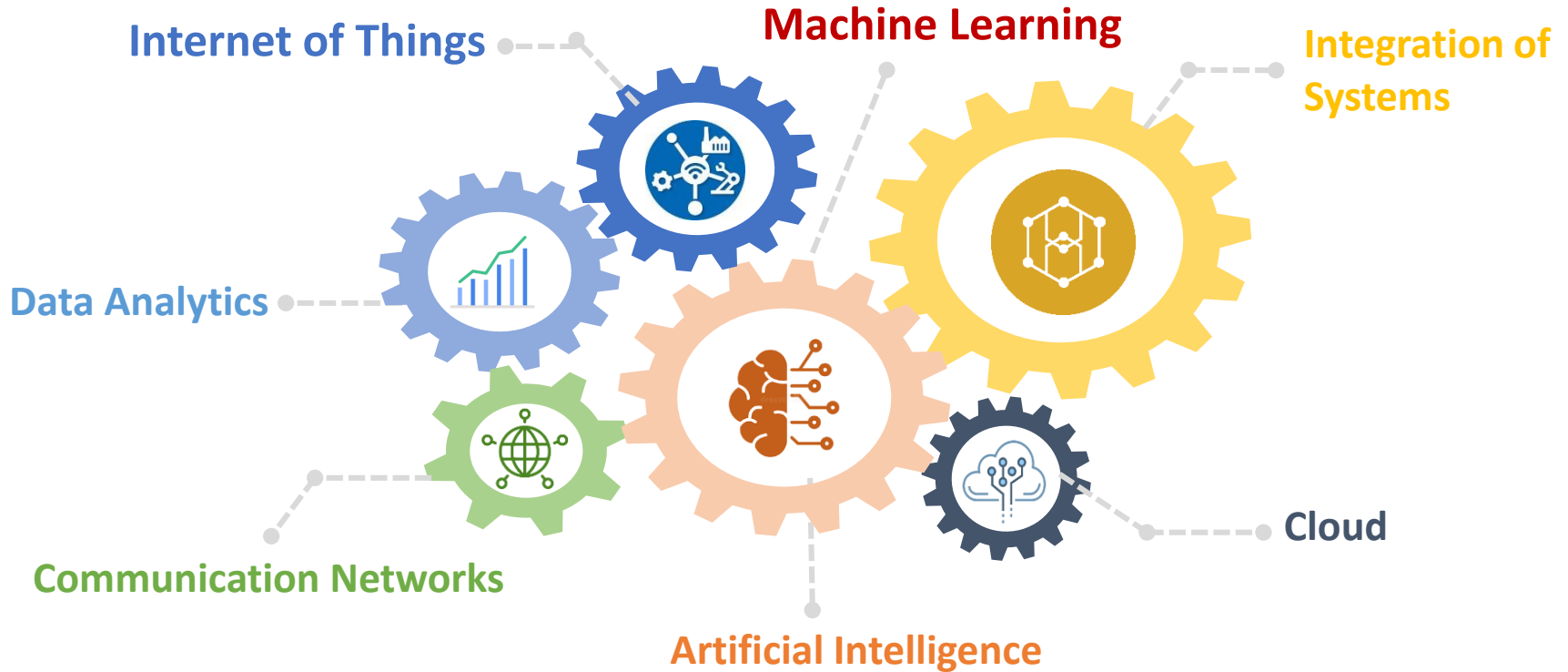




[www.greenovative.co.in](http://www.greenovative.co.in)

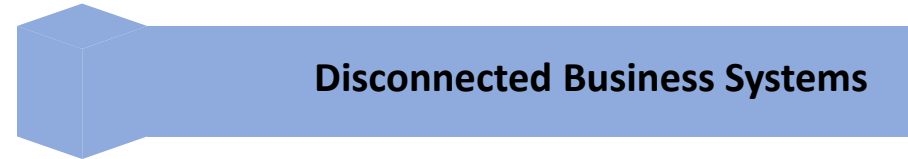


# Current Scenario in Industry 4.0

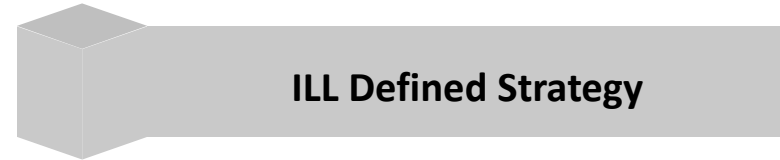


# Road Blocks in Industry 4.0

Multiple Systems been deployed at same unit performing multiple functions



Stakeholders exercise inherited methods to enhance the performance and improve productivity



With no proper data analytics the decision making intricate



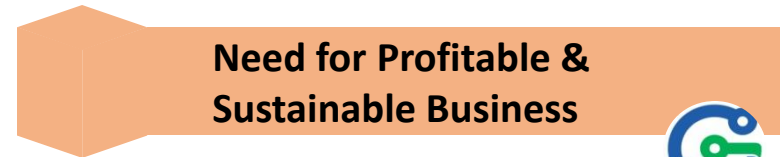
Technology Innovations Developed dynamically and integration of systems not defined



Business are transforming at diverse altitudes



Segments concentrate on hidden potential for profitable & sustainable business



# Drivers of Industry 4.0



Productivity Limits Reached



Techniques to Improve efficiency



Improved Connectivity & Smart Manufacturing



Integration of systems simplified



Data Availability artless



Computing and Sharing Data Globally



New Generation of Technology & workforce demand connectivity



Customer Demand for customization



Machine learning and Improvisation



Production should be up and running



# Optimization opportunities



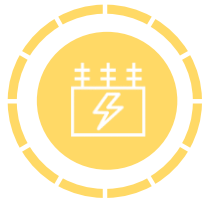
## Energy (EMS)

- Implementation of Energy Management System
- Real time data monitoring
- Loss identification
- Reduction of Consumption
- Specific Energy Consumption
- ISO 50001 ENPI



## Process (OEE)

- Implementation of Overall Equipment Effectiveness
- Machine Learning
- Integration of business process
- Manufacturing Excellence
- Base Line Identification
- Shop Floor visibility



## Assets (ASM)

- Implementation of Asset Monitoring
- Precise Data congregation
- Artificial Intelligence
- Reduce Down Time
- Benchmarking of performances
- Harmonic Analysis IEEE519:2014
- Identifying defective equipment's
- Machine Running Hours

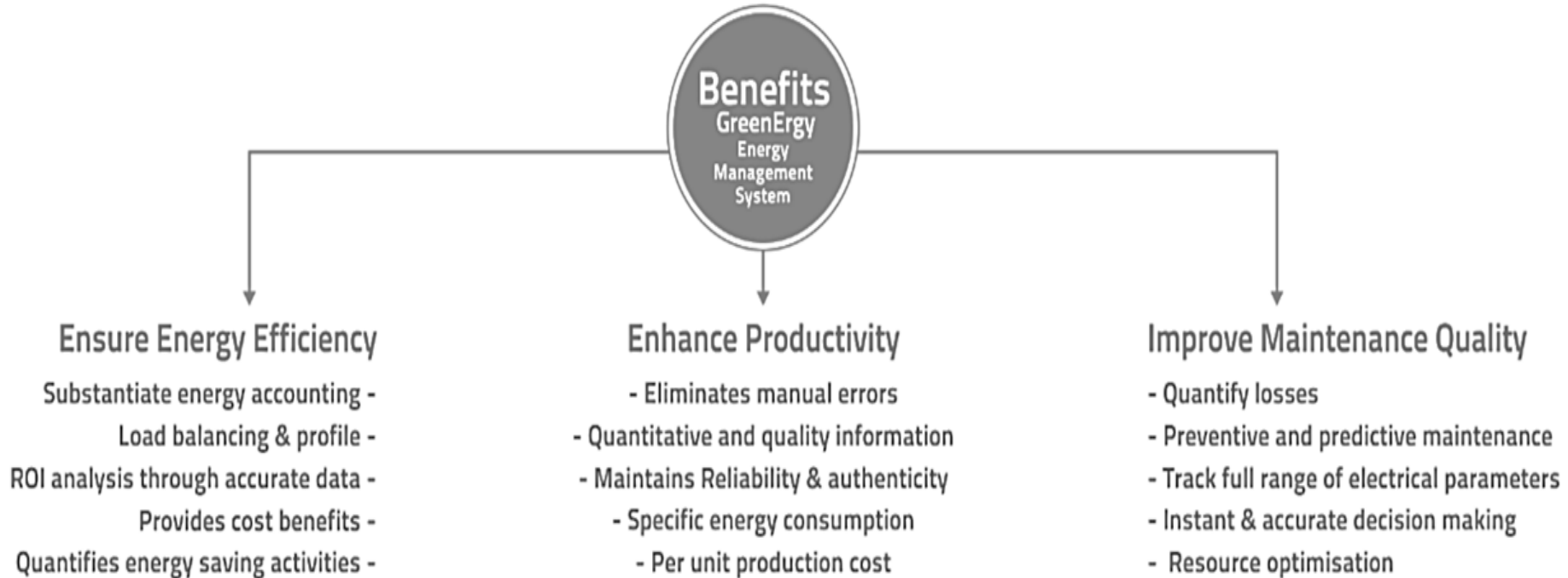


## Workforce

- Integration of systems(SAP, ERP)
- Reduce Manual Errors
- Improve Efficiency (workforce, machines)
- Improve productivity
- Astonishing user experience
- Save Cost



# Benefits



# USE CASE

## About Our Client

- ❖ Global leader in paint manufacturing with 40 production sites in 24 countries, and presence in over 100 countries, Matrix organization divided into seven segments selling decorative paints and performance coatings for marine, powder, and protective coatings.
- ❖ This facility includes equipment such as **extruder lines, mill lines, PlasMec mixer, shot blasting, zepline blender, etc.**
- ❖ But being unable to get the exact Machine Run Hours, Machin Loading patterns; they often missed their Production & Product Costing targets. Also the Ghost Loads during non-productive hours were haunting them.

## Objectives

- To Understand consumption of the factory
- Critical energy consuming areas identification
- Benchmarking and baseline identification
- Specific Energy Consumption
- Calculate Loses
- Operator Vs Machine Efficiency
- Machine comparisons
- Machine Vs Operator Vs Consumption per hour
- Recommendation for energy efficiency and production improvement





# Industry 4.0 Implementation

Technology Implementation

Phase 1



## Energy Management System

GreenErgy is a real-time software solution that enables effective energy management through data collection, diagnosis and reporting

Phase 2



## Overall Equipment Efficiency

Measuring the OEE helps improve the manufacturing process by measuring the performance of your machinery, identify losses, measure the progress, and in the end, improve the machine's and operator's productivity

Phase 3



## Asset Monitoring

Monitoring the assets leads to reduced down time, improve maintenance activities, enhance equipment performance and save maintenance associated cost

Components Stage Wise

- Utilities: Transformer, Chiller, Compressor
- PCC and MCC level implementation
- Motors, Pumps, etc. inclusion.

Machines operating on Production Floor like molding, extruder, Banbury, etc.  
Operators Operating the Machines

Transformers, Compressors, Chillers, Diesel Generators, Boilers, Furnace, and so on.

Timeline

1 month

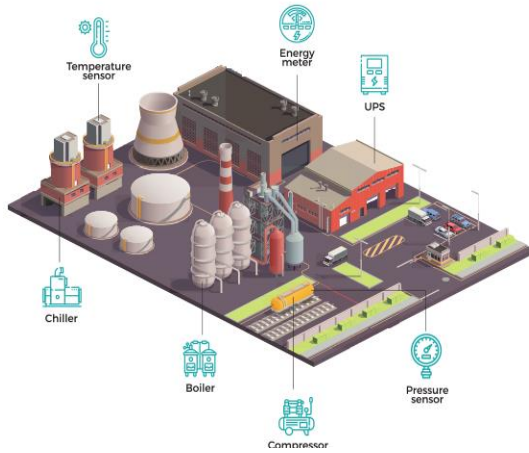
1.5 month

1 month





# Illustration & Benefit



OR



## Benefits



### In-depth Reporting

Daily, Weekly, Monthly, Quarterly, Yearly, SEC, ISO50001



### Advanced Analytics

Demand Calculations, Loss analysis, machine running hours, alerts, and events



### Integration of Multiple Systems

Create hassle free user access to a single platform

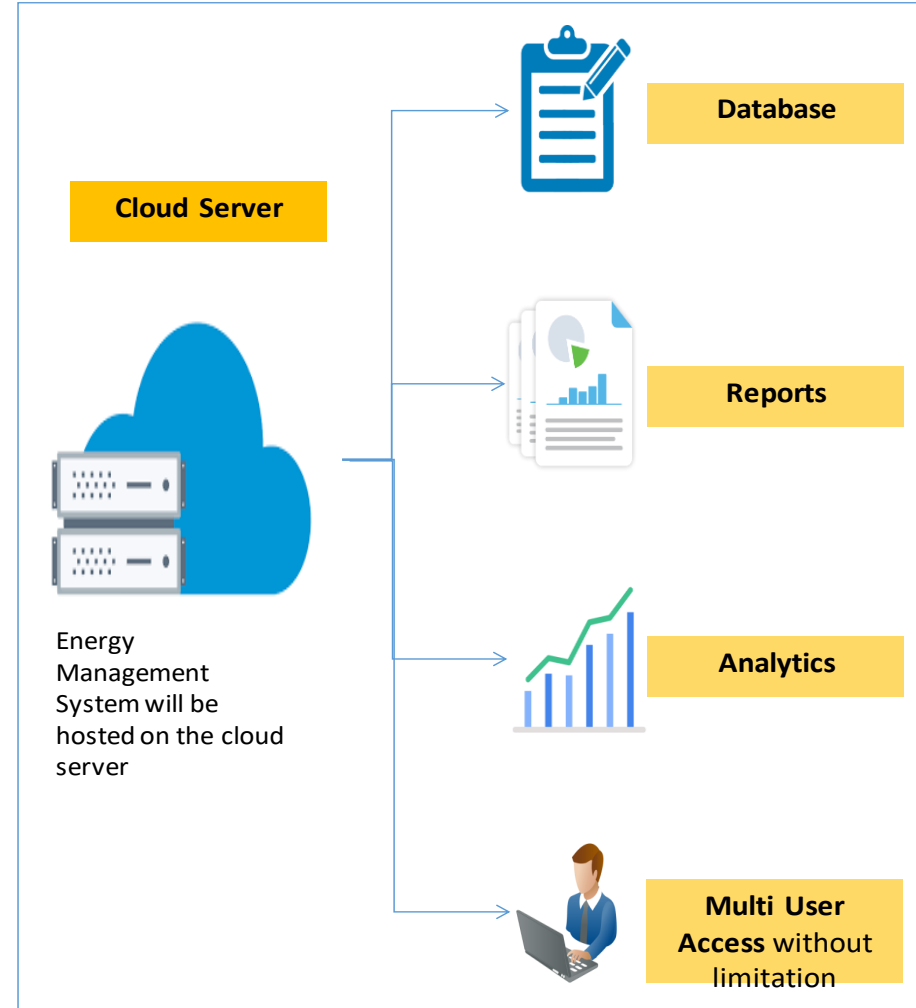
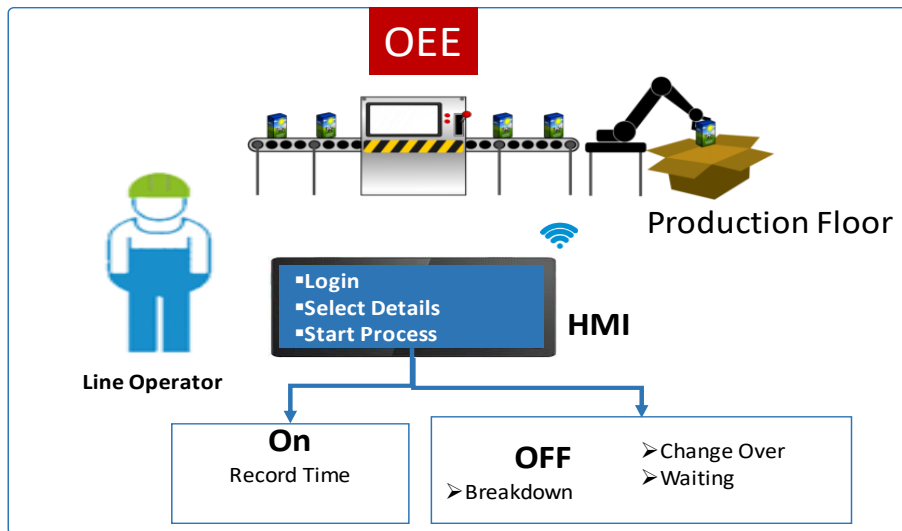
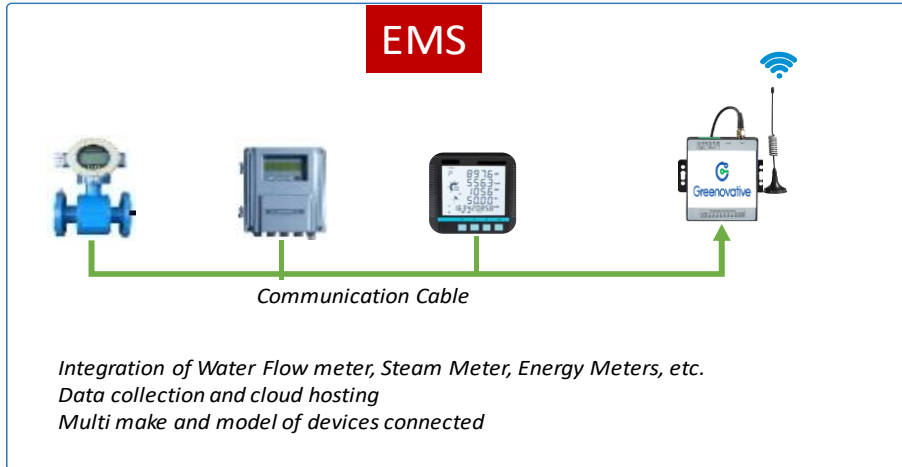


### Cost Savings Reduction in

Energy Consumption, Enhanced Productivity, Reduction in breakdown

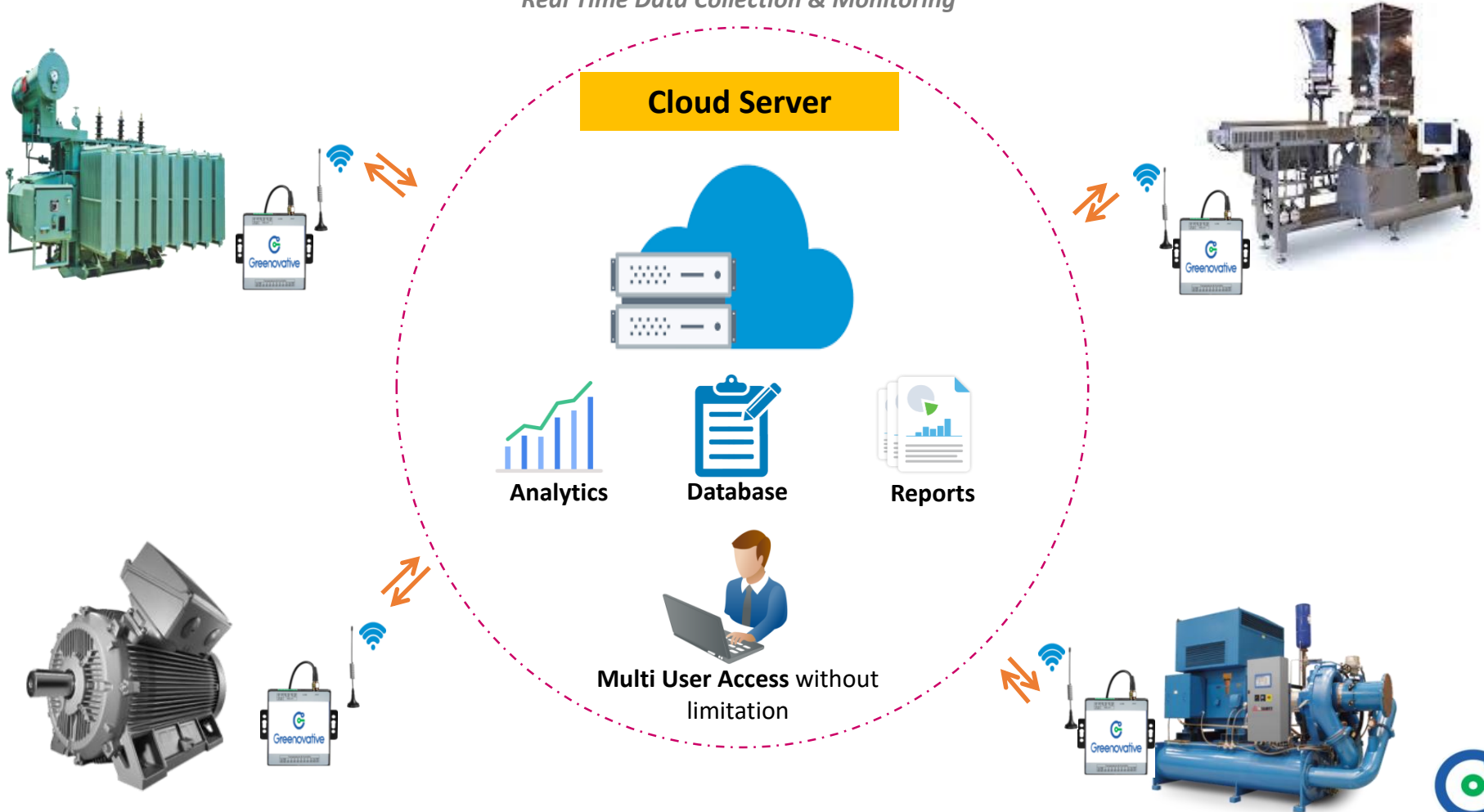


# Implementation



# Asset Monitoring System

*Real Time Data Collection & Monitoring*

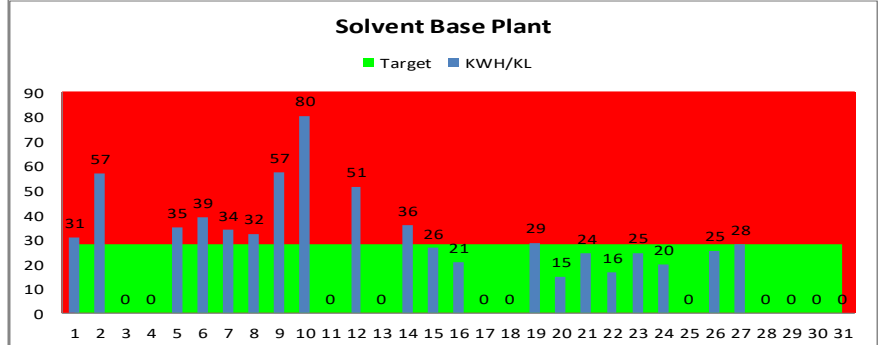
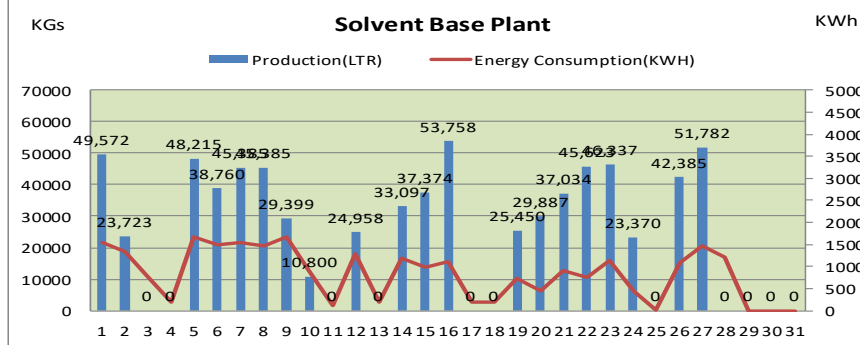
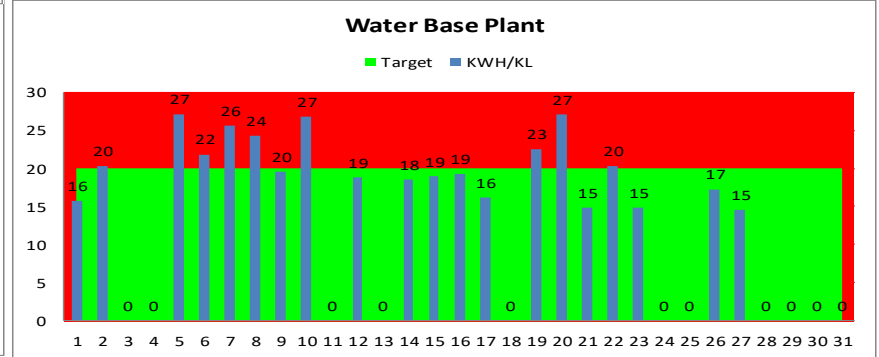
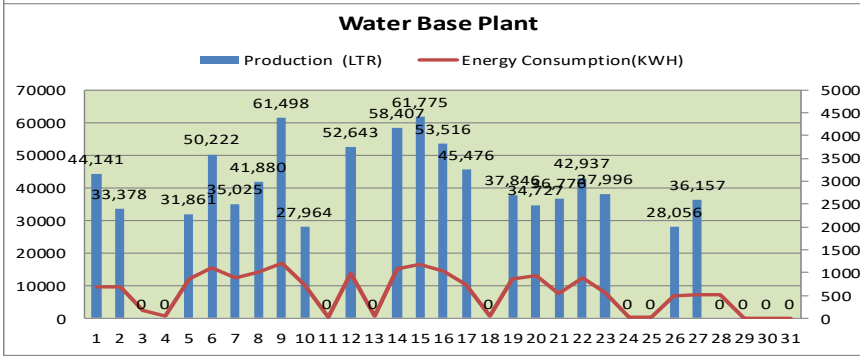
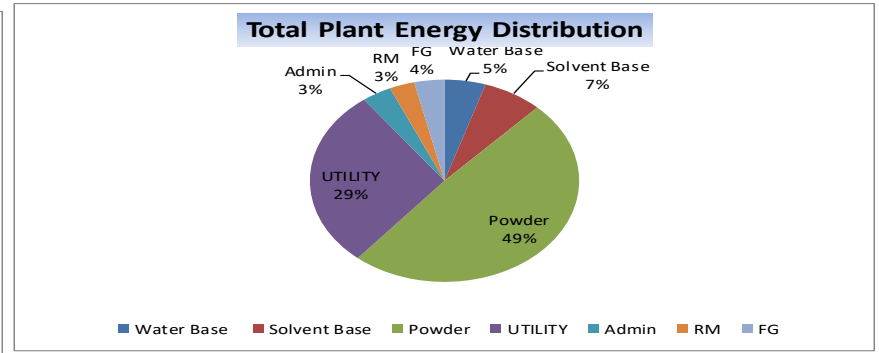
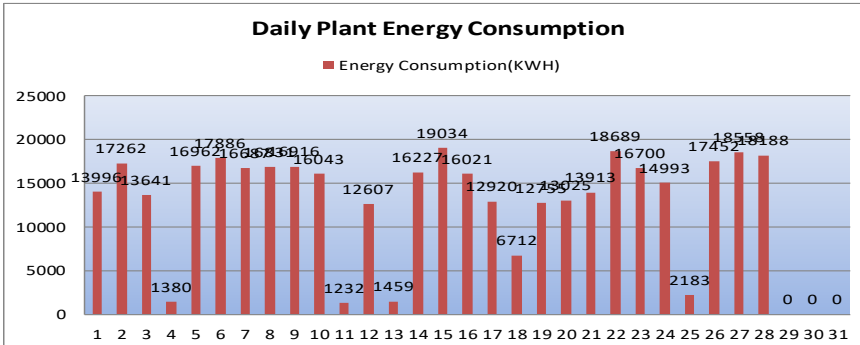


# Specific Energy Consumption Report



Date	Product 1 (KL)			Product 2 (KGS)			Product 3 (KL)			UTILITY	Total Manufacturing	Admin	RM	FG	PLANT	PLANT	
	Energy Consumption(KWH)	Production (LTR)	KWH/KL	Energy Consumption(KWH)	Production (KGS)	KWH/KGS	Energy Consumption(KWH)	Production(LTR)	KWH/KL	Energy Consumption (KWH)	KWH	KWH	KWH	KWH	Energy Consumption(KWH)	KWH/KL	
1	693	44141	16	6003	13470	446	1534	49572	31	3892	12122	468	429	526	13996	131	
2	678	33378	20	8034	24365	330	1345	23723	57	5069	15125	521	423	510	17262	212	
3	174	0	0	6857	19725	348	771	0	0	4120	11922	433	388	322	13641	692	
4	48	0	0	222	0	0	186	0	0	13	468	295	137	246	1380	0	
5	864	31861	27	7594	23190	327	1673	48215	35	4702	14834	501	444	505	16962	164	
6	1097	50222	22	8238	26835	307	1505	38760	39	4878	15718	494	495	584	17886	154	
7	895	35025	26	7706	25420	303	1533	45385	34	4321	14455	466	463	607	16687	158	
8	1015	41880	24	7601	21880	347	1464	45385	32	4560	14639	493	455	533	16831	154	
9	1204	61498	20	7678	23120	332	1683	29399	57	4444	15009	449	390	525	16916	148	
10	749	27964	27	8472	26470	320	869	10800	80	4220	14310	382	368	424	16043	246	
11	34	0	0	266	0	0	126	0	0	85	511	259	129	203	1232	0	
12	988	52643	19	5567	13020	428	1284	24958	51	4101	11941	448	414	514	12607	139	
13	50	0	0	252	0	0	183	0	0	34	519	329	141	257	1459	0	
14	1079	58407	18	7169	21305	336	1184	33097	36	4569	14001	484	459	544	16227	144	
15	1170	61775	19	9659	29110	332	988	37374	26	5017	16834	520	463	529	19034	148	
16	1032	53516	19	7238	19425	373	1110	53758	21	4427	13807	517	461	583	16021	126	
17	733	45476	16	6104	21140	289	200	0	0	4359	11397	401	372	296	12920	194	
18	42	0	0	3933	13590	289	183	0	0	1983	6141	187	153	148	6712	494	
19	855	37846	23	6550	26740	245	728	25450	29	2861	10994	480	425	480	12755	142	
20	940	34727	27	7150	28265	253	444	29887	15	2644	11178	510	390	519	13025	140	
21	544	36776	15	6874	17680	389	907	37034	24	4199	12524	463	407	519	13913	152	
22	875	42937	20	9044	26620	340	753	45623	16	5231	15903	548	528	626	18689	162	
23	563	37996	15	7401	21970	337	1137	46337	25	4507	13608	636	467	586	16700	157	
24	17	0	0	7413	18430	402	462	23370	20	4546	12438	511	433	485	14993	359	
25	17	0	0	357	0	0	20	0	0	310	703	417	153	302	2183	0	
26	485	28056	17	8205	25175	326	1076	42385	25	4758	14524	591	477	565	17452	183	
27	528	36157	15	8365	25695	326	1457	51782	28	4958	15307	590	485	582	18558	163	
28	528	0	0	8038	0	0	1201	0	0	5241	15009	516	544	639	18188	0	
29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	17897	852,281		177,990	512,640		26006	742,294		104050	325,943	12,912	10,896	13,158	0		
	Water Base Paint						Solvent				UTILITY						

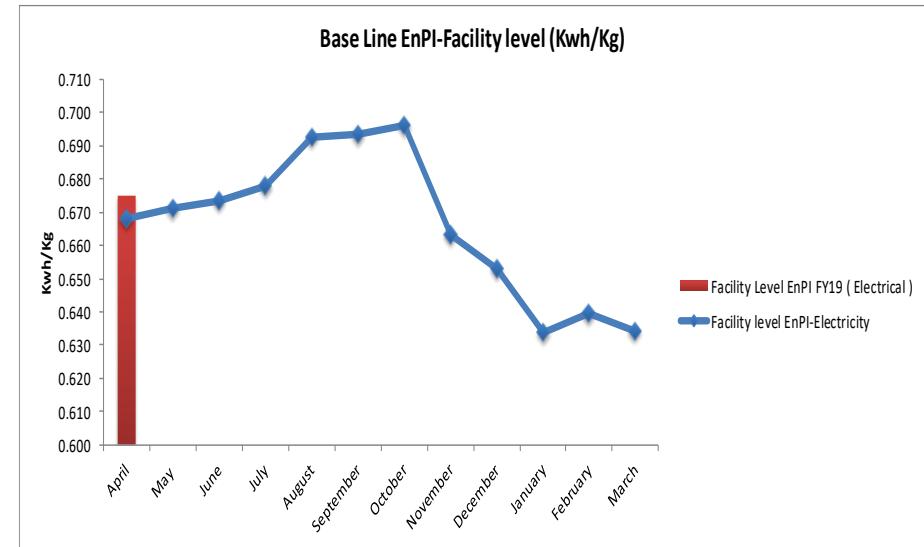
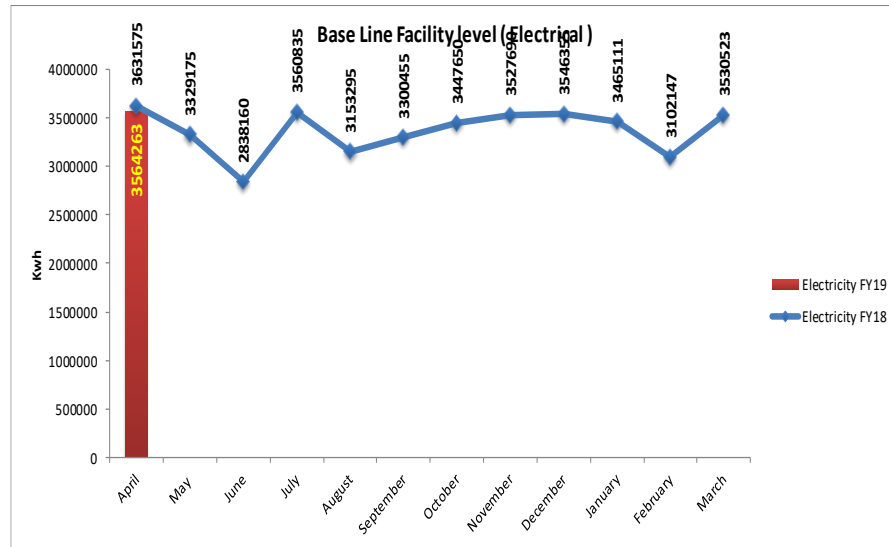
# Customized Dashboard



# ENPI Report



Fuel	April	May	June	July	August	September	October	November	December	January	February	March
Electricity FY17	3579450	3625745	3783423	3882875	3589065	3432105	3406805	3467100	3568515	3499694	3188986	3679129
Electricity FY18	3631575	3329175	2838160	3560835	3153295	3300455	3447650	3527690	3546355	3465111	3102147	3530523
Electricity FY19	3564263											
Facility level EnPI-Electricity	0.668	0.671	0.673	0.678	0.693	0.693	0.696	0.663	0.653	0.634	0.639	0.634
Facility Level EnPI FY18 ( Electrical )	0.649	0.668	0.727	0.689	0.722	0.689	0.697	0.671	0.674	0.658	0.653	0.647
Facility Level EnPI FY19 ( Electrical )	0.675											
Brequette												
Facility level EnPI (Brequette)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Facility level EnPI (FO)	5281480											
FO EnPI	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Production FY17	5358420	5403367	5619523	5729508	5181370	4949110	4893280	5228380	5464564	5520760	4986800	5800818
Production FY18	5593793	4984620	3906000	5165220	4368413	4791500	4944872	5260644	5262498	5267751	4747470	5458657
Production FY19	5281480											



# OEE Analytics

Dashboard Reporting **Analytics** Tools

Line Operator Efficiency

Line  Mill  Extruder

Line-4 x Line-3 x Line-2 x

Status(Optional)

Choose Status..

Reason(Optional)

Choose Reasons..

Sub Reason(Optional)

Choose Subreasons..

Yesterday  Last Week  Last Month  Custom Date

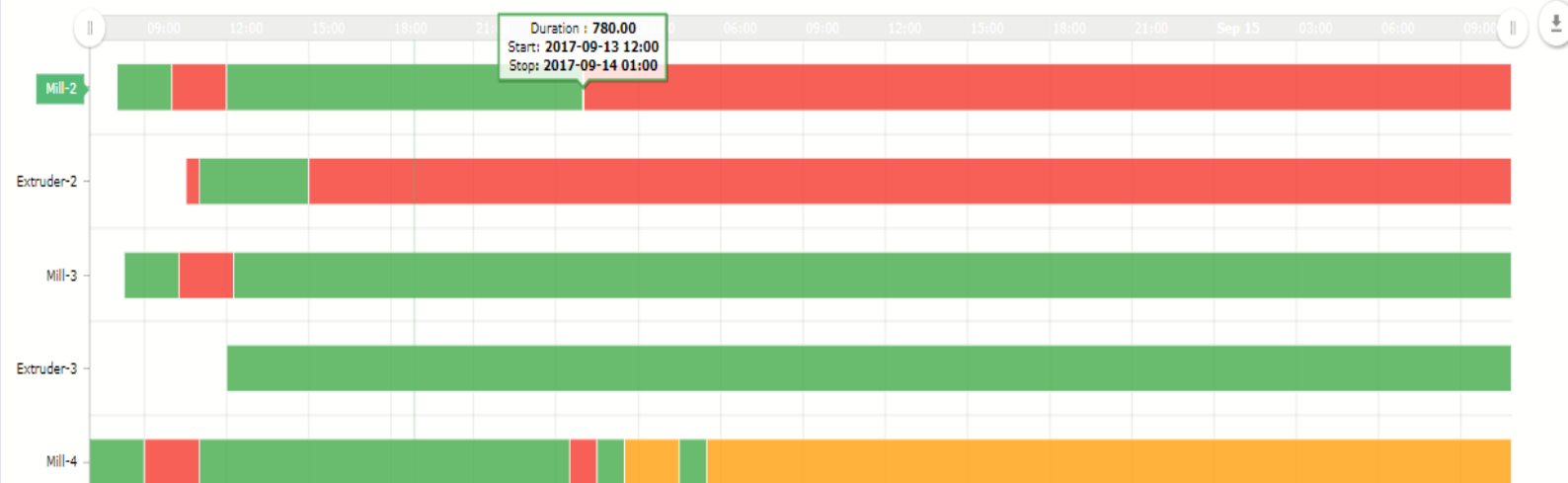
13 Sep 2017 05:25:00

15 Sep 2017 10:50:59

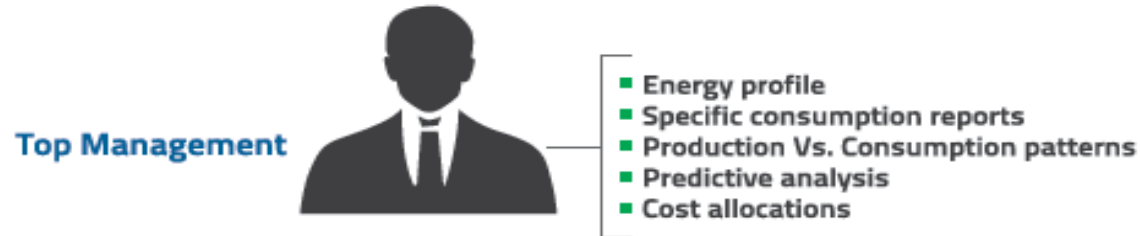
GENERATE

Line Graph

Bar Line Pie



# Hierarchical gains





# Key Take Away

## Demand and Load Flow Analysis

- Demand analysis helps to understand the demand pattern. Provides efficient method of measuring actual demand . Load flow analysis help s to utilize power efficiently, reduces wastage of energy on non productive process

## Equipment Loading Pattern

- Loading & Unloading Pattern of Equipments like compressor , Chillers etc

## Distribution Loss analysis

- Precise analysis of Transmission & distribution losses at Substation as well as Feeder level

## Equipment Performance Analysis

- Helps in asset management & operating conditions of equipments like transformers, switchgears, etc. This helps in planning preventive maintenance of the equipments

## Predictive Maintenance

- Sudden breakdowns or failures can be avoided ensuring safe operations of assets subsequently reducing the operating cost

## Reporting in compliance with ISO 50001

- Real time power & energy analysis helps in identification of potential areas of energy saving opportunities to increase profitability
- Set up Energy Performing index for all significant energy usage areas/equipments



# Solution Building Blocks

## Field Sensors



*Sensors: Energy meter, Pressure, Temperature, Air –water-steam Flow, HMI, PLC etc.*

## Connectivity Support



## Field Equipments



*Equipments: Boilers, Compressors, Chiller, Motors, Pumps, Transformers, Drives, Machines , Switch gears etc.*

## Technology Platforms



## Supported Protocols



## Third Party Integration capabilities



# Key Metrics & Accomplishments

Diagnosing **1 Billion+** energy unit every hour

Maintenance Cost Reduced by **6%** (\$0.12 Mn\*)

Amplified equipment uptime by **14%**



Decrease in energy consumption by **12-15%** (\$5 Mn\*)

Maintaining reports complied with **ISO 50001**

Increased Productivity Throughout up to **8%**

Recognized member of Department of Industrial Policy and Promotion (DIPP) India

Member of MCCIA

Assisting IMC in Egypt

  
Greenovative

Winner – Emergix  
“Highway to a 100 Unicorns”



Microsoft  
for Startups

Winner of Maharashtra Start Up Week 2018  
Winner of BIZ Arena by Proctor & Gamble 2019

Smart Startup of the year 2020 by India Smart Grid Forum For power quality at EV charging station

# Proudly Serving At...

## AUTOMOBILES



Sundram Fasteners Limited



## TEXTILE



PROUD TO BE INDIAN  
PRIVILEGED TO BE GLOBAL



## PHARMA



## STEEL



## FOOD & BEVERAGES



# Proudly Serving At...

## FACILITIES & INSTITUTES



Indian Ordnance Factories

## CEMENT



Formerly LAFARGE CEMENT

## CHEMICALS, PAINTS & EXPLOSIVES



SUDARSHAN



## TYRES & PLASTICS



People who know plastics best



## HEAVY INDUSTRIES & OTHERS



Honeywell



Amphenol®





# Greenovative

#uncoverEnergyIntelligence

**Mr. Vinit Kulkarni (9890639013)**

## **Greenovative Energy Pvt. Ltd.**

Plot No. 20, Bhagwati Nagar, Behind Croma Store, Baner, Pune-411045,  
Maharashtra, India

**Ph.:** 020 2729 5000, **E:** info@greenovative.com

**[www.greenovative.com](http://www.greenovative.com)**