

# Managing UFW in Iran

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## Abstract

From Geographical point of view, Iran is located in Dried and semidried part of the globe. In these areas, Due to dried weather conditions and rapid evaporation, water has a special value attached to it.

Range of annual precipitation , in some areas like Kavir loot is about 50 mm , and other areas like Northern provinces i.e. Caspian sea sides is about 1800 mm.

Total area of Iran is 1.648 Millions square meters, and based on the latest statistics, population is close to 70 millions, of those 46.5 millions are living in 1000 different cities.

In 1996, average rate of UFW was close to 32%; today that rate has dropped to 30%. Reducing the rate of UFW, Because of two main factors, is very important. The first one is economic reasons; the second one is social welfare reason.

Because of above mentioned reasons, 39 provincial water and wastewater companies which have the responsibility to provide safe urban water, are forerunner in executing various programs in order to reduce existing rate of UFW.

By structural reorganization of these companies and central government focuses on providing safe drinking water base of WHO standards, we definitely can claim that a good level of investments for providing safe drinking water has been made.

In some periods of time, increases in water production have unfortunately resulted in increased in UFW rate. But, in recent years, in order to reduce UFW rate, some good steps have been taken, valuable experiences have been gained, tools related to leakage detection have been recognized and utilized, improvement in ways that water supply and distribution projects are executed, these all together have created an atmosphere of hope that we will be able to reach 19% rate of UFW by 2025 horizon.

In this article, we have paid attention to what have been done so far, Economic achievements and results of reducing UFW and future plans and programs.

**Key words:** Limitation of water resources, Managing UFW, Experiences and solutions

## Introduction

Iran, from global point of view is located in dry and semi dry part of the world. Usually, in these areas due to dry weather conditions and high rate of evaporation, water has a special value attached to it. At the same time, supplying water in these areas is extremely expensive. There is a constant struggle among various water subscribers to receive a higher share of existing and available body of water.

Increase in population, increase in rate of services demanded, expansion of industrial and agricultural activities are all various reasons for increase in water demands.

Almost 1000 cities with 46.5 millions of population, as of know are consuming about 4.5 Billion of cubic meters of water on annual basis. Supplying this volume of water requires heavy investments and current expenses.

Unfortunately, despite what is being done, a large volume of supplied water is being lost as UFW in this consumption cycle. This is also causes extreme and very expensive economic losses.

UFW rates are different in various cities of the country, in eastern Azerbaijan province, 20.4% of UFW rate has been registered, on the other hand, in Hamadan Province, the average rate is about 36.6%.

In 2005, Average UFW rate in the whole country was close to 30.2%. This means 1.37 Billion of cubic meters of UFW in waterworks' system in Iran. From various point of views, volume wise, economically, and sanitation wise, the effects of this huge UFW rate is felt. This is considered, as one of the most serious challenges related to Iran's urban water issues.

## **Main Axis of activities for reducing UFW in Iran**

In recent years, steps have been taken to recognize effective alternatives to reduce UFW rate, in many cases, we have reach desirable results. Some of axis that to improve the UFW conditions in Iran, are as follow:

- Improvement in designing of installation and exerting Effective supervision during construction phase of water Supply and distribution projects.
- Paying special attention to technical and engineering Principals and utilizing available and existing national Standards during installment of water branches.
- Dedicating a portion of government budget and also National water and wastewater companies' budget for reducing UFW.
- Leakage detection and repairing of them in water Distribution network.
- Changing traditional metering system, and utilizing more accurate water meters in some cities.
- Working on a quicker response system to accidents Related to water distribution system.
- Utilizing various managerial alternatives with the aim of controlling water pressure in water networks and Utilizing more advance soft wares in some cities.
- Executing various practical – engineering pilots with the Aim of recognizing more effective alternatives in reducing UFW in such a way that these alternatives are not only Effective, but also help us to recognize vulnerable parts of water networks.

During last five years, sue to implementing above mentioned items, UFW rate has been reduced two percentage points. And now, this rate is 30%.

But due to climate conditions, ever increases in water demand and limitation on water resources, this rate still is a fundamental problem.

So far, due to experiences gained inside Iran and from participation in International conferences and gathering , we have reach this conclusion and believe that by

executing various mentioned alternatives, we will be able to reduce UFW rate effectively in future.

### **Water without income and related economic results;**

During 2006, fluctuation in weather conditions, specially changes in temperature and last but not least changes in Demographic condition, 4.53 billion cubic meters of water was supplied and distributed in Iran. Meanwhile, of that volume, 3.93 billion cubic meters was sold and 1.37 billion cubic meters did not generate any income, from this volume 0.8 billion cubic meters is considered real lost.

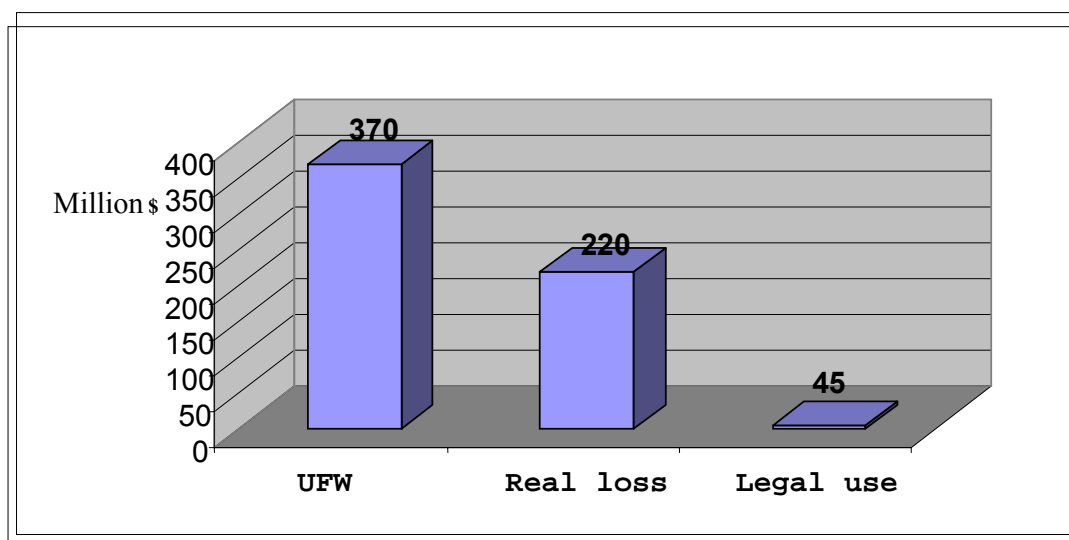
Above mentioned statistics, are sensitive indicators, because they are so large, that they attract managers' attention, not only from public welfare point of view, but because of water economic reasons.

Water has a special value in Iran, due to these country geographical conditions. Some portions of water that is being used is extracted from Qantas (underground aquifer), and some other portion from ground resources like deep wells. Unfortunately, a favorable rate of replenishment of these resources is not taken place.

Some of the Qantas that are being used as part of water supply system, have a long historical background and they are the results of previous and huge efforts and activities of people who loved to serve public. Therefore, water supplied from these resources shall not be wasted under any conditions.

From economical point of view, water supply and distribution activities in Iran is a very expensive, for some of these projects, sometimes up to 700 Km of water transfer is taking place. Therefore, the overall price for each cubic meter of water is very high, on average; the cost of per cubic meter of water that is being distributed is close to 1130 Rials, if we add supply costs to it, the price will reach 2500 Rials per cubic meter (0.28USD).

Therefore, the value of annual UFW is close to 3400 billion Rials, of that 2000 billion Rials is considered real waste. It is important to mention this point that unlawful and illegal consumption of water without any income for water industry is about 150 billion cubic meters on annual basis (close to 3.03 percent). Its monetary value is about 37 billion Rials.



**Figure 39:** Estimated value of UFW million USD

This amount of money is so large and important for water industry that related companies have been trying to come up with various solutions to improve this condition. So far, thru engineering and planning activities, they have been trying to reduce UFW rate, with an eye on financial results.

There are other indicators which makes UFW rate so important, in Iran there are 89.4 thousands of Km of water distribution network and also 8.9 millions of water subscribers, almost \$45 per year is being imposed on each subscriber because of UFW, this number for per Km of water network is close to \$4000 per year.

These numbers indicate that leakage detection and reconstruction and renovation of old parts of water networks from economical point of view is justifiable.

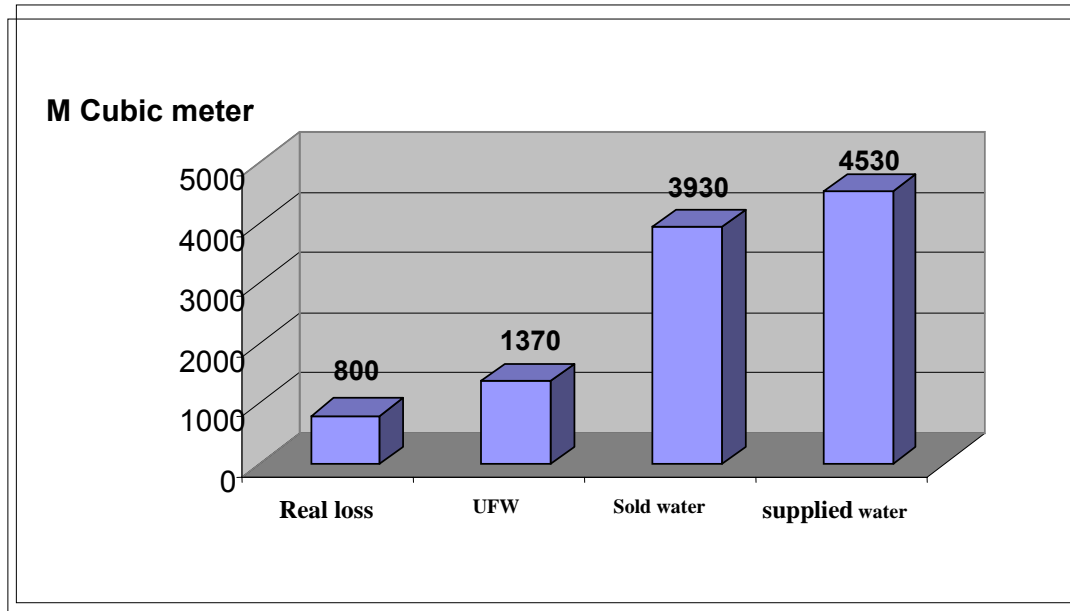


Figure 40: comparison between supply and urban UFW

## Reasons and problems relate to UFW in Iran

There are various reasons for increase in UFW rate in many different cities of Iran. Although, many of these reasons are same as and similar to what is happening in other large cities in the world, but, we think, there are some reasons that are unique:

- Age of pipes, valves, and related equipments in some cities.
- Problems and lack of updating and upgrading in water distribution diagrams in some cities
- The way reconstruction ,repairs and maintenance of water distribution systems are being handled
- Lack of utilizing data that are being gathered from repeated accidents
- Diversity of designs of distribution networks
- Diversity of pipes being used in networks
- Diversity and age of water meters in various cities

One of the most important needs to effectively reduce UFW rate is technical inspections of water installations and equipments. So far, following activities are being followed;

## **Inspection and recognition of where water is being lost**

In order to reduce water loss and recognize water leakage spots, constant inspection is considered one of the main items in managing UFW in Iran. Following activities and priorities are considered;

- paying attention to unusual reduction of water pressure in The network
- paying attention to sudden increase in accidents
- paying attention to sudden increase of water pressure in some part of the network
- paying special attention to increase in customers' complains about changes in water pressure and quality of water
- paying special attention to inspection of fire hydrants , valves in the network, air release valves and high pressure joints in the network
- paying special attention to inspection of water pressure valves and equipments related to registering water pressure
- Inspecting water meters conditions (especially in water supply sector) and customers' water meters.

Experiences gained so far in these inspections indicates in most of the cities in Iran like other cities in the world, the rate of water loss in the main water networks is not very high, and is close to two percent.

But in distribution networks due to large numbers of valves and joints, this rate is higher and is close to 8.9 percent. Inspections in any case shall always be translated into effective and practical plans.

Statistics and data gained in these inspections, in some cases which can be analyzed from a non practical point of view, is being done so and reconstruction plans is usually planned.

In most cases gained data and information not only are not enough but also they are not complete, unfortunately in many cases in this stage leakage detection usually starts. Information gained from leakage detection activities is normally more expensive, but these data are usually more accurate than previous way of collecting data. Presently, there are leakage detection activities plans are considered for some big cities, but these programs are not in priority for some of them. In big cities, specially centers of provinces like Tehran, Tabriz, Mashed, Esfahan, Shiraz,... due to high costs of water supply, treatment and supply, activities related to leakage detection are either completed are close to completion and results have been relatively favorable.

### **Leakage detection in water distribution network of Tehran Priorities:**

Based on analysis that have been conducted and also based on the results of 217 various pilot studies in all over the country during last decade, collected data indicate 8.9% of water volume in being lost in distribution network, 2% is being lost in transfer lines, 5.6% in connections, and less than .4% in water reservoirs .

Average rate of UFW in Iran is about 30%, of that 18% is real lost, 10% is apparent lost, 2% are consumption without any income. There are a lot of rooms for improvements in all of above categories. In order to effectively improve and decrease UFW rate, practical and plans have to be determine and prioritize.

## **Practical and managerial activities underway to reduce UFW rate in Iran**

There are many activities underway in Iran; some of them are as follow:

- Observing design standards
- Technical supervision during implementation phase of water projects.
- Observing technical standards in relation to water meters' installations and providing proper training of installers.
- Improving technical knowledge of operators
- Increasing water meters accuracy and selecting proper types of water meters.
- Selecting proper technology
- Repairing water meters on proper interval

There are serious determinations to reduce UFW rate, main limitation, as of right now is financial resource limitation, and low water tariffs is also an important factor. Managerial activities in relation to UFW rate have been very objective and effective. Reduction of 7.5% in UFW rate in last decade, is the result of above mentioned activities and they are continued

1. In each of provincial water and waste water companies an executive have been designated specifically for UFW activities and also an organizational position been defined for him.
2. Policies and programs for controlling and reducing UFW rate have been defined.
3. An annual budget and practical programs for each of provincial water and wastewater companies have been defined.
4. For each of cities, separate plans related to UFW have been selected.
5. In most of the cities, after engineering studies have been completed, a limited pilot has been executed in other to define its effectiveness and then it was extended to other cities.
6. In order to prevent the increase of UFW rate, special attention was paid to design and expansion of new water networks.
7. There is some competition among water and wastewater companies to reach their goals in relation to UFW objectives, those which have been more successful in reaching their objectives are being praised.
8. National Engineering water and wastewater company which supervises all water and wastewater companies in Iran, controls all activities related to UFW. It sets policies, analysis the results and back up those activities.

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