers

In addition to low noise, low vibration, high efficiency and high performance, the new models come with a user-friendly touch

panel type liquid crystal screen display that allows you to check operation status at a glance and has a full range of control functions. As the perfect answer to user needs, Hitachi's chillers are designed to cover a broad range of applications from air conditioning of buildings to cooling of factories.

At Suzuki Motors Gujrat Pvt, three air-cooled Hitachi chillers with a capacity of 155 TR are installed, in PSGA which are used for process cooling in the paint shop. 5 No's of PHEs are installed to recover heat for the process.

Methodology

This document reports on the findings and data analysis relating to the performance data before and after the installation of Hydromx as the heat-transfer fluid in the closed-loop system of the Chiller unit. The Chiller unit provides a cooling effect to the medium of heat transfer (originally water and subsequently replaced by Hydromx) in circulation in the closed loop between the Chiller and the PHE. The cold water is supplied to meet the demand for heat extraction in the secondary circuit.

This report specifically investigates the performance data trends, before and after the installation of Hydromx, and utilize academic knowledge and expertise to verify the saving in energy consumption and cost calculations with an overall aim of delivering a view of the system's performance before and after Hydromx was installed.

The data collected had been monitored and acquired in two stages:

1. Before Hydromx was installed, (62 days) (when the system running on water)

2. After the Hydromx was installed (88 days)

A number of energy-saving assessment methods are examined to compare the normal operating condition of the system when water was used as heat transfer fluid in the cooling system with that of the system using Hydromx as heat transfer fluid, in order to identify overall trends in energy savings and assess, an indication of whether significant changes have occurred in the operation of the system affecting the energy consumption. The financial and energy benefits of installing the product have been looked at.

Hydromx Installation at site

The original design and construction of piping system; for supply and make-up of heat transfer fluid for its loss during the process operation, was done keeping in view that water is a medium of heat transfer and can be discharged and recharged as required. However, with the replacement of water by Hydromx as heat transfer fluid, we cannot afford to lose Hydromx in discharge from the system. Hence a modification in the system is necessary. The direct water supply pipeline to the makeup tank is disconnected to ensure that no water is supplied automatically to the makeup tank. This is because water in the make-up tank has been replaced

by Hydromx. The life of the Hydromx solution is expected more than 15 years.

The data logger was installed on 9th April 2023 in consultation with the company management. The raw data has been collected from 10th April to 10th June 2023 for parameters related to supply/return temperature, energy consumption, flow rate, run time, Ambient temperature, Room temperature, etc. During this period, water was the medium of heat transfer for the supply of chillers to the PHE.

The Hydromx was introduced as a heat transfer medium in the system on 12th June 2023 and data are recorded through data logger from 19th June 2023 to 17th September 2023.

Data Summary Sheet

The logger data received were analyzed for possible direct savings (by using Hydromx in place of water as heat transfer medium) in terms of energy consumed by the compressors of the chillers. At the same time, the heat energy transferred from cooling system to the chillers is evaluated. The summarized data are presented in the table and also represented graphically to understand the impact of Hydromx. The comparison has been made for similar conditions and duration of operation of the system.

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HITACHI AIR COOLED CHILLERS 155 x 3		
	WATER	**HYDROMX**
	10TH APRIL TO 10TH JUNE.2023	**19TH JUNE TO 17th Sep.2023**
Days	62	88
TOTAL RUN TIME (hrs)	2059.5	2498.6
TOTAL PER DAY RUN TIME (hrs)	33.22	28.39
TOTAL KWH	305228	313329
TOTAL KWH PER DAY	4923.03	3560.56
KWH/HR.	148.20	125.40
SUPPLY TEMP. ºC	9.59	8.18
RETURN TEMP ºC	12.4	11.4
DELTA ºC	2.78	3.24
FLOW RATE GPM	400	400
TR	83.40	97.20
TOTAL TRH	171762.3	242863.9
IKW/TRH	1.78	1.29
COP	1.98	2.7

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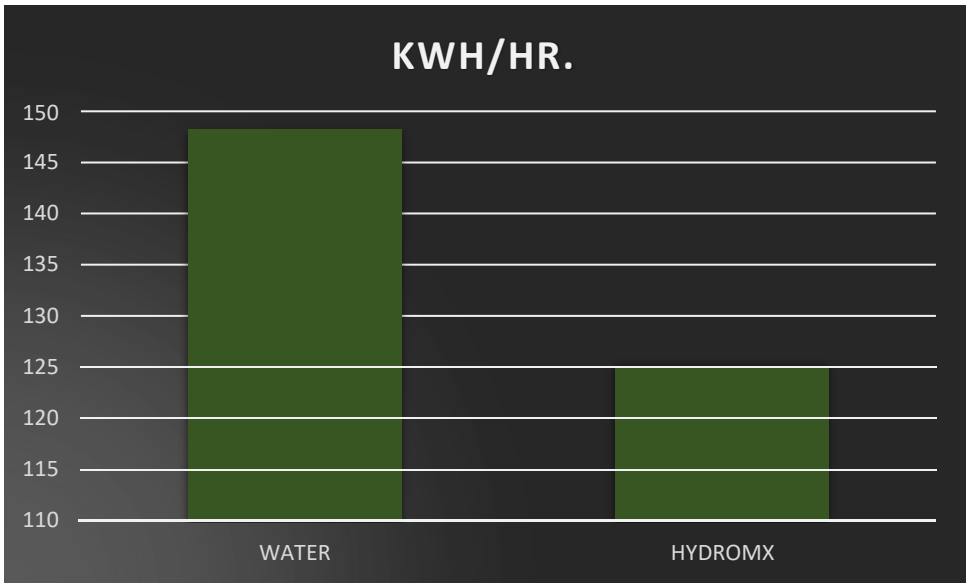

Chart 1 - Energy Consumption

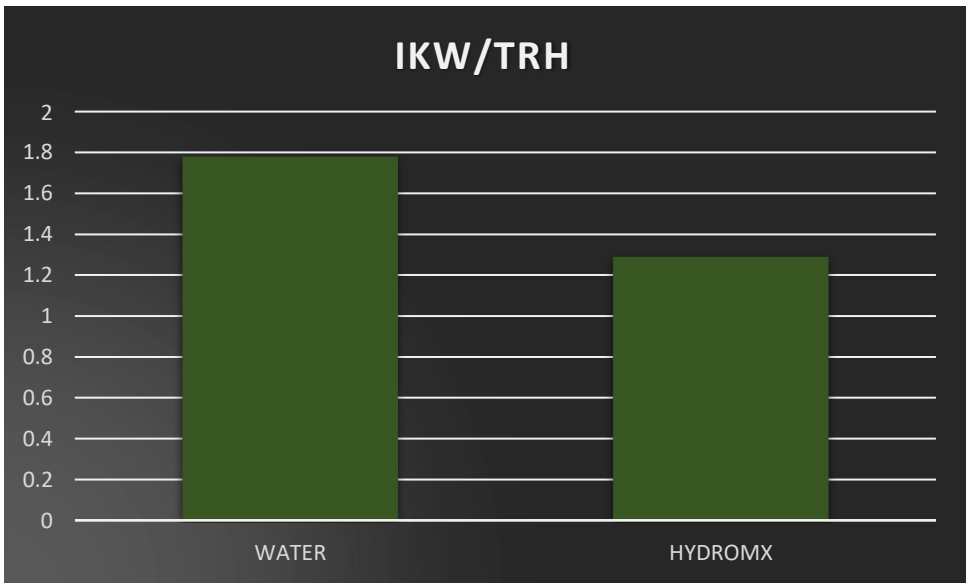

Chart 2 - Energy Consumption

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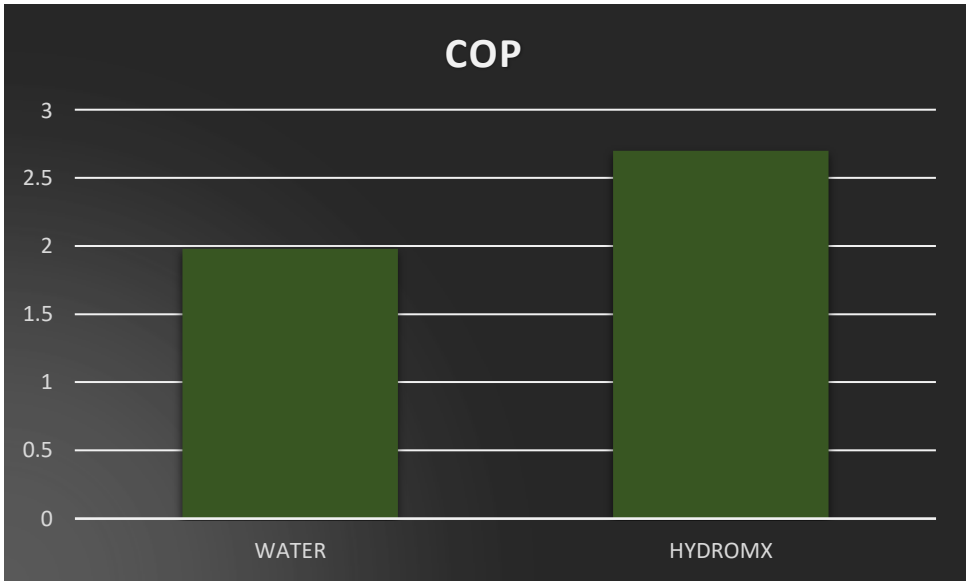

Chart 3 - Energy Efficiency (COP)

Energy consumption & savings per year -

S. No.	Water	Hydromx
Energy Consumption per year (kWh)	1945855.8	1412705.74
Savings per year (kWh)		533150.01
Cost of Energy consumption per year (INR)	17999165.74	13067528
Savings per year (INR)		4931637.59

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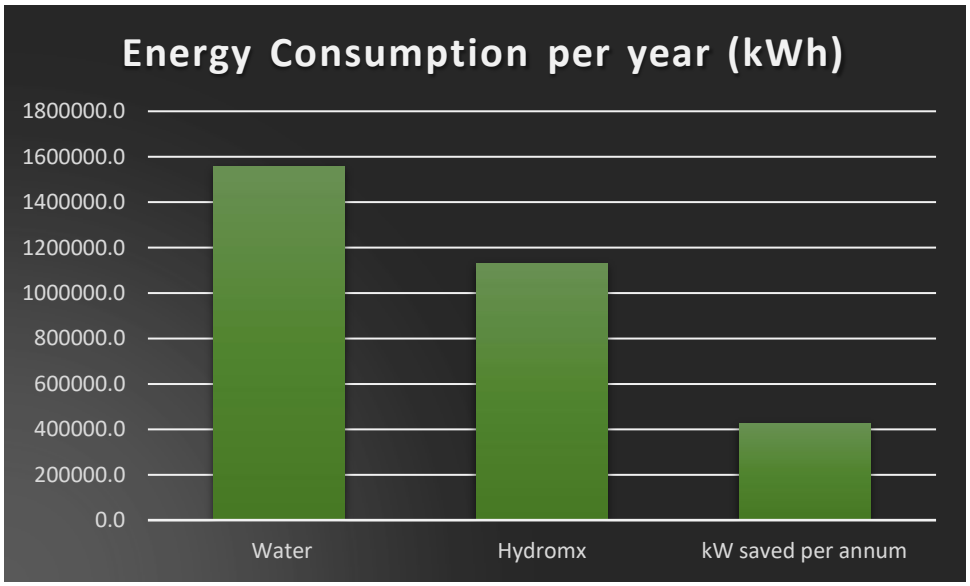

Chart 4 - Annual Energy Consumption Savings

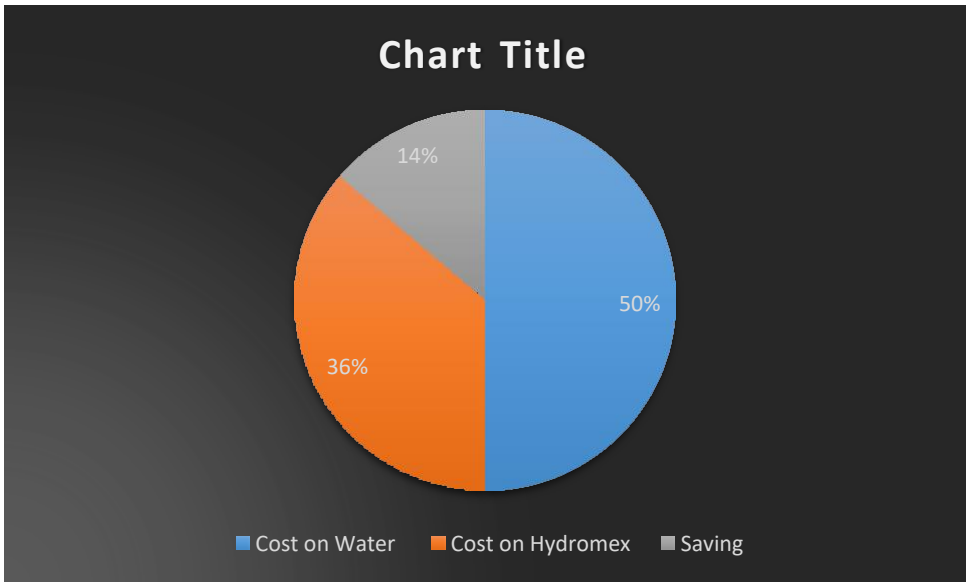

Chart 5 - Annual Financial Savings

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Conclusion

The results indicated are based on the data collected for the durations of 62 days and 88 days for the Hitachi Air cooled chillers using water as well as Hydromx as heat transfer fluid.

- Energy Consumption **IKW/ TR** has decreased by **27.4%** with the use of Hydromx as a medium of heat transfer in place of water.
- The system performance in terms of **COP** has improved by **37.7%** with the application of Hydromx as a medium of heat transfer in place of water.
- Annual energy savings is **533150.01 kWh** with the application of Hydromx as the medium of heat transfer in place of water.
- In terms of cost, annual energy savings is of the order of **INR 4931637.59** with the use of Hydromx as medium of heat transfer in place of water.

Therefore, taking an overall view of the system and considering various parameters the average saving in energy consumption is more than 27.4% when Hydromx is used as heat transfer fluid in place of water.

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Annexure – Installation Photographs

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