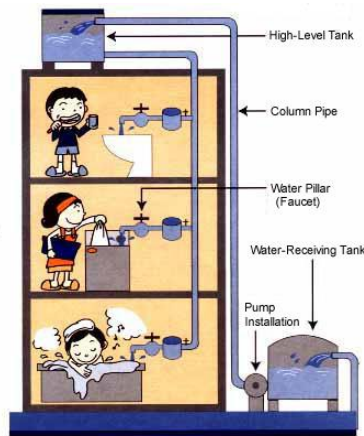




Continuous issue-21 | April - May 2016

Community cooperation for meter supply water can promote efficient use of domestic water leads to conserve energy for better livelihood.

A case study of Navdeep Apartment, Memnagar, Ahmedabad, Gujarat, India



1.0 Background

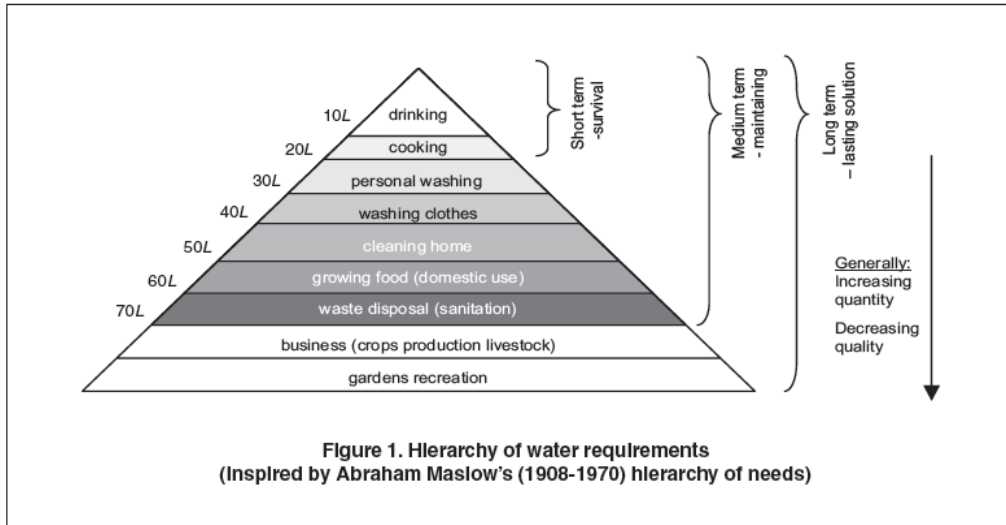
Without water, life is impossible for most creatures and plants. Water is essential to life. From morning to night and from birth until death we cannot leave without water. Water has economic, social and spiritual importance. Water is key natural element, which is MOST vital to life on Earth.

Water meters used to measure quantity of water supply thru that pipe. Purpose of water meter is to supply water thru volumetric based and charge accordingly to use of water. This will provide firsthand information about how much water one is using. There are varieties of water meter used for domestic water supply. Most commonly fan type rotating spindle type or turbine meter used. They easily fit in to pipe water supply system. The flow range varies from 0.05 to 1.5 liters per second used for domestic used.

There is practice to read reading monthly, bimonthly or quarterly depend up on billing system. A person will note down current meter reading and it deduct from previous meter reading, difference between current and previous meter reading provide the amount of water used.

Ahmedabad is the largest city of Gujarat. It is the administrative headquarters of the Ahmedabad district. With a population of more than 5.8 million and an extended population of 6.3 million, it is the fifth-largest city and seventh-largest metropolitan area of India.

In this paper application of water meter done by Navdeep community discussed. A registered cooperative housing society namely “Panchsil Memnagar co-operative housing society limited vibhag-1” in 1995. It had four blocks, A had 14 apartments, B had 18 apartments, C had 18 apartments and D had 26 apartments.



Around 76 apartment owners having 270 people lived in four block had agreed and decided to distribute water thru meter in year 2013. They had decided to collect charges as per use of water to cover their operational expenditure to maintain water supply system.

For promoting efficient use of water for domestic purpose, representative of Navdeep gather and discussed how to

reduce wastage of water? One solution is to meter water supply to each house. During discussion, it was raised question that each house had three to four connection from different direction as well as all connection coming from terrace to all floors? At that time it was decided that first to see the successful meter supply of water where implement. There were two separate visits were done one at Avadh apartment where meter water supply was successfully implemented by owner and running it satisfactory. During discussion with both places, it was found that it will ultimately reduce wastage of water and it leads to reduction in electricity bill.

1.1 Legal Status of Water in India

Water is a state subject, which implies that according to the constitution of India it comes under the purview of the state government. The 74th Amendment of the constitution delegated 18 functions, including water supply to urban local bodies (UBL), and accorded constitutional status to these institutions as the third tier of the Government. However, without commensurate increase in their revenue-raising powers, ULBs face inordinate fiscal stress, which has rendered most of them incapable of meeting the challenges of a rapidly urbanizing society.

The world's population, which was 2.5 billion in 1950, has increased 150% to over 6 billion in 200. About half the world's population lives in urban centres today, compared to less than 15% in 1900. The number of metropolitan cities rose from one in 1901 to 35 in 2001. Currently, about 30% of India's population lives in urban areas and by 2030 this is likely to increase to 40%.

According to study done by the Asian Development Bank on Indian utilities average water supply in urban areas is around 4.3hours/day.

1.2 Water Consumption

UN says that a human being needs 50 litres of water per day in order to prepare meals and to have enough for personal hygiene. But , many in Africa must get along with 20 litres water per day. In Germany, the water

consumption per person amounts to 122 litres water per day. About 1/3 is for toilet-flushing, 1/3 for body hygiene and another third for laundering, washing the dishes, cooking and drinking. For cooking and drinking, we need about 5 litres per day.

Scenario of Water meter at a glance:

Measuring water thru water meter is used in industrial used and now a days used for residential as well. It is not practice in irrigation. Measuring water in domestic supply of pipe water system is easy compare to irrigation canal water. Many places selectively used water meter for domestic supply of water. In many developing countries, meter supply of domestic water (hot and cold) as well as measuring drainage water and tax accordingly that is most commonly practice.

S.Droz dov (2002) in his paper (published in Paris, February 25-26, 2002) clearly stated that metering water will leads to reduction of domestic water consumption. He further added that “Cost plus” tariff formulae to address sustainability. He had emphasis that there should be clearly defined laws and regulations of ownership of water meter, maintenance and operational responsibilities etc.

2.0 Maintenance of Navdeep housing society

As per the practice, electricity is required to lift water from the ground water or from the storage tank, which is currently, fill up by Narmada Water by municipality. For 2011-2012, monthly maintenance was Rs. 700 per month and those who pay all twelve months maintenance in advance in month of April- 2011 given rebate of Rs. 250. At the same time it was decide to increase maintenance from April 2013 due to increase in electricity bill. It was assume that it should be around Rs.1000 per month. Meanwhile there was discussion to reduce leakage and lots of effort done to reduce leakage and wastage of water. Ultimately result was nil. At that time there is needs to replace old pipe line also comes in to agenda because of eighteen years old pipe line network is almost damage at many places. This all comes to a time when there was model exist nearby society that had placed water meter where similar size and type of apartment was there. One day a group of people went to visit Avadh Apartment, which is just one kilometer away from Navdeep apartment. After having exposure to newly established water meter system representative of Navdeep was impressed and decided to sharing their views with management committee of Navdeep. The idea discussed in general meeting and accepted by almost 90% people. A plan decided to generate money to established water meter system by collecting Rs.10,000 from each apartment owner.



Water Meter

2.1 Metered Water

A metered water account involves a meter to monitor water usage. Metered water accounts are subject to a minimum charge per year as well as a rental charge/ water use charge. The water use charge paid on a bimonthly basis. The minimum charge can vary in different local authority areas.

Meters generally used to monitor the amount of water used by users. The meter installed on an agreement by majority of the apartment

owners. A volunteer had took responsibility to do meter reading, prepare bill and collect fees. Bill was prepared on bimonthly.

2.2 Costing of Meter Water Supply

The cost of metering includes:

- Investment costs to purchase *and to install* meters, as well as
- Recurrent costs to read meters and to issue bills based on consumption instead of bills based on monthly apartment fees.

While the cost of purchasing residential meters is low (in the range of Rs. 2300 per meter), the total life cycle costs of metering are higher. For example, retrofitting apartments in large buildings with meters for every apartment can involve major plumbing work and can be very costly.

In case of Navdeep apartment, common meeting held where majority of house owner gather and discussed about their visit to meter water supply projects. It was estimated that around Rs. 6,00,000 required to implement this project. During detailed discussion it was decided that Rs.7000 will be collected from each apartment owner, which will be comes to Rs.5,32,000. During execution of work each apartment owner remains present to see quality of work. Few individuals also volunteer entire project for material management, quality supervision, coordination between contractor and apartment owner etc. Mr. Rasiklal had volunteered to maintain stock of material and handle material management. He is person who also volunteered to read meter and raised bill and collect bill amount and deposit to secretary. He had done excellent work of keep all kind of data and accuracy in this work. He had provided this information for this study.

Expenditure for entire pipe line replacing and establishing meter cost Rs. 6,67,474. For 76 apartments, it comes to Rs. 8782. This is higher than what was decided and collected per apartment Rs.7000. The remaining money Rs.1,35,474 was spent from common fund, which comes to Rs.1782 per apartment. It is indirectly incentive provided from the common funds. Apartment owners created this fund.

3.0 First Water Bill:

On 16th December, first reading of water meter was taken in presence of apartment owner and sign in register. Second meter reading was taken on 3rd February, 2013 for water used during the period of 16th December, 2012 to 3rd February, 2013. It was decided that Rs.15 will be charge for 1000 liter of water. i.e. for apartment C/3- water consumption was 15.19 (thousand liters) water have to pay Rs.228. For timely payment of said amount it was announce that after stipulated date the penalty of Rs.30 will be added for next bill.

Use of water: As per water bill for 49days comes to 15190 Liters for three adult people in family (C/3, Navdeep). Use per day comes to 310 liters per day and 103 liters per capita per day.

3.1 What happened?

- Navdeep apartment was almost 15 years old, the galvanize pipe within apartment was corrugate and plastic pipe had accumulated dissolved solid and become narrow in section. During this process of meter water all pipes was replace by UPVC good quality pipes with meter. Which ultimately resulting increase flow and zero down leakages.

- All apartments have their own dedicated line from meter to all three or four places, which provide enough pressure to fulfill their requirement. It ultimately increases velocity and discharge at end users.
- Due to change in all old pipes, individual apartment owners also takes interest and repaired or replace their internal plumbing, which resulting to zero down leakage at apartment level.
- Reduction in wastage of water leads to overall reduction in water supply, which leads to reduction in pump hours to operate. This reduce electricity bill during this period.
- Having this positive impact, the executive committee decides to reduce monthly maintenance charge from Rs. 700 to Rs.400.

It not only reduces the use of electricity but also reduce wastage of water and this again reduce load on sewerage system. This ultimately reduces use of ground water. Earlier every two years we lowering down tube well pipe by 6 to 12 meters now from last four years we did not.

3.2 Who Benefited

- Apartment owner get new pipelines
- Reduce the use of electricity
- Reduce monthly maintenance
- Reduce wastage of water: Judicious use of water
- Security guard reduces their work to fill the water tanks. “We are now running bore well for only two to three hours instead of seven hours: says Dahanjibhai Security Guard of Navdeep”
- Reduce maintenance of bore well.
- Owner of apartment have continuous flow of water
- Owner have better quality of water because the use of ground water reduce
- Mixing with Narmada water (Less TDS: 140) with tube well water (High TDS: 1200) and reduction in use of water leads less lifting form tube well water which ultimately reduction of TDS in mixed water. Increase quality of water supply.
- Reduce leakage and dampness due to reduction in water use.
- Easy to repair after implementing metering water supply system.

3.3 Water rate:

Water rate up to 31st March, 2013 was Rs. 15 per 1000 liters and from 1st April, 2013 onwards Rs. 12 per 1000 liters.

Water use per block:

a) For specified period per block

Water use per Block for specified time in 1000 liters						
	16th December 2012 to 3 Feb 2013	3 Feb 2013 to 31 March 2013	1 April 2013 to 31 May 2013	1 June 2013 to 31 July 2013	1 august to 30 September 2013	1 October to 30 November 2013.
A	446	521	576	707	434	520
B	758	860	924	902	955	930
C	531	474	427	618	569	607
D	632	690	784	712	772	780
Total	2366	2545	2711	2939	2730	2837

The above table shows the water used apartment wise from 16th December 2012 to 30 November 2013.

b) For specified period for a block per day

Water use per Block per day in 1000 liters						
	16th December 2012 to 3 Feb 2013	3 Feb 2013 to 31 March 2013	1 April 2013 to 31 May 2013	1 June 2013 to 31 July 2013	1 August to 30 September 2013	1 October to 30 November 2013.
A	9	9	9	12	7	9
B	15	15	15	15	16	15
C	11	8	7	10	9	10
D	13	12	13	12	13	13
Total	48	45	44	48	45	47

The above table shows the water used apartment wise from 16th December 2012 to 30 November 2013. Further analysis done per day water used by each apartment and it shows that on and average water used per day by all apartments comes to 44000 Liters to 48000 Liters. Looking towards the water used apartment wise it comes to 7000 Liters to 16000 liters per days per apartment.

c) Water use per day per apartment per day (Average) for specified period

Water use per apartment per day in Liters						
	16th December 2012 to 3 Feb 2013	3 Feb 2013 to 31 March 2013	1 April 2013 to 31 May 2013	1 June 2013 to 31 July 2013	1 August to 30 September 2013	1 October to 30 November 2013.
A	650	653	674	828	508	609
B	859	838	842	821	870	1089
C	602	462	389	563	519	711
D	496	466	494	449	487	913
Total	635	587	585	634	589	612

The water use per day per apartment is ranges from 1089 Liters to 449 Liters. Average water used per apartment per day around 600 liters. It comes to 100 to 150 liters per capita per day.

Average number of member per apartment is around four persons. So water use per capita per day is around 150 liters.

d) Water rate as per water use and electricity bill:

Water rate for 1000 liters as per Electricity bill							
	16th December 2012 to 3 Feb 2013	3 Feb 2013 to 31 March 2013	1 April 2013 to 31 May 2013	1 June 2013 to 31 July 2013	1 August to 30 September 2013	October November 13	Dec 13 Jan 14
A	16	10	8	6	11	10	11
B	9	6	5	5	6	6	10
C	13	12	11	7	8	8	8
D	15	11	8	8	8	10	10
Common	15	9	7	6	4	4	1
Total	28	18	14	12	11	12	11

Looking towards the expenditure made for keep the water meter in place total Rs.667474 spent. This includes replace 15 years old pipes network and put sluice valve for every apartment. This is around Rs. 8783.

The maintenance charge is Rs. 400, if water meter not installed may be reach up to Rs. 1200 to Rs.1400 per month from Rs.700 three years back. Apartment water bill is around average Rs. 240 per month. While in adjoin apartment maintenance charge is Rs.1200 per month. This is around Rs.360 per month saving, in year it is around Rs.4320. Total expenditure had recovered in two years. In addition to have new pipe network and have sluice valve system which had reduce wastage of water.

3.4 Electric bill before water meter and after water meter installed at Navdeep Apartment:

(A) Electric bill before water meter installed at Navdeep Apartment:

Electricity bill of Navdeep Apartment before water meter installed						
Month	Dec-Jan 2011-12	Feb-March 2012	April-May 2012	June-July 2012	Aug-Sept 2012	Oct-Nov 2012
Block A	8140	7432	7270	6010	7051	9038
B	9020	7892	8020	9840	8610	7994
C	7530	8430	10233	7003	7654	7988
D	11005	9014	10120	8914	8950	9427
Common	46208	43748	39706	40223	41044	47325
Total	81903	76516	75349	71990	73309	81772

Average electricity bill was 76807 for two month. (December 2011 to November 2012).

(B) Electric bill after water meter installed at Navdeep Apartment:

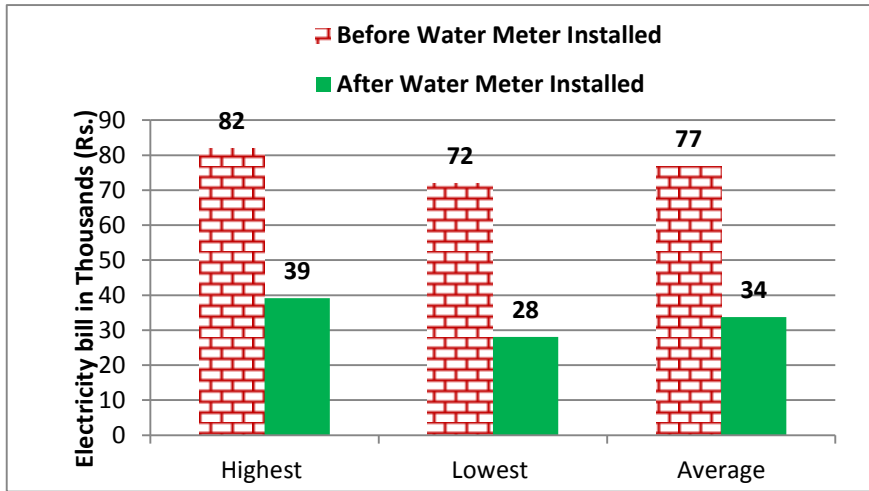
Average electricity bill was 33758 for two month. (April 2013- January 2014)

So, before water meter installed two moth electricity bill was Rs. 76807 which reduce to Rs. 33758 after water meter installed. Net reduction in electricity cost Rs. 43049.

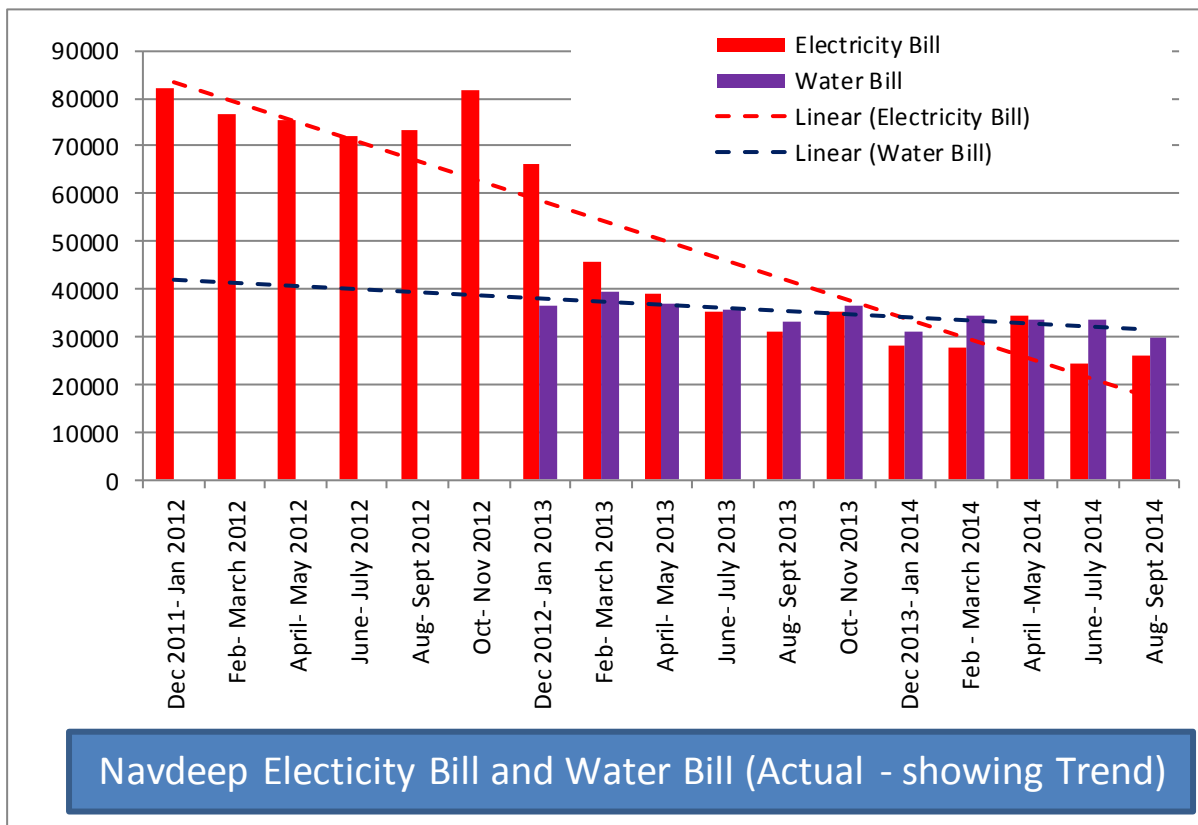
Before Water Meter Installed			After Water Meter Installed		
Electricity bill	In Rs.	Time period	Electricity bill	In Rs.	Time period
Highest	81903	Dec - Jan 2011-12	Highest	39095	April- May 13
Lowest	71990	June - July 2012	Lowest	28071	Dec 13- Jan 14
Average	76807	Dec 2011 - Nov 2012.	Average	33758	April 2013- Jan 2014

This graph shows clear impact of water meter installed at Navdeep apartment. Befoe water meter installed the highest electricity bill was Rs. 82000 and agerage bill was Rs. 77,000. While after water meter installed highest electricity bill was Rs.39,000 and average bill is Rs.34,000. Members of Navdeep apartment use water judiciously after water meter installed. This shows the reduction in electricity bill up to 55%.

Light bill of Navdeep Apartment after water meter installed					
Block	April- May13	June- July13	Aug- Sep13	Oct- Nov13	Dec13- Jan14
A	4730	3893	4900	5125	5408
B	4913	4361	5297	5889	7030
C	4554	4022	4482	5046	5000
D	6433	5726	6255	7440	7425
Common	18465	17385	10064	11741	3208
Total	39095	35387	30998	35241	28071



Reduction of water used leads to reduction of water bill due to reduction in wastage of water. This is ultimately reduction in electricity bill. The graph shows this trend clearly.



3.5 Operation and Maintenance of water supply system:

Prior to metering water there were old pipe line and almost all valve to operate the system was not working at all from last couple of years. When anybody want to do repairing their water supply work they have to physically deploy plumber who come and went in to water tank to close the pipe with west cotton cloth.

These leads to unhygienic condition and deteriorate water quality. In several times empty the overhead water tank. This was tiresome some job so people avoid to repair their minor leakage thru tap or joint. These ultimately resulted in to wastage of water, leakage of water on wall and increase dampness, corrosion of pipelines. The new system of meter with valves leads to easy to close own water supply and now it is easy to repair any water pipeline or change leaking tap. Ultimately almost all leakages stops and longtime pending problem was resolved. On other hand people value the water and that leads to timely repair their water pipeline and taps.

Problems

Problems associated with metering arise particularly in the case of intermittent supply, which is common in many developing countries. Sudden changes in pressure can damage meters, so that many meters in cities in developing countries are not functional. Also, some types of meters become less accurate as they age and under register consumption thus leading to lower revenues, unless they are being replaced regularly. Many types of meters also register air flows, which can lead to over registration of consumption, especially in systems with intermittent supply, when water supply is re-established and the incoming water pushes air through the meters

4.0 Conclusion

Navdeep experience of water meter proves that before water meter water installed there were electricity bill, which was around 2.3 times (base on electricity consumed). It means that was use of water was almost 2.3 times more than current water used. It is beneficial to consumer that it leads to less maintenance charge to them. Ultimately, judicious use of natural resources will lead the sustainability. The example set by Navdeep community will be going to spread and it will set example of water conservation, energy conservation thru community cooperation. It not only reduces the use of electricity but also reduce wastage of water and this again reduce load on sewerage system. This ultimately reduces use of ground water. Earlier every two years we lowering down tube well pipe by 6 to 12 meters now from last four years we did not.

Water meter will help to reduce leaks and eliminate wastage of water. Maintenance of water meter will depend upon water quality and quality of water meter. If water quality had up to, 500 TDS (total dissolved solids) and less silt and have good water meter had less maintenance cost of water meter. Water meter will need cleaning and repairing after five to six years.

Challenges may come across in using water meter may be damaged needs to replace, initial capital cost may be more, may need regularity in measuring water and issue water bill and collect amount.

“Water is the driving force in nature.” — Leonardo da Vinci

“Rahiman paani rakhiye, bin paani sab soon; paani gaye na ubere, moti,manas,choon”- Rahim (Water is Life and Life cannot exist without water. It is sacred for its life giving and life sustaining properties) Community Action for Save Water- Save Energy)

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