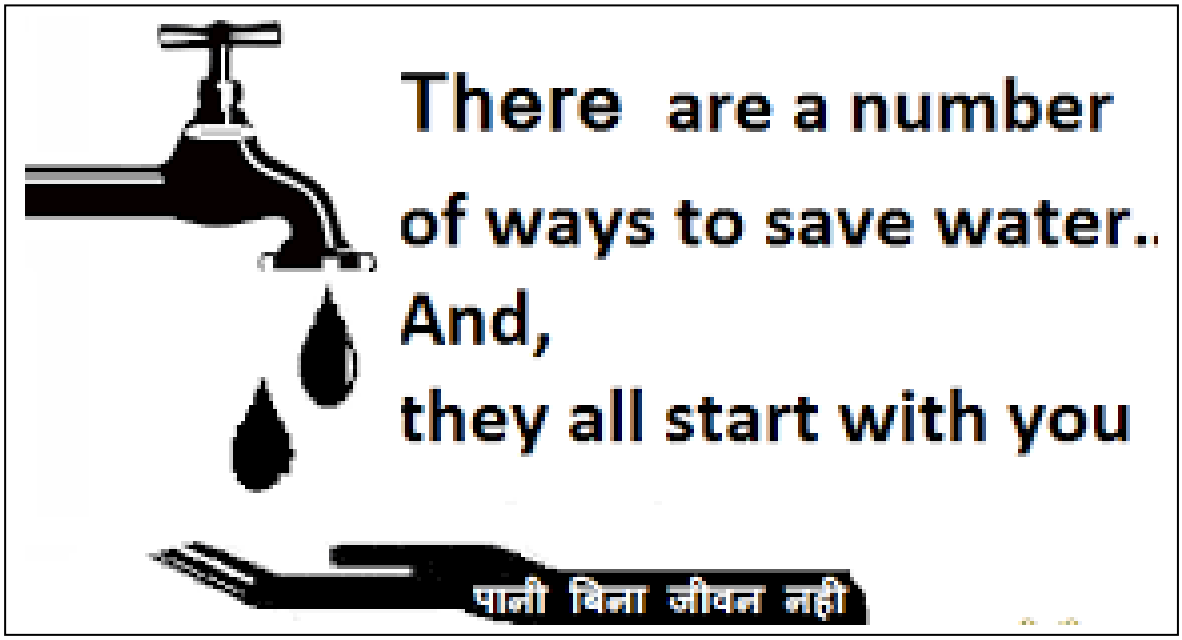
Project Category	Smart Water Project
Sub Category	Water management & treatment Project
Implementing Organization	**AHMEDABAD MUNICIPAL CORPORATION**
Name of Project	SUPPLY,INSTALLATION, T E S T I N G & COMMISSIONING OF ELECTRICAL, MECHANICAL AND INSTRUMENTATION WORKS FOR WATER OPERATION (E & M) DEPARTMENT OF AHMEDABAD MUNICIPAL CORPORATION.
Implementing Agency	Chetas Control Systems Private Limited Pune
Project Cost	33.36 Cr (Including 5 years O & M)
Funding Pattern	35% from Central Government from JnNURAM scheme 15 % from State Government and 50% AMC
Project Key Agenda	Acquisition of Real time Energy, hydraulic & Water Quantity and Quality parameter data from 145 nos. Water distribution station , 4 nos WTP, 5 Nos. French well at centralized location at a glance & generating inputs & implementing act for increasing efficiency of water distribution system .
Project Period	Oct 2014 to Apr 2021

Smart Innovative action to fight with water crises inspired by



Preamble

Ahmedabad also known as Amdavad, is the largest city and former capital of Gujarat. Ahmedabad is located on the banks of the Sabarmati River, 30km (19 mile) away from the state capital Gandhinagar. Ahmedabad is the fifth largest city and seventh largest metropolitan area having population of 7.2 million in India. Ahmedabad Municipal Corporation was established in July 1950 under the Bombay Provincial corporation Act of 1949.Ahmedabad Municipal Corporation (AMC) grew from an area of 52.49 Sq.Km. (in 1950) to 466 Sq.Km. (in 2013). The city is divided into Six zones constituting 48 wards.

AMC provides obligatory and discretionary services to the citizens are: water, drainage, sewerage, health, street light, Road and bridges, hospitals, education, public transportation, library, fire, solid waste, public laboratory. Water treatment and Water Distribution is a very important key for the development of any city. All ULB (URBAN LOCAL BODIES) popularly called as Municipalities in India have started working towards this and many have achieved very good progress in the field of water treatment and distribution.

Ahmedabad Municipal Corporation – AMC is one of such ULB in India who has achieved till date as good as 90% of house hold coverage with potable water supply as on date and working ahead to achieve objective of 100% coverage with 24 x 7 water supply as per WHO quality standards for drinking water. AMC supplies apx. 1150 MLD water across the city through 3 major water treatment plants and 187 WDS.

AMC is responsible for catering to the domestic and commercial water demand of the city. Sabarmati river and Narmada canal are the two main sources of water for the city. AMC currently operate 3 major Water Treatment Plants namely Kotarpur, Raska, jaspur. Currently there are 4 operational frenchwells on Sabarmati River that augment water supply to the city. Along with Sabarmati River and Narmada canal, ground water is also utilized as a source for water supply. After treatment, water is then supplied to various Water Distribution Station (WDS) in 6 zones across Ahmedabad city which further supply water to the end user. The major supply sources to the city are given below.

Earlier Operating Mechanism

- All WTP are manual operated on contract basis
- Critical operations were manually basis .
- Monitoring of water quality parameters was on manual in Laboratory on sampling basis.
- Consumption of chemicals is calculated and logged manually.
- All reporting is thru manual log books
- Government water charges were paid on yearly audit & run hour basis.

Need is mother of innovation

Objectives-

- Provide adequate quantity of water as per CPHEEO standard to citizens.
- Reduction in NRW.
- Reduce Break downs and maintenance Time.
- Water and energy Audit.
- Provide tool to executives for improving water distribution efficiency.
- Effective and efficient management of Water Supply.
- Transparency to citizens.

To overcome above objective, Ahmedabad Municipal Corporation have decided to adopt a solution comprising following goals:-

- Adopting advanced technology
- Real time data generation with online monitoring.
- Monitoring KPI (Key Performance Indicator)
- Defining SOP (Standard Operating Procedure) for auto analysis & Alerts
- Monitoring health & performance of water distribution pumps
- Preventive maintenance to avoid break down maintenance
- Monitoring Water Distribution Efficiency.
- Review of Return on Investment (ROI)

Adopting advanced technology

Use of SCADA:-

- Converts measured data to engineering units
- Performs local and remote control functions
- Performs equipment safety shutdown functions
- Transmits data to a central monitoring location
- Water/wastewater system can be operated as a single coordinated entity
- It saves money in electrical and chemical costs
- It takes far fewer people to monitor and operate the system-additional savings are realized
- Emergencies can be instantly responded and System faults such as main breaks can be quickly identified instead of waiting for citizen complaints
- Treated Water quality is closely monitored to ensure public health and safety
- Human errors elimination in operation.

In first phase, AMC has commissioned Real time data generation and defining SOP for auto analysis and alerts for Flow, Energy and Analytical parameters of 148 WDS, 3 WTP and 4 frenchwells.

Real time Energy, hydraulic & Water Quantity and Quality data from 148 nos. Water distribution station , 3 nos WTP, 4 Nos French well are available at a glance at centralized command center & 6 nos Zonal water management stations.

List of Major Equipments covered under SCADA Project & their function

Sr. No	Name of Equipment	Function
1	Ultrasonic Level Transmitter	Monitoring water Sump Level
2	Electromagnetic Flow meter & Insertion type multipath ultrasonic flow meters	Quantification of water at various locations
3	Pressure Transmitter	Monitoring of water line Pressure
4	Chlorine –PH Meter	Monitoring quality of water
5	Turbidity Meter	Monitoring quality of water
6	PLC/RTU & SCADA	Gathering Data from various water quantity/quality monitoring instruments &wireless data transmission to zonal ,central location , GUI & MIS Reports
7	Open Channel flow meter	Quantification of gravity water flow
8	Differential Level Transmitter	Identification of water screen clogging
9	Multi function Meter	Monitoring of Energy of water Pumps
10	IBM – IOC software	Data analysis at a glance

Sr. No	Name of Equipment	Quantity of Instruments (Nos)
1	Multi function Meter	785
2	Ultrasonic Level Transmitter	203
2	Blind Pressure Transmitters	714
3	Digital Pressure Transmitters	177
4	Open Channel flow meter	4
5	Differential Level Transmitter	4
6	Electromagnetic flow meter	277
7	Ultrasonic Flow meter- wtp	4
8	Chlorine –PH Meter	145
9	Turbidity Meter	155
10	Stand alone PH Meter-wtp	6
11	Stand alone FRC analyzer-wtp	6
12	PLC/RTU for WDS	154
13	PLC/ RTU for Frenchwell	5
14	PLC/ RTU for WTP	1
15	Zonal monitoring computer stations	7
16	Master Centralized Scada system along with necessary servers,UPS, Video wall , Ac Furniture, IBM command center	1

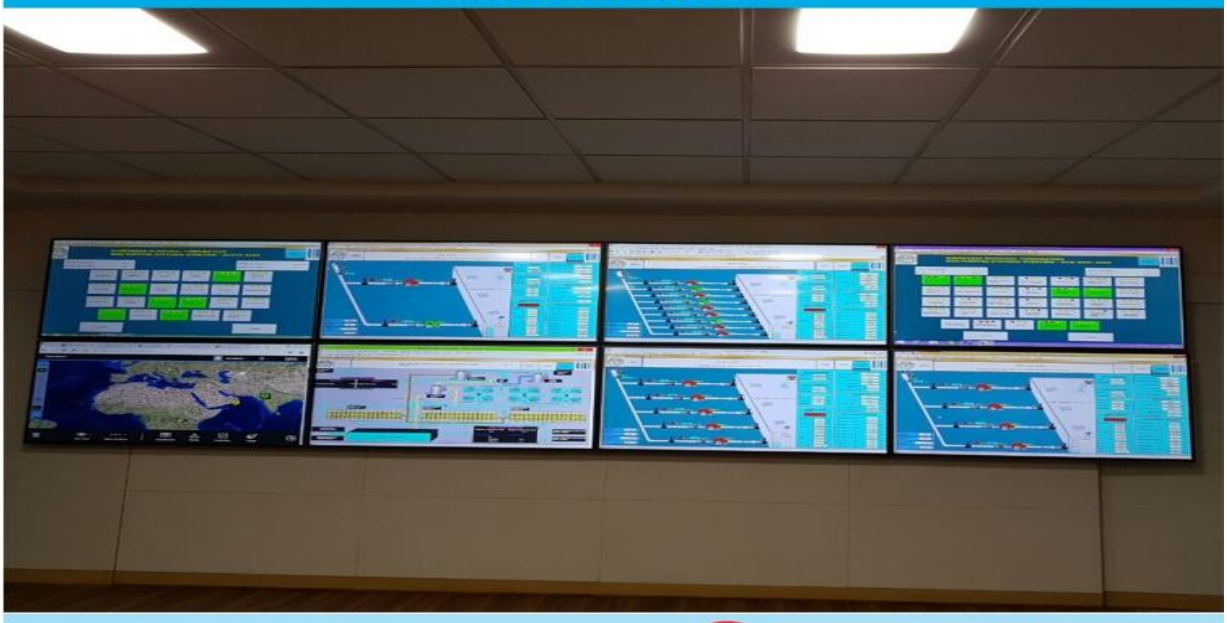
Administrative Advantages of SCADA

- Important tool for implementing 24 x 7 Scheme.
- Improved efficiency of executives enabling them handle more infrastructure with limited man power.
- Overcome manual errors in operation reducing break downs.
- Direct monitoring from centralized control room additionally.
- Monitoring of entire water supply system by topmost authority in AMC.
- Automatic direct reporting to all concern Engineers.
- Web base application enable monitoring through Mobile.
- Quality monitoring increase safety and health of people.
- Centrally Surveillance of WTP

Financial Advantages of SCADA

- Reduced cost of operation as preventive measures can be planned.
- Proper automated operations smoothens mechanical and electrical shocks lengthening life of equipment more to reduce maintenance cost.
- Energy monitoring and saving reduce electricity cost.
- Auto power factor control eliminate penalty, thus saving expenditure.
- In water treatment plant auto operations alert the back wash requirement & recharging of bed media thus saving of clear water resulting in monetary gain.
- Auto reporting to centralized place minimize present practice reporting which leads to reduced communication cost.
- Controlling physiochemical parameters results in to savings of chemicals at WTP/WDS.
- SOP for auto analysis and alerts for Flow, Energy and Analytical parameters
- Total 23 mld production increased by analyzing the French well data at no cost.
- By analyzing the data of WDS & operating the valves, total Rs.587 Lakhs. Per annum saving has started by reduction of borewell running hours.

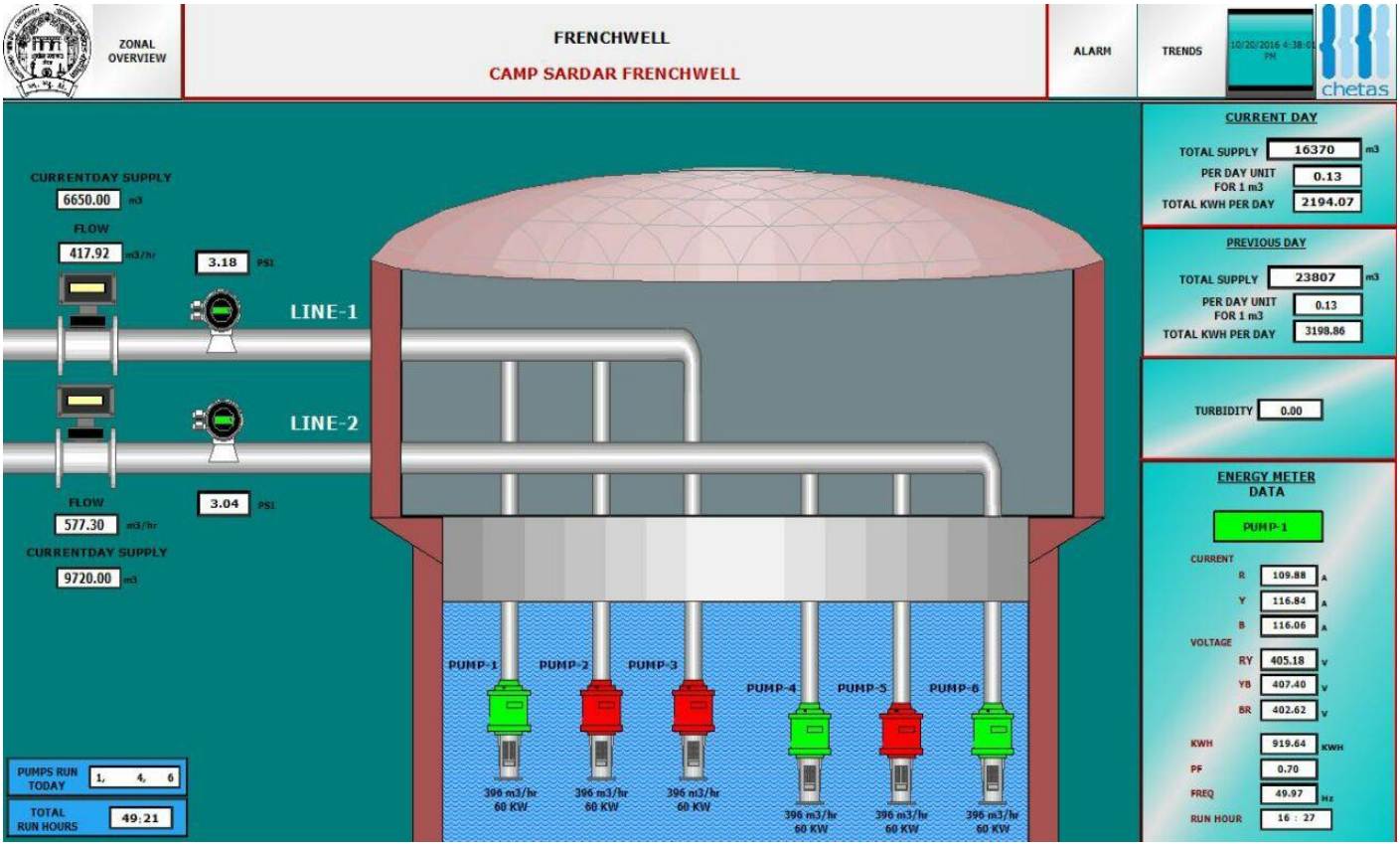
WATER SCADA



- **S** Specific
- **M** Measurable
- **A** Achievable
- **R** Realistic
- **T** Time-bound

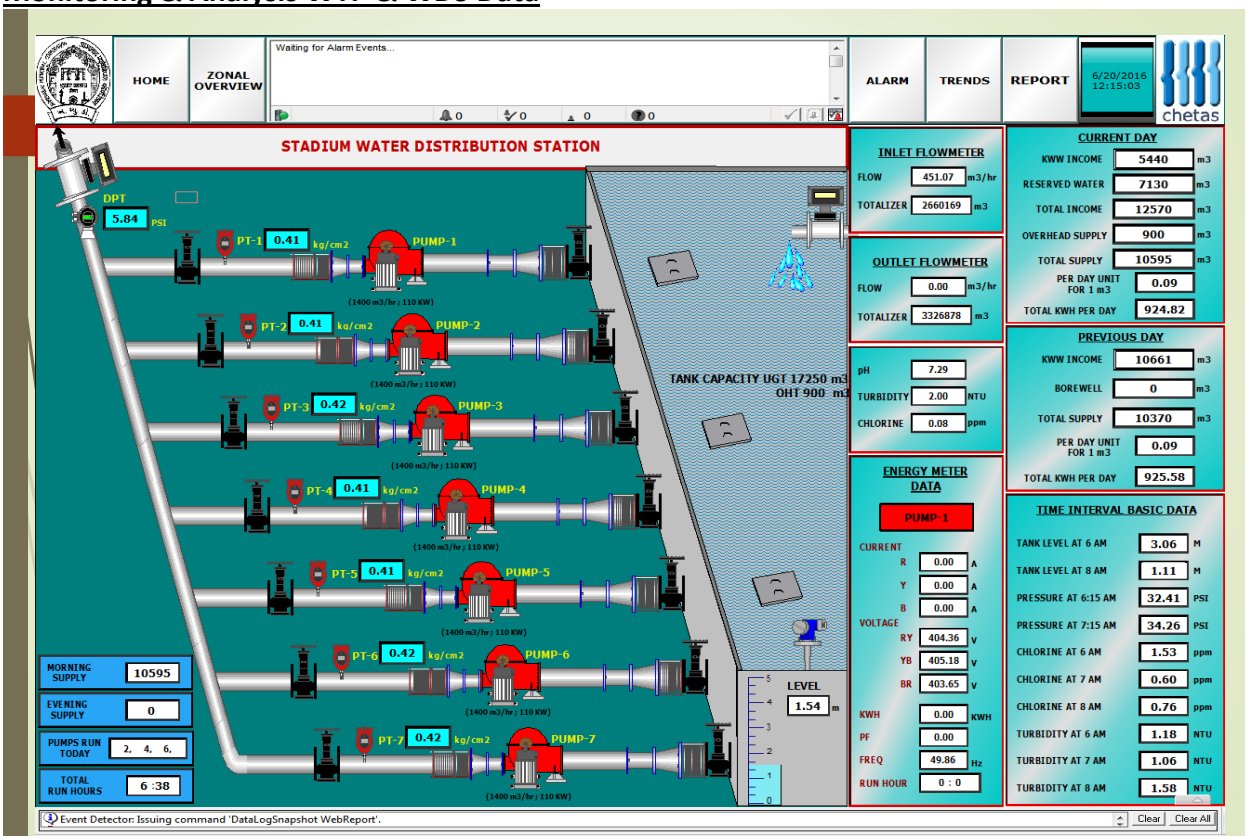
- **Real Time** monitoring of all hydraulic & analytical parameters from water source to distribution @**centralized water command center**
- Scope covers **145 Nos Water Pumping Stations, 4 Nos WTP'S, 5 Nos French wells.**
- Generation of inputs **for online water audit** from water source to distribution
- Effective utilization **of intelligent water operation** at Master Command Center for monitoring of KPI (Key Process Indicators) & Processing of SOP's
- Monitoring of **pump performance** w.r.t. water discharge, head & electricity.
- Gathering inputs for **continual improvement** of water distribution efficiency
- ₹ Commencement of **continuous saving of 600 Lakhs** per annum

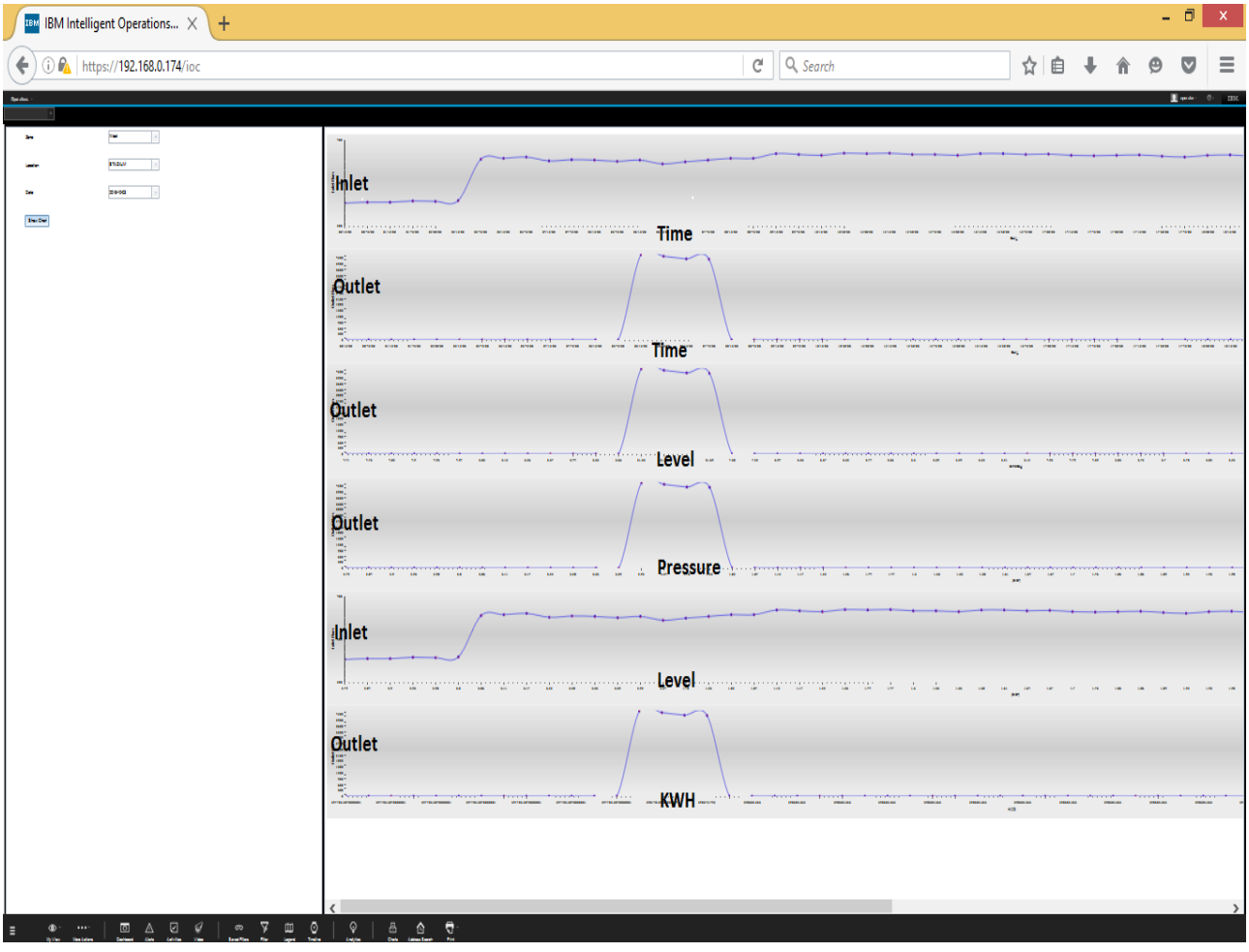
Case study of Bhadreshwar & Camp Sadar Frenchwell



Sr. No.	Name of Frenchwell	Water drawn pump/MLD		
		Before SCADA Production data (MLD) (A)	**After SCADA Actual Production data (MLD) (B)**	**Production increase after SCADA data analysis & necessary action taken (MLD) (C)**
1	Camp Sadar	19.06	17.2	20 -23
2	**Bhadreshwar**	**47.65 (with 5pumps run)**	**22.59 (with 5pumps run)**	**28 – 31 (with 3pumps run)**
3	KWW	19.06	17.3	20 - 23
4	Motera	27.60	17.8	30 - 33
5	Acher	7.5	7.5	0 - 9
	TOTAL MLD	**120.87**	**82.3**	**98 – 119 (Avg-105)**

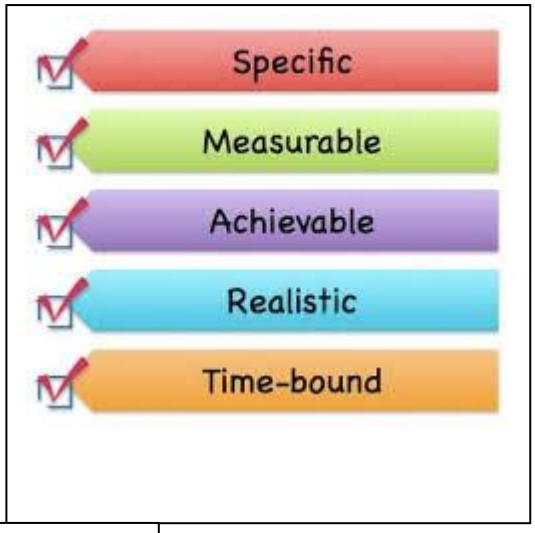
Monitoring & Analysis WTP & WDS Data





Review of Return on Investment (ROI)

- Cost Incurred In Project :- 30.77 Crore
- Energy saving :- 587 lakhs
- Leaking identification case :-
- Effective utilization of water by augmentation on basis of SCADA data analysis :- 23 MLD
- Total Cost Saving –per day :- 1.61 lakhs
- Total cost saving – per Year :- 587 lakhs
- Project break even achievement in months – 5 years 6 months



Water Production(mld) increases & Savings At Frenchwell Due to SCADA

Sr. No.	Name of Frenchwell	Water drawn pump/MLD		
		Before SCADA Production data (MLD) (A)	**After SCADA Actual Production data (MLD) (B)**	**Production increase after SCADA data analysis & necessary action taken (MLD) (C)**
1	Camp Sadar	19.06	17.2	20 -23
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	TOTAL MLD	**120.87**	**82.3**	**98 – 119 (Avg-105)**

- **23 MLD PRODUCTION FROM FRECHWELL INCREASES (23 MLD WTP WORTH WTP COST OF RS.4.5 CRORE)**
- **SAVINGS IN IRRIGATION CESS TO GOVT. = (A - C) x 2370/MLD x 365 DAYS = 137 LAKHS/YEAR**
- **SAVING IN ENERGY AT BHADRESHWAR = (60 KW X 2) X 24hrs. X Rs. 8/kwh X 365 Days**

  = 84 LAKHS/YEAR

Utilizing the increased production of 23 MLD from frenchwell (Savings due to SCADA)

1	**Supply increase in West Zone**	**185 MLD to 192 MLD = 7MLD**
2	**New WDS commissioned Supply increase in other Zone WDS**	**Kalapinagar : 5.3 MLD Shahpur : 1.36 to 3.35 mld Barfiwala**
3	**135-150 hrs bore well hours reduced in NZ/CZ/WZ per Day**	**NZ: 500 to 435 hrs. CZ: 375 to 360 hrs. WZ: 750 to 675 hrs.**
	Energy Saving: 135* 50 *8/unit = 0.54 lakh per day = 197 lakh per annum	

Saving in energy by closing delivery valves during non supply hours for the year 2017

SR. NO.	NAME OF WPS	SERVICE NO.	Before SCADA	After SCADA					
			JAN-16	JAN-17	FEB-17	MAR-17	APR-17	May-17	June-17
			UNIT	UNIT	UNIT	UNIT	UNIT	UNIT	UNIT
1	Ankur	8000203	108340	67380	41720	50290	51190	71180	68630
		LT-3269285	36524	21418	27900	26564	24170	208	1662
2	Pragatinagar	8000248	58483	37930	33193	43770	41778	35910	39018
3	Sabarmati	8000146	49920	44350	38630	43170	41810	40420	41670
		100177331	31190	30854	27126	32398	29606	10594	11072
4	Harijan Ashram	8000196	103700	65810	52630	49300	43590	44950	47960
		LT-3259290	40680	1560	0	1488	0	242	0
		LT-3260377	40072	0	1474	706	888	1126	1504
5	Fatehpura	8000201	158670	110410	101760	108960	105370	93620	97110
6	Javaharnagar	8000157	104290	79240	73650	84600	86560	82680	106260
		LT-3262539	13800	0	5878	88	5576	22842	10678
7	Vadaj	8000190	69370	42320	33870	38625	38975	38425	39320
		LT-3254386	31196	1904	276	578	1778	6172	17550
8	Meghaninagar	8000156	61330	77580	68930	77790	77470	78760	76420
		LT-2266313	29638	34324	19358	16650	4450	5524	7012
		LT-2243765	35802	43540	33458	30242	39014	37732	35036
		LT-2263839	45962	55048	44630	46914	49740	48604	46074
9	Memco	8000960	43390	44410	33318	20518	25933	24378	29498
10	Krishnanagar	8000837	104660	100670	88080	92160	98000	103810	101350
11	Naroda TP- 2	8001331	56823	34253	27225	29958	26565	27168	26003
12	Vatva Railway cros	8001148	61953	73425	70265	89793	93585	86805	67353
TOTAL			**1285793**	**966426**	**823371**	**884562**	**886048**	**861150**	**871180**

SR. NO.	NAME OF WPS	SERVICE NO.	Before SCADA	After SCADA					
			JAN-16	July-17	Aug-17	Sept-17	Oct-17	Nov-17	Dec-17
			UNIT	UNIT	UNIT	UNIT	UNIT	UNIT	UNIT
1	Ankur	8000203	108340	78830	89920	67930	88510	79020	73660
		LT-3269285	36524	7498	30498	4698	21140	26722	28400
2	Pragatinagar	8000248	58483	46065	3883	34098	39405	31313	32937
3	Sabarmati	8000146	49920	43180	51640	40670	44750	39090	40950
		100177331	31190	1158	890	804	4	34	287
4	Harijan Ashram	8000196	103700	46430	50860	42510	61020	58060	61930
		LT-3259290	40680	1350	25744	1924	3386	2330	23410
		LT-3260377	40072	3708	8790	16700	27922	21756	9118
5	Fatehpura	8000201	158670	106540	103180	93300	96860	95310	91520
6	Javaharnagar	8000157	104290	85660	89330	89870	105090	103450	76280
		LT-3262539	13800	13348	7306	66	184	0	8862
7	Vadaj	8000190	69370	47885	47550	51975	68625	51370	41105
		LT-3254386	31196	2244	950	0	0	17982	36852
8	Meghaninagar	8000156	61330	83070	85370	76680	83590	73090	78010
		LT-2266313	29638	4298	2430	0	744	2	6
		LT-2243765	35802	34484	25078	3850	6770	21994	11990
		LT-2263839	45962	45272	44330	45556	48888	30600	41628
9	Memco	8000960	43390	23450	26738	25225	35963	28643	26993
10	Krishnanagar	8000837	104660	107180	104650	98240	98240	101140	108810
11	Naroda TP- 2	8001331	56823	23645	26558	30318	30318	26925	28695
12	Vatva Railway cros	8001148	61953	59130	71695	67913	67913	68235	72375
	TOTAL		**1285793**	**864425**	**897390**	**792327**	**929322**	**877066**	**893818**
Total Savings = 406869 x 8.0 = 3254954/- per month i.e. 3,90,59,448/- per annum									

Net Savings due to SCADA Implementation

Sr. No.	Actions taken after SCADA Implementation	Savings (in Lakhs) per annum
1	Savings In Irrigation cess To Govt.	137 lakhs (As per actual measurement of water consumption)
	Energy saving	
1	Energy saving at Frenchwell	84 lakhs
2	By utilization of increased 23 MLD Surface water from Frenchwell	197 lakhs
3	By closing Delivery valves during non supply hours.	390 lakhs
	Total	587 lakhs

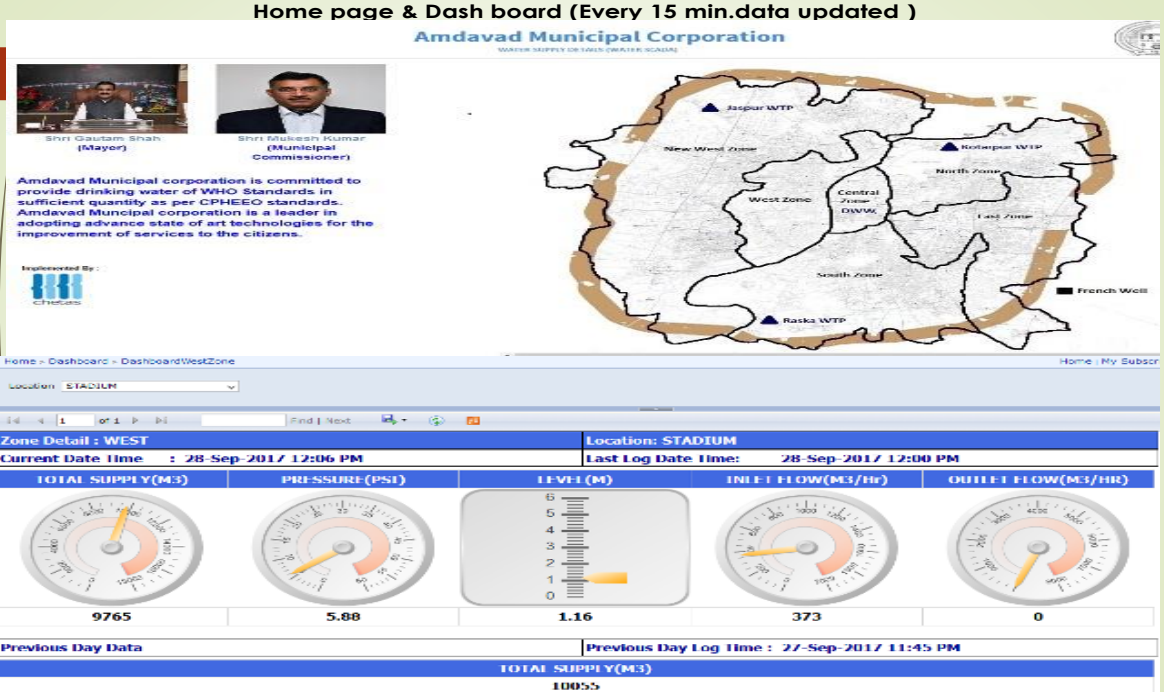
till Further Analysis work is going on……

Will bear the fruits in near future……

Energy Saving after SCADA Implementation

Energy bill Before SCADA					
2015					
HT		LT		TOTAL UNIT (TPL HT,LT + GEB)	TOTAL AMOUNT (TPL HT,LT + GEB)
UNIT	AMOUNT	UNIT	AMOUNT		
76267123	600984062	48474378	357334178	130871101	994264240
Energy bill After SCADA					
2016					
HT		LT		TOTAL UNIT (TPL HT,LT + GEB)	TOTAL AMOUNT (TPL HT,LT + GEB)
UNIT	AMOUNT	UNIT	AMOUNT		
80515202	597867624	47913913	328409990	134912685	968222114
2017					
HT		LT		TOTAL UNIT (TPL HT,LT + GEB)	TOTAL AMOUNT (TPL HT,LT + GEB)
UNIT	AMOUNT	UNIT	AMOUNT		
77620777	585753738	42886839	298451442	126929216	924453680
Net Saving due to SCADA Data analysis Implementation					**5,88,82,736/-**

SCADA Report Website
Home page & Dash board (Every 15 min.data updated)



Surveillance of WTP

SCADA WORK IN PROGRESS FOR 51 new WDS

Work is taken up for following works:

- SCADA OF 51 NEW WDS constructed during last 3 years.
- Up-gradation of manually operated sluice
- Modification of LT panels.
- Local Time/Level-based/Pressure based Automation of all WDS.
- Incoming surface water valve automation