

1. INTRODUCTION :

- a. The North Eastern Electric Power Corporation Ltd. (NEEPCO), was incorporated on 2nd April 1976 as a wholly owned Government of India Enterprise under the Ministry of Power to plan, promote, investigate, survey, design, construct, generate, operate and maintain both hydro and thermal power stations. It has the unique distinction of implementing and operating both hydro and thermal power plants right from concept to commissioning. NEEPCO has been upgraded to **Schedule – ‘A’** status on 28th Aug' 2008 and is also likely **to attain the status of a Miniratna CPSE**. Presently, the Corporation has an Authorized Share Capital of Rs. 5000 Crore.
- b. With a modest beginning by commissioning 50 MW Khandong Power Station in 1984 as a part of the 275 MW integrated Kopili H.E. Power Station, NEEPCO today operates five hydro and two thermal power stations spread over the North Eastern Region of India with a total installed capacity of 1130 MW, out of which 755 MW in Hydro and 375 MW in Thermal sectors. It caters to more than 60 % of the region's energy requirements.
- c. While NEEPCO takes cognizance of the possible impact of its projects on environment and ecology, it is committed to environmental protection and sustainable development of natural resources to preserve the ecological balance for future generations, and therefore adopts suitable measures to negate any adverse effect on environment and ecology during execution and operation & maintenance of its projects.
- d. In view of the vital importance of water for sustenance of plant & animal, including human life, maintaining ecological balance and economic and developmental activities of all kinds, and considering its increasing scarcity, the planning and management of this resource and its optimal, economical and equitable use has become a matter of the utmost urgency.
- e. The Water Conservation Policy set out below, describes the organisation's policy to improve upon its activities towards preservation and conservation of water for achievement of organisational goals and objectives in a more eco-friendly manner.

2. DEFINITIONS :

(a) Water conservation

Water conservation can be defined as:

- I. Any beneficial reduction in water loss, use or waste as well as the preservation of water quality.

- II. A reduction in water use accomplished by implementation of water conservation or water efficiency measures; or,
- III. Improved water management practices that reduce or enhance the beneficial use of water. A water conservation measure is an action, behavioural change, device, technology, or improved design or process implemented to reduce water loss, waste, or use. Water efficiency is a tool of water conservation. That results in more efficient water use and thus reduces water demand. The value and cost-effectiveness of a water efficiency measure must be evaluated in relation to its effects on the use and cost of other natural resources (e.g. energy or chemicals).

3. NEED FOR WATER CONSERVATION POLICY:

- I. Water is a prime natural resource, a basic human need and a precious national asset. Development, management & conservation of water resources need to be governed by local & national perspectives.
- II. As per the latest assessment, out of the total precipitation including snowfall of around 4000 billion cubic metre in the country, the availability from surface water and replenish able ground water is put at 1869 billion cubic metres. Because of topographical and other constraints, about 690 billion cubic metres from surface water and 432 billion cubic metres from ground water can be put to beneficial use. Availability of water is highly uneven in both space and time. Precipitation is confined to only about three or four months in a year and varies from 100 mm in the western parts of Rajasthan to over 10000 mm at Cherrapunji in Meghalaya. Rivers and underground aquifers often cut across state boundaries. Water, as a resource is one and indivisible: rainfall, river waters, surface ponds and lakes and ground water are all part of one system.
- III. Water is part of a larger ecological system. Realising the importance and scarcity attached to the fresh water, it has to be treated as an essential environment for sustaining all life forms.
- IV. Water is a scarce and precious national resource to be planned, developed, conserved and managed as such, and on an integrated and environmentally sound basis, keeping in view the socio-economic aspects and needs. It is one of the most crucial elements in developmental planning. As the country has entered the 21st century, efforts to develop, conserve, utilise and manage this important resource in a sustainable manner, have to be guided by the national perspective.

- V. Growth process and the expansion of economic activities inevitably lead to increasing demands for water for diverse purposes: domestic, industrial, agricultural, hydro-power, thermal-power, navigation, recreation, etc. So far, the major consumptive use of water has been for irrigation.
- VI. Demand of water for power generation, in particular, thermal power generation and for other industrial uses is also increasing substantially. As a result, water, which is already a scarce resource, will become even scarcer in future. This underscores the need for the utmost efficiency in water utilisation and a public awareness of the importance of its conservation.

4. OBJECTIVES OF WATER CONSERVATION POLICY:

Conservation Policy should aim to achieve the following goals:

- **Sustainability** : To ensure availability for future generations, the withdrawal of fresh water from surface/underground sources should not exceed its natural replacement rate.
- **Energy conservation** : Water pumping, delivery, and wastewater treatment facilities consume a significant amount of energy.
- **Habitat conservation** : Minimising human water use helps to preserve fresh water habitats for local wildlife and migrating waterfowl, as well as reducing the need to build more & more water supply arrangements.
- To promote water conservation and progressively reduce per capita consumption.
- To raise awareness of the environmental impact of water waste.
- To provide guidelines for the use of water.

5. HOW TO CONSERVE WATER AND USE IT EFFECTIVELY.

In the context of NEEPCO, water users can choose from among many different water uses efficiency practices, which fall into two categories:

- I. Engineering practices: practices based on modifications in plumbing, fixtures, or water supply operating procedures.
- II. Behavioural practices: practices based on changing water use habits

Both engineering and behavioural practices are described below.

5.1 PRACTICES FOR DOMESTIC USERS

I. Engineering Practices

(i) Plumbing

An engineering practice for individual residential water users is the installation of indoor plumbing fixtures that save water or the replacement of existing plumbing equipment with equipment that uses less water. Low-flow plumbing fixtures and

retrofit programs are permanent, one-time conservation measures that can be implemented automatically with little or no additional cost over their lifetimes. In some cases, they can save the Corporation money over the long term.

It has been estimated that an average three-member household can reduce its water use by 54,000 gallons annually as a result of which precious money can be saved per year if water-efficient plumbing fixtures are used.

Given below are few steps to reduce water waste in residences and offices.

Low-Flush Toilets: Residential demands account for about three-fourths of the total water demand in projects. Indoor use accounts for roughly 60 percent of all residential use, and of this, toilets (at 3.5 gallons per flush) use nearly 40 percent. Toilets, showers, and faucets combined represent two-thirds of all indoor water use. In new construction and building rehabilitation or remodelling there is a great potential to reduce water consumption by installing low-flush toilets.

Conventional toilets use 3.5 to 5 gallons or more of water per flush, but low-flush toilets uses only 1.6 gallons of water or less. Since low-flush toilets use less water, they also reduce the volume of wastewater produced.

Even in existing residences, replacement of conventional toilets with low-flush toilets is a practical and economical alternative. Conventional toilets that use about 4.5 gallons per flush may be replaced with low-flush toilets that use approximately 1.6 gallons per flush. The change will surely result in a decrease in water consumption, which will result a savings of 34 percent! The cost of replacement of the conventional toilet with a low-flush toilet will be recovered in about five years.

Installation of Dual Flush Toilets: Dual flush toilets can be installed to replace single flush toilets in the event of any refurbishment or cistern replacement.

Toilet Displacement Devices: Plastic containers (such as plastic jugs) can be filled with water or pebbles and placed in a toilet tank to reduce the amount of water used per flush. By placing one to three such containers in the tank (making sure that they do not interfere with the flushing mechanisms or the flow of water), more than 1 gallon of water can be saved per flush. A toilet dam, which holds back a reservoir of water when the toilet is flushed, can also be used instead of a plastic container to save water. Toilet dams result in a savings of 1 to 2 gallons of water per flush.

Low-Flow Showerheads: Showers account for about 20 percent of total indoor water use. By replacing standard showerheads with low flow ones, a family of four

can save large amount of water per year. Properly designed low-flow showerheads are available to provide the quality of service found in higher-volume models.

Faucet Aerators: Faucet aerators, which break the flowing water into fine droplets and entrain air while maintaining wetting effectiveness, are inexpensive devices that can be installed in sinks to reduce water use. Aerators can be easily installed and can reduce the water use at a faucet by as much as 60 percent while still maintaining a strong flow. More efficient kitchen and bathroom faucets that use less water are available

Pressure Reduction: Because flow rate is related to pressure, the maximum water flow from a fixture operating on a fixed setting can be reduced if the water pressure is reduced. Homeowners can reduce the water pressure in a home by installing pressure-reducing valves. The use of such valves might be one way to decrease water consumption in homes. For homes served by wells, reducing the system pressure can save both water and energy.

A reduction in water pressure can also save water in other ways: it can reduce the likelihood of leaking water pipes, leaking water heaters, and dripping faucets. It can also help reduce breakdowns in a plumbing system.

Homes with high water pressure if compared to homes with low water pressure may exhibit an annual water savings of about 6 percent.

Gray Water/ Rain water Use: Domestic wastewater composed of wash water from kitchen sinks and tubs, clothes washers and laundry tubs is called gray water. Gray water/ rain water can be used by homeowners for toilet & urinal flushing, home gardening, lawn maintenance, landscaping and other innovative uses wherever possible as an alternative water source.

(ii) Landscaping

Spreading a layer of organic mulch around plants retains moisture and saves water, time and money. Using a layer of organic material on the surface of planting beds minimise weed growth that competes for water. Aeration of lawn should be done at least once a year so that water can reach the roots rather than run off the surface.

Wherever water runs off the lawn easily, splitting of watering time into shorter periods will allow for better absorption. Watering lawns on windy days when most of the water blows away or evaporates should be avoided. On sloping lawns, applying water for five minutes and then repeating two to three times will decrease

water from being wasted. Watering should be done only when necessary, more plants die from over-watering than from under watering.

Lawn and landscape maintenance often requires large amounts of water, particularly in areas with low rainfall. Nationally, lawn care accounts for about 32 percent of the total residential outdoor use. Other outdoor uses include washing automobiles, cleaning sidewalks and driveways.

Landscape Irrigation: One method of water conservation in landscaping is to use plants that need little water, thereby saving not only water but labour and fertilizer as well. A similar method is grouping plants with similar water needs. Scheduling lawn irrigation for specific early morning or evening hours can reduce water wasted due to evaporation during daylight hours. Another water use efficiency practice that can be applied to residential landscape irrigation is the use of cycle irrigation methods to improve penetration and reduce runoff. Cycle irrigation provides the right amount of water at the right time and place, for optimal growth. Other practices include the use of low-precipitation-rate sprinklers that have better distribution uniformity, bubbler/soaker systems, or drip irrigation systems.

II. Behavioural Practices

Behavioural practices involve changing water use habits so that water is used more efficiently, thus reducing the overall water consumption in a home. These practices require a change in behaviour, not modifications in the existing plumbing or fixtures in a home. Behavioural practices for residential water users can be applied both indoors in the kitchen, bathroom, laundry room and outdoors.

In the kitchen, for example, if dishes are washed by hand, water can be saved by filling the sink or a dishpan with water rather than running the water continuously. Also, water used for rinsing fruits and vegetables can be collected and then reused to water houseplants.

Water can be saved in the bathroom by turning off the faucet while brushing teeth or shaving. Water can be saved by taking short showers rather than long showers or baths and turning the water off while soaping. This water savings can be increased even further by installing low-flow showerheads, as discussed earlier. Toilets should be used only to carry away sanitary waste.

Households with lead-based solder in pipes that flush the first several gallons of water should collect this water for alternative non potable uses (e.g., plant watering).

Water can be saved in the laundry room by adjusting water levels in the washing machine to match the size of the load. If the washing machine does not have a

variable load control, water can be saved by running the machine only when it is full. If washing is done by hand, the water should not be left running. A laundry tub should be filled with water, and the wash and rinse water should be reused as much as possible.

Outdoor water use can be reduced by watering the lawn early in the morning or late in the evening and on cooler days, when possible, to reduce evaporation. Allowing the grass to grow slightly taller will reduce water loss by providing more ground shade for the roots and by promoting water retention in the soil. Growing plants that are suited to the area ("indigenous" plants) can save more than 50 percent of the water normally used to care for outdoor plants.

As much as 150 gallons of water can be saved when washing a car by turning the hose off between rinses. The car should be washed on the lawn if possible to reduce runoff.

Additional savings of water can result from sweeping sidewalks and driveways instead of hosing them down.

Behavioural Practices at a glance:

- Minimize grass lawns as less grass means less water demand.
- Don't over-water lawns. A good rain eliminates the need watering for more than a week.
- Water the lawns only during early morning/late afternoon hours to reduce losses from evaporation.
- Use waste water of cloth washing for gardening and cleaning the floor.
- Check leaks in hose, pipes etc.
- Don't wash floors with a hose. Use a broom.
- While waiting for hot water to come through the pipes, catch the cold water in a bucket to use later for other purpose.
- Keep your showers down to five minutes or less.
- Turn the water off while lathering-up in the shower.
- Take shallow baths, no more than 3 inches of water.
- Flush the toilet only when necessary. Never use the toilet as an ashtray or wastebasket.
- Never let the water run while brushing your teeth or shaving.
- Wash dishes using the least amount of detergent possible. This will cut down on rinsing. Use a sprayer or short blasts of water to rinse.
- Remove food scraps off dishes into the garbage can.
- Never use hot, running water to defrost frozen foods. Plan ahead &/or use the microwave oven.

- Rinse vegetables and fruits in a sink or a pan filled with water instead of under running water.
- Repair all leaky faucets, fixtures and pipes both inside and outside your home.
- When doing the laundry, never wash less than a full load.

5.2 PRACTICES FOR INDUSTRIAL/ COMMERCIAL USERS

As an industrial/commercial user, the Corporation may apply a number of conservation and water use efficiency practices listed below:

I. Engineering Practices

i. Water Reuse and Recycling

Water reuse is the use of wastewater or reclaimed water from one application to another application such as landscape watering. The reused water must be used for a beneficial purpose. Some potential applications for the reuse of wastewater or reclaimed water include other industrial uses, landscape irrigation, aesthetic uses such as fountains and fire protection. Factors that should be considered in an industrial water reuse program include:

- Identification of water reuse opportunities
- Determination of the minimum water quality needed for the given use
- Identification of wastewater sources that satisfy the water quality requirements
- Determination of how the water can be transported to the new use

The reuse of wastewater or reclaimed water is beneficial because it reduces the demands on available surface and ground waters. Perhaps the greatest benefit of establishing water reuse programs is their contribution in delaying or eliminating the need to expand potable water supply and treatment facilities.

ii. Cooling Water Recirculation

The use of water for cooling in *thermal projects* constitutes one of the largest water uses. Water is typically used to cool heat-generating equipment or to condense gases in a thermodynamic cycle. The most water-intensive cooling method used in industrial applications is once-through cooling, in which water lowers the temperature of a heat source and then is discharged.

Recycling water with a re-circulating cooling system can greatly reduce water use by using the same water to perform several cooling operations. The water savings are sufficiently substantial to result in overall cost savings.

iii. Landscape Irrigation

Another way that industrial/commercial facilities can reduce water use is through the implementation of efficient landscape irrigation practices. There are several general ways that water can be more efficiently used for landscape irrigation, including the design of landscapes for low maintenance and low water requirements, discussed above. The use of water-efficient irrigation equipment such as drip systems or deep root systems, the proper maintenance of irrigation equipment to ensure that it is working properly, the distribution of irrigation equipment to make sure that water is dispensed evenly over areas where it is needed, and the scheduling of irrigation to ensure maximum water use.

iv. Rain water Harvesting

This has become a very popular method of conserving water especially in the urban areas. Town planners and civic authority in many cities in India are introducing bylaws making rainwater harvesting compulsory in all new structures. Rainwater harvesting essentially means collecting rainwater on the roofs of building and storing it underground for later use. Not only does this recharging arrest groundwater depletion, it also raises the declining water table and can help augment water supply. Rainwater harvesting and artificial recharging are becoming very important issues. It is essential to stop the decline in groundwater levels, arrest sea-water ingress, i.e. prevent sea-water from moving landward and conserve surface water run-off during the rainy season.

5.3 PRACTICES FOR SYSTEM OPERATORS

I. Engineering Practices

i. Metering

Billing customers based on their actual water use has been found to contribute directly to water conservation. Meters also aid in detecting leaks throughout a water system. Unaccounted-for water drops substantially through metering and leak detection programs.

ii. Leak Detection

One way to detect leaks is to use listening equipment to survey the distribution system, identify leak sounds, and pinpoint the exact locations of hidden underground leaks. An effective way to conserve water is to detect and repair leaks in water distribution systems. Repairing leaks controls the loss of water. The early detection of leaks also reduces the chances that leaks will cause major property damage. When water leaks from a system before it reaches the

consumer, the Corporation incurs unnecessary costs. Such costs should provide *an incentive* for system operators to implement a leak detection program.

Programs for finding and repairing leaks in water mains and laterals (conduits) may be cost-effective. A leak detection program is especially important in projects that have large, old, deteriorating systems.

iii. Water Main Rehabilitation

Management and rehabilitation of a water distribution network may be improved by using a distribution system database. Using the database can help to lower maintenance costs and can result in more efficient use of the water resource. The database can help the concerned department to set priorities and efficiently allocate rehabilitation funds. A comprehensive database should include information on the following:

- The characteristics of the system's components, such as size, age, and material
- The condition of mains, such as corrosion
- Failure and leak records
- Water quality
- High/low pressure problems
- Operating records, such as pump and valve operations
- Consumer complaints
- Operating and rehabilitation costs

5.4 WATER RESTRICTIONS

Treated water should not be used for any of the following activities:

1. Washing of vehicles, tools or equipment.
2. Pavement washing.
3. Dust suppression.

6. REPORTING SYSTEM AND PERIODICITY

- The reporting system shall consist of both short term and long term measures taken and progress made thereof. The Head of Projects/Departments of various offices of the Corporation shall implement the conservation measures as per Policy and send periodical reports to the Environment Cell of the Corporate Planning Department, which will then compile the Action Taken Report, and place it to the Audit Committee of the Board of Directors for perusal and advice. In addition, the Environment Cell will be responsible to review and monitor

implementation measures and suggest suitable improvement measures from time to time.

- The Reporting Format shall include the opportunities identified and the measures taken for conservation as well as the limitations, if any, to implementation of policy measures. A sample Report Format is enclosed at **Annexure-I**, which can be suitably modified by the reporting authority in consultation with the Environment Cell of the Corporate Planning Department.

7. EDUCATION AND TRAINING

Most employees consider water to be a "free good" as they are not directly required to pay any charge for it. Education programs can be used to inform the employees about the basics of water use efficiency:

- How water is delivered to them
- The costs of water service
- Why water conservation is important
- How they can participate in conservation efforts

Education is an essential component of a successful water conservation program. A number of tools can be used viz. feature articles and announcements in the periodicals, workshops, booklets, posters for instilling water conservation awareness. Moreover, training the system operators on the effectiveness of various conservation measures and tools of conservation which may be affected by them will be useful.

Another way to provide information and education, as well as to collect actual data on water conservation and use efficiency is through the use of demonstration projects.

8. INCENTIVES

As most people consider water to be a "free good", any amount of information and education promoting conservation may not be effective by themselves in achieving a conservation goal if the conservation program does not include provisions to reward the personnel/operators responsible to achieve specified conservation targets.

9. RESIDENTIAL WATER AUDIT PROGRAM

Residential water audit programs involve sending trained water auditors to homes to encourage water conservation efforts. Auditors visit homes to identify water conservation opportunities, such as repairing leaks and low-flow plumbing, and to

recommend changes in water use practices to reduce home water use. The audit programs should aim to achieve utilization of existing water supplies by getting water users to use water more efficiently. The largest percentage of indoor use comes from washing, bathing and toilet flushing. Therefore, the bathroom is an ideal place for water system operators to focus water conservation efforts.

10. RESPONSIBILITY AND AUTHORITY

- Although overall responsibility of implementation of the Conservation Policy rests with the Chief Executive Officer of the Corporation, each and every employee of the Corporation, as a matter of fact, has his share of responsibility for the success of the Policy.
- All managers should support and promote compliance of the Policy as a whole, and shall be responsible for effective implementation of the conservation measures relevant to their spheres of responsibilities. This may include identification and reporting of opportunities of conservation in his/her areas of operation, and taking active part in the process of conservation.
- The Board of Directors requires assurances from the CEO that a Water Conservation Policy is in place, endorses and approves the Policy. The Board of Directors also provides important oversight to the Water Conservation Policy and concurs with the Corporation's strategy of conservation. The Board of Directors reviews and comments upon periodic reviews and actions taken for conservation of water.

11. DISCLOSURE IN ANNUAL REPORT

A chapter on the measures adopted and achievements made by the Corporation in respect of water conservation shall be incorporated under the chapter "Corporate Governance".

SAMPLE OF REPORTING FORMAT

Annexure-I

Broad heads of conservation	Sub heads of conservation	Conservation practices	Unit of measurement	Existing units	Units changed during reporting period	Tentative amount of water saved	Periodicity of reporting	Responsibility centre
A. DOMESTIC USERS								
Engineering Practices	1. Plumbing	i. Low-Flush Toilets used ii. Plastic containers/ toilet dams used in the tank iii. Low flow showerheads replacing standard ones iv. Faucet Aerators (inexpensive devices) installed v. Pressure-reducing valves installed vi. Amount of gray water used for gardening, lawn maintenance, landscaping etc.	Nos. Nos. Nos. Nos. Gallons.				Six months	1. <i>At Head Quarter:</i> Estate Department. 2. <i>In case of projects:</i> Respective HoPs. 3. <i>For other offices:</i> Respective HODs.
	2. Landscaping	Use of plants that need little water, grouping plants with similar water needs, lawn irrigation for specific early morning or evening hours, cycle irrigation methods, use of low-precipitation rate sprinklers with better distribution uniformity, bubbler/soaker systems, or drip irrigation systems.	Nos. /categories of plants/ Nos. of sprinklers/ soakers etc. used with specification.				Six months	
Behavioural Practices		Area of grass lawn (should be minimized)/ waste water used for gardening and floor washing/ timing of watering.	Sq. m. of grass lawns/ gallons of waste water used.				Six months	

B. INDUSTRIAL/COMMERCIAL USERS								
Engineering Practices	Water Reuse and Recycling	i. Identification of water reuse opportunities ii. Determination of the minimum water quality needed for the given use iii. Identification of waste water sources that satisfy the water quality requirements iv. Determination of how the water can be transported to the new use etc.	No. of opportunities identified. Nos. of samples tested. Nos. of sources identified. Mode & distance of transportation.				Six months	
	Cooling Water Recirculation	Amount of water recycled with a re-circulating cooling system.	Gallons				Six months	
	Landscape Irrigation	Water used efficiently for landscape irrigation.	Techniques/ equipments used along with specifications.				Six months	
	Rain water Harvesting	Quantity of collection/ direct use/ recharge.	Gallons				Six months	
C. SYSTEM OPERATORS								
	Leak Detection	No. of leaks detected and no. of leaks repaired.	Nos.				Six months	
	Water Main Rehabilitation	Management and rehabilitation of water distribution network.	Nos. and types of rehabilitation (repair) done.				Six months	