Energy Efficiency Emphasis at NWSDB

Five Year (2007- 2011) Energy Efficiency Roadmap
National Water Supply & Drainage Board (NWSDB)
Sri Lanka

Prepared by:
The Alliance to Save Energy

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Creating an Energy-Efficient World

NWSDB

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LIST OF ACRONYMS

DSCR	Debt Service Coverage Ratio
EE	Energy Efficiency
EOI	Expression of Interest
EPC	Energy Performance Contracts
ESCO	Energy Service Company
ESU	Energy Saving Unit
FIs	Financial Institutions
IGA	Investment Grade Audit
IPMVP	International Performance Measurement & Verification Protocol
IRR	Internal Rate of Return
M&V	Monitoring & Verification
MLD	Million Liters /Day
NPV	Net Present Value
NWSDB	National Water Supply Drainage Board
PC	Performance Contract
PDD	Project Development Document
QCBS	Quality & Cost based Selection
RFP	Request for Proposal
SEC	Specific Energy Consumption
WPP	Water Purification Plant

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Introduction

Shortages of drinking water and electricity are critical issues for Sri Lankan municipalities as they face the pressures of an increasing population, a rising per capita demand for clean water, and increasing power tariffs. The Alliance to Save Energy, under a USAID funded program, partnered with the National Water Supply and Drainage Board (NWSDB) in 2002 and since then has been working on water and energy efficiency (EE) outreach program for entire country. NWSDB operates more than 285 pumping stations across the entire island nation, with a significant share – 34% of its costs consumed by the energy needed to operate its water and sewage treatment systems. The Sri Lanka "Watergy" Program has facilitated pilot energy audits at bulk water supply stations at Ambatale and Anuradhapura, and assisted in the training of municipal engineers and managers in EE audit process and best practices.

To build lasting capacity within NWSDB, the Alliance helped establish an "Energy Saving Unit" (ESU) constituted by a voluntary team of six senior and middle level technical and managerial NWSDB staff for enhancing efficiency in NWSDB operations. In year 2004, NWSDB accorded permission for the ESU to function. The Alliance conducted a two week comprehensive energy audit and training program for the water board that involved more than 40 engineers from various provinces of the country. The concept of water and energy efficiency has caught the interest of the NWSDB top and senior officials, and energy conservation practices at NWSDB have acquired top priority. In the present context of acute power shortage and the ever-widening demand supply gap, the staff is eager to adopt EE practices on a larger scale with set targets for reducing energy bills.

NWSDB's interest in EE coincides with the national goal of reducing energy consumption in Government organizations. The Presidential Secretariat of Sri Lanka issued a circular on July 13th 2006 to all Government bodies instructing them to reduce their energy consumption by 20%. The Ministry of Power and Energy in Sri Lanka has advocated this step to reduce not only costs but the country's dependency on imported fuels. At present 60% of the country's power is produced by using imported fuels. The Alliance in order to guide NWSDB to move forward in this endeavor in a structured manner has prepared this Roadmap. The roadmap is a timely reference tool for NWSDB to embark on the path of EE in a big way. The Roadmap lays out the vision, the objectives and the action paths to be followed by NWSDB to become energy efficient over the next five years.

Purpose of the Roadmap

The purpose of the Roadmap is to help NWSDB realize its vision for reducing their overall energy costs by at least 15% over the next five years (2007-2011), and to be acknowledged as a staunch practitioner of EE in water supply and waste water systems. Towards this end, the Roadmap becoming lays out a set of action paths to be followed by ESU for converting this vision into reality. The action paths should be incorporated into the Corporate Plan of NWSDB. And they should form the strategic plan of action devised by ESU for adoption by all NWSDB staff to achieve the organization's goal of reducing energy usage and energy cost.

Specifically, the Roadmap will assist NWSDB and its ESU in:

- Incorporating and institutionalizing Energy Efficiency (EE) practices in all operations of NWSDB (Water Supply, Sewerage and Water Treatment Plants).

- Setting goals and defining action paths for reduction of energy bills for the entire water supply and wastewater systems in the next five years.

- Providing guidelines to ESU for strategizing water and EE programs to achieve the aforementioned target.

- Incorporating EE measures at the design stage of the new projects that have been commissioned and also during major rehabilitation work.

- Building EE as a key component in procurement during the tendering process for any kind of replacement/retrofit of major equipments (such as Pumps, Motors, Capacitors, Rotating assembly, Impellers, etc.).

- Setting short term and long term goals of optimizing energy use, reducing energy bills and improving water supply.

The Roadmap should be reviewed annually by ESU and modified as needed to incorporate any new additional information and set new goals in accordance with the new activities of NWSDB.

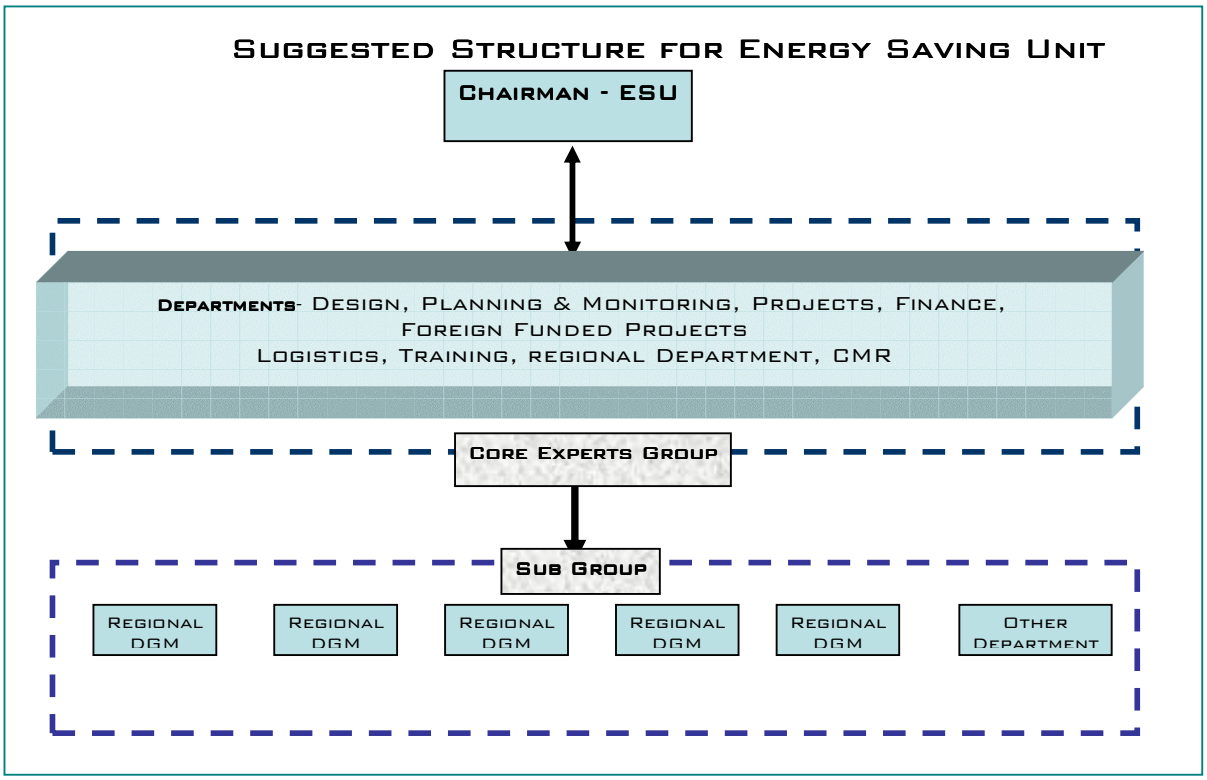
Energy Saving Unit (ESU)

The Energy Saving Unit at NWSDB will be the nodal unit that will follow the action paths laid out in the Roadmap and also act as the information clearing house for EE projects.

Composition of ESU:

- It is suggested that the ESU should be expanded and comprise of 12 members. 8 core members can be from Colombo and 4 other active members from the Regional Centers.
- Membership into the ESU and continuation of ESU should be instituted.
- The ESU may create sub committees to oversee specific EE projects in Water pumping stations.
- It is also proposed that the ESU have representation from all major departments and from all relevant engineering fields such as Mechanical, Electrical and Civil.

Figure 1: Suggested Organizational Structure for Energy Saving Unit



Advisory Services to ESU:

The Alliance to Save Energy will provide services of an in-country water and energy expert advisor to guide and assist ESU with technology evaluation, evaluation of unsolicited proposals for EE improvements and for advising while contracting with a consultant for EE audit and implementation. The Advisor will be available to ESU 4 to 5 days per month for a year. The Alliance will also provide the services of a full time engineer to assist the ESU in the aforementioned activity.

Energy Efficiency Roadmap - Action Paths

Action Path 1: Optimizing Energy Usage at NWSDB plants

Objective: Achieving yearly goals set for reducing overall energy bill in accordance with targets agreed upon by ESU and incorporated into the NWSDB Corporate Plan.

Discussion:
The ESU has set achievable target percentage for every year for reducing energy consumption within their operations. The first and second year targets will be termed as short term goals and year 3 to 5 will be classified as long term goals. The yearly targets are as follows:

Year	Percentage of annual cost savings to be achieved in overall Energy Bill
1	5%
2	3%
3	3%
4	3%
5	2%

Action Path –

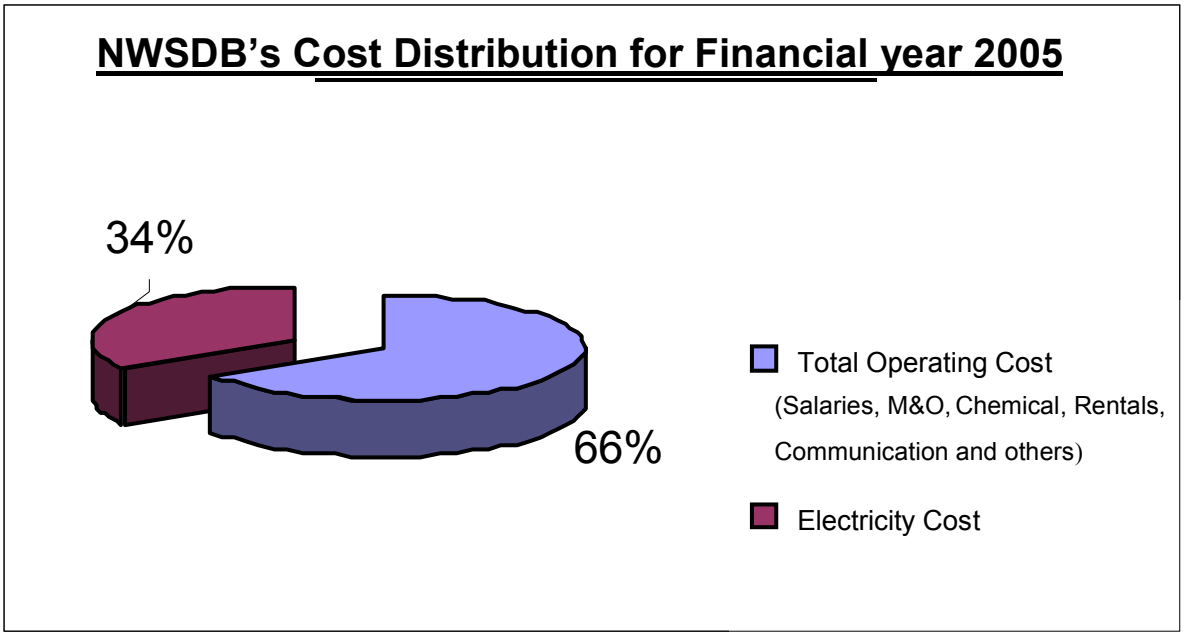
A) Collection and creation of technical of all pumping stations at the National level:
It is proposed that NWSDB collect technical information of all pumping stations to create a database at national level. ESU should circulate the information sheet (Annex. – 1) and gather data from all pumping stations. This will be the first step in accessing energy usage and determining efficiency of operations and identifying operations that require further water and energy audit study. The database of the following aspects should be complied.

A. No. of Pumping stations
B. Installed and running capacity of each pumping stations
C. Details of the Installed equipments
D. Energy consumption data of each pumping stations

B) Procedure for collection and classification of data:
It is suggested as a first step that ESU identify a marginal sample of pumping stations apart from Ambatale based on their cumulative energy consumption and specific energy consumption (KwH /ML) This list can be prepared by referring to the Corporate Plan that details all the pumping stations based on their installed capacity. Based on the data gathered and preliminary analysis, a few stations will be identified for water and energy audit. Pilots may be chosen initially from the Central and Eastern Regions. The ESU can ask Regional Service Center offices to provide the annual energy bill details for the aforementioned stations. The data from the remaining medium and smaller pumping stations should be collected on an ongoing process and the entire exercise should be completed and documented by the end of year 1. The form in Annex 1 can be used for collecting data.

Due to the Alliance Watergy Training and interventions and other initiatives of NWSDB since 2002, the overall annual electricity cost has been reduced from 42.59% in 2002-2003 to 36.14% in 2003-2004 and has finally come down to 34% in 2004-2005. This energy conservation initiative within NWSDB has also resulted in reduction of electricity cost over total cost expenditure - since year 2002 it has come down from 40% to 34%.

Graph 1: NWSDB's Operating Cost Comparison

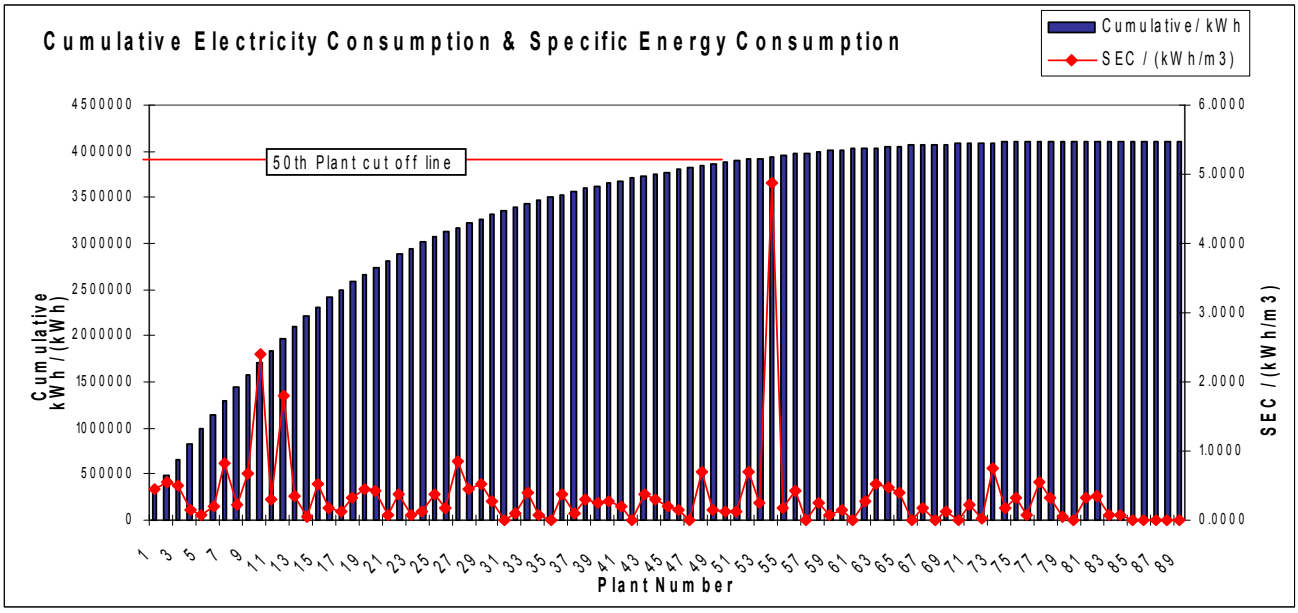


C) Analysis of data:
As the data is being gathered on energy usage at pumping stations and fed into the database, the Alliance along with ESU has started analyzing specific energy usage in order to establish the baseline for all pumping stations. This task is essential for setting yearly targets for achievable reductions in energy bills, optimizing energy usage and improving water supply. The trend analysis done so far is listed in the Annex 1 and this data will be further analyzed:

The graph 2 shows the cumulative energy consumption and the specific energy consumption of individual plants.

In this analysis, Ambatale plant will be analyzed separately since it is the main energy cost contributor to NWSDB when compared to all other plants. Ambatale alone consumes 32,344,667 kWh per month and has a specific energy consumption on an average of 1.69 kWh per m^3 water production.

Graph 2: Plant Cumulative Electricity Consumption and Specific Energy Consumption Analysis



D) Energy Audits and implementation of EE measures in prioritized Water pumping stations: Based on the analyzed data, ESU should shortlist energy guzzling pumping stations for energy audit study by Consultants / ESCOs and implement suggested EE measures. The ESU can also guide pumping stations on the low and no cost measures that can be implemented on their own for reduction of energy usage.

E) Guidelines for prioritizing stations for Energy Audit:
To identify and prioritize the stations for EE project implementation using NWSDB's own funds or with private sector assistance, the following criteria and tables provided in Annex 5 can be used:

- Specific Energy Consumption: Pumping stations having higher specific energy consumption (KWH/ML) based on their cumulative energy consumption should be short-listed for energy audit study.

- Duty Cycle of the installation – An installation that has continuous operations or intermittent operations but with a large number of operating hours should be chosen as it is likely to offer greater potential for energy savings.
  Note: A quick assessment of the duty cycle can be obtained by comparing the monthly consumption in kWh with the maximum operating load in kW.

- Size of the electric load (in terms of the maximum operating load in KW) – A larger load is better since very small load would offer only small energy savings potential.

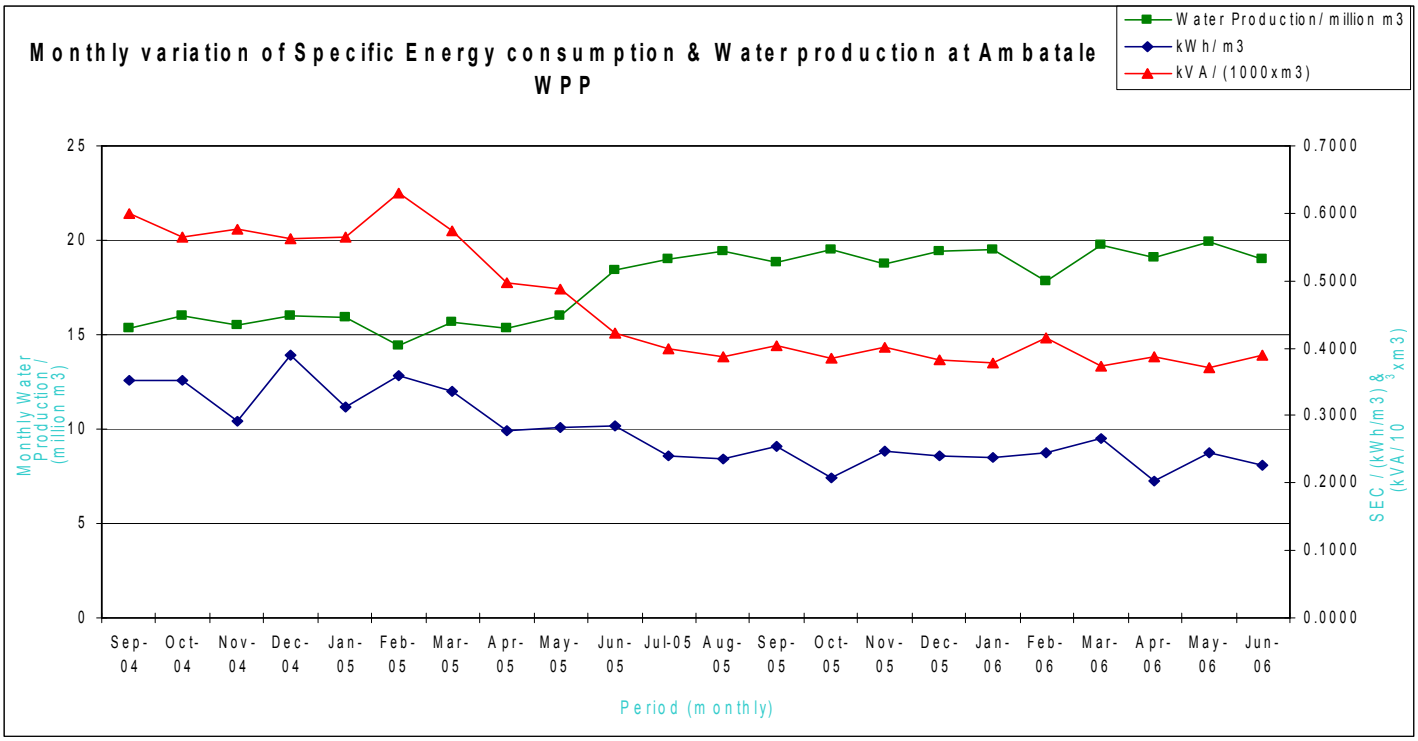
- Uncertainty regarding future growth and/or operational profile – An installation that is likely to have stable operations for a period of time of about 3 to 5 years is preferred over one that is subject to greater uncertainty in future operations.

- Age of existing equipment – An older installation is likely to offer a greater potential for efficiency improvement than a relatively new operation.

F) Communication of yearly targets to all plants:
The yearly targets will be circulated through Regional Service Centers to all pumping stations.

G) Tabulating Results:
Achieved results should be tabulated in three ways – Specific energy consumption Kwh / MLD, cost savings in energy bills, additional water delivered / additional connections given. For example: the NWSDB staff at Ambatale plant implemented few of the suggested energy efficiency measures and were able to showcase the energy and cost savings with significant reduction in specific energy consumption (see chart below):

Graph 3: Analysis of Monthly Variation of Specific Energy Consumption at Ambatale Plant



H) Reporting results:
The pumping stations should report the achievements to Regional Service Centers while marking a copy to the ESU. The pumping station in-charge can use the format in Annex 1 to communicate implementations undertaken and results achieved on a monthly basis to the Regional Centers and ESU.

Action Path 2:

Guidelines and Policies for incorporating EE at design stage, procurement stage and identifying opportunities for technological up-gradation

Objective: By the end of the 1st year, the NWSDB should have instituted guidelines and policies to ensure that EE is incorporated into the system at various stages of operations.

Discussion: The ESU can coordinate with the Design team and consultants to prepare guidelines and checklists for incorporation of EE at design stage of new projects/ retrofit/project expansion stage and EE at tendering stage of procurement process. The ESU can assist in identifying the needs and requirement such as simulating software and other tools required by various departments such as Design, Projects and Planning in order to enhance their technical skills for incorporating EE in their tasks.

Action Path –

A) Incorporating EE at design stage:

"***Prevention is Better than Cure*** "goes the age-old adage. So is the case with energy conservation also. The EE aspects incorporated right at the design stage can ensure substantial energy saving from the day one of commencement of operation. Some of the water utilities, which have done this, have achieved higher energy efficiencies, comparable with the best in the world. The Design team should focus on defining the standard EE guidelines for incorporating them at the design stage of the work and during the tendering stage of any procurement. The Design team, after being empowered, can guide the divisions designing new systems and oversee incorporation of EE practices. Few parameters and guidelines can be defined with the help of a consultant. NWSDB could also make it mandatory for projects to be assessed and reviewed by Design team prior to freezing design documents or undertaking any major procurement activity.

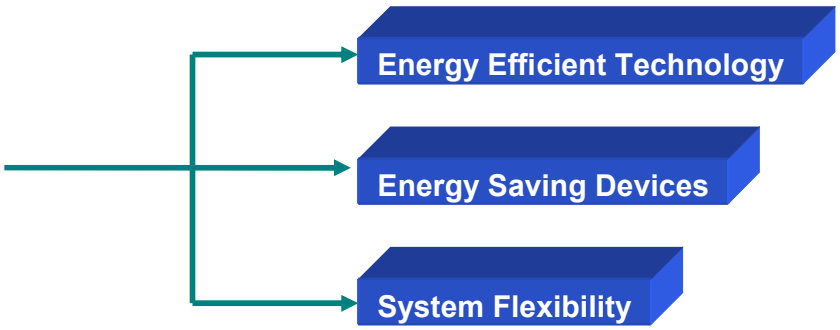
Many players are involved in selection of equipments such as pumps and motors, right from specification & design stage, to the installation and operation. Safety margins are added at each of these stages, primarily due to the high degree of uncertainty in pinpointing design parameters. But this practice leads to considerable loss of efficiency and energy in pumps. The energy efficient operation of any water supply system or equipment depends on the right specification, selection and installation at the design/retrofit/project expansion stage.

To achieve this, the first step at the design stage is, to begin with specific energy consumption targets for the

- ✓ Overall systems/ process
- ✓ Individual equipments / section

Any further actions shall be such that, meets these specific energy consumption targets.

Overall Approach:
A multi-pronged approach a detailed below is advocated for successfully achieving energy efficiency at the design stage.



Installation of Energy Efficient Technology:
For achieving quantum jumps in energy efficiency, the application of an efficient technology is vital. The practice can be adopted easily at the design stage; the alternative of retrofitting at the most is just a compromise. The additional costs involved are only marginal, in comparison to the benefits of energy efficient operations.

Usage of Energy Saving Devices:
The incorporation of the latest technology takes care of energy conservation at a macro-level, while the energy saving devices ensures energy efficiency of individual equipments. The retrofitting of energy saving devices at a later stage is beset with many disadvantages, such as, operations down time, increased investment, resistance of operating personnel, etc. In some of the cases, the retrofitting of an energy saving device, may even call for replacement of the original major equipments which could necessitate higher investment. Hence, it is beneficial to incorporate energy saving devices at the design stage itself. Some of the energy saving devices are Automatic Star-Delta converters, Soft Starters, VSD. Etc.

System Flexibility:
Though the flexibility of the pumping systems does not have a direct bearing on the energy efficiency, this can go a long way in ensuring sustained and increased running capacity of the pumping stations.

Life-cycle Cost Vs Initial Investment:
In many projects, the initial investment is taken as the criterion for evaluation and these results in choosing energy ***inefficient*** alternatives. In majority of such cases, the detailed life-cycle cost analysis reveals that energy accounts for 60 to 70%, while the initial investments accounts for 15-20% over the life of the equipments. Hence it is advocated that the life-cycle cost comprising of the energy cost, maintenance cost, along with initial investment, should be taken as the basis for the evaluation.

Impact of Over-Design:
The over design of the equipments is inevitable in any water utility and is needed for meeting the future demand and making safety allowances. The extent of over design is often debatable and should be best left to the designer. The over design of the equipment however, has a major impact on the energy consumption during operation and hence needs to be considered

at the design stage. For example: in case of pump that has been over designed, it can be corrected at an early stage by installing a lower size impeller or VSD.

Hence, at the design stage, the equipments which are over designed needs to be clearly communicated to the ultimate user and provision has to made (at the design stage) for easier correction after establishment of pumping operation.

An energy expert could also be involved at the design stage in order to assist in the choice of energy efficient equipments.

Energy Efficiency Design Consideration:
A few of the parameters Design team should consider, while selecting / designing a pumping systems are listed below:

- Minimizing Over-Design
- Selection of right type of Pump and Motor of higher Efficiency
- Installation of Variable Speed Drives (VSD's)
- Segregation of High-head and Low-head Pumps
- Utilization of Gravity Flow
- Unitization of Pumps:
- Parallel Operation of Pumps:
- Piping Design:

B) Energy Efficiency at Procurement and Tendering Stage:
It is essential to have policies and guidelines for incorporating EE measures during the tendering stage of any procurement of equipment since this will ensure the standard of the participating company as well as the quality of its efficient equipments in the bidding stage itself. ESU can develop policies / guidelines that specify required efficiency parameters for pumps and motors and also include conditions / clauses as illustrated in the example - such as: testing the required pumps performance in parallel operation of the pumps. Emphasis should also be given to operation and maintenance cost over the life of the equipment for the equipment /system to be procured.

C) Identify and Procure state of the art technology for advancing EE in NWSDB operations:
ESU should work with the Advisor, the Alliance and other consultants to identify latest technologies, concepts that can assist in enhancing NWSDB's energy efficient operations. ESU can coordinate with various different departments and identify their requirement for latest technology that will make their operations. It could be simulation software for design department, Energy use analysis software and so on.

D) Web Interactive Online Tool for EE in Water Supply Systems:

NWSDB in the long run should consider developing a website that would accumulate and make publicly available the following information. NWSDB can provide intranet connection from the aforementioned website. This intranet can be used to host the NWSDB Energy Efficiency knowledge base for employees containing:

- Case studies
- Training material
- Software
- Benchmarking tools
- Guidelines and templates
- Various other information that can be a part of the knowledge base.

Action Path 3: Energy Audit, Implementation of EE measures and M&V

Objective:
By the end of five years, NWSDB should have successfully implemented suggested EE measures recommended in Energy Audit reports.

Discussion:
Once the ESU has completed the preliminary data analysis and short-listed pumping stations, the Roadmap will suggest the way forward for identifying the EE needs of the various pumping stations by assessing the current ongoing operations. Based on the collected information and data the ESU along with experts will identify and prioritize critical pumping stations to be further audited.
Note: NWSDB can also consider establishment of internal Energy Audit Unit within NWSDB in the long run conduct preliminary audits, monitor and verify achieved results.

Action Paths:

A) Investment Grade Audits (IGA)*:*
The concept of an "investment grade" audit has evolved from the need to provide sufficient detail to financial institutions and private companies (ESCOs) to participate in the financing and implementation of EE projects. The IGA guidelines in Annex 2 will help in implementing EE projects through private party participations. The ESU can provide these guidelines to consultants while contracting for IGA at any of the pumping stations.

B) Implementation of EE Projects*:*
1) Implementation of project through NWSDB's funds. The NWSDB engineers can carry out walk through audits by NWSDB and undertake low cost /no cost improvements using their O&M budgets.

2) Implementation of project through private funds (action path on accessing financing discusses this in more detail.)

3) Implementation of projects through private party participation – ESCO model (By utilizing local ESCOs. The Alliance will provide technical assistance for preparation EPC documents).

C) Metering & Monitoring:
"***You can't manage what you don't measure***". One of the very important aspects of the sustainability of the EE projects is periodical quantification of energy and cost saving at various sections of the plant process. This can only be monitored by installing meters and sub-meters at all the necessary locations. The Metering and Monitoring guidelines will provide a plan for selecting proper meters and identifying the reasonable points for their installation.

Another important element of the sustainable energy efficiency project is the monitoring function. Many energy efficiency projects fail because they do not have in place the appropriate measurement and monitoring systems to assure that the equipment is continuing

to perform efficiently and that the energy savings and cost reductions are being achieved on an ongoing basis.

The recommended long-term solution is to assign the monitoring functions and responsibilities to the ESU. This will require ESU staff to be expanded and adequately trained, but doing this will provide the advantage of NWSDB having its own staff perform the monitoring functions. NWSDB ESU can also follow M & V protocol for post evaluation which is developed by USAID-SARI program for South Asian region.

The installation of appropriate control systems & instrumentation for monitoring energy consumption can help in ensuring energy efficiency. In order to effectively perform project monitoring, NWSDB should consider acquiring the following types of metering equipment:

Metering Equipment

Measurement	**Metering Equipment**
Electrical Parameters	Clamp-on Power Meter
Head/ Pressure	Pressure Gauge
Flow	Ultrasonic Flow meter
Continuous Electrical Measurements	Data Logger
Speed	Tachometer/ Stroboscope

Evaluation of Results:
ESU should evaluate the achieved results by the end of the year and analyze if set goals have been achieved and if the results were on par with the target. Achievement, over achievement or under achievement of set goals should be further investigated to understand the reasoning that contributed to the success or failure of energy efficiency programs.

Action Path 4: Accessing Private Capital Financing

Objective: Successful implementation of two to four large, capital-intensive energy efficiency projects.

Discussion:
Large energy efficiency projects can be financed through various mechanisms and by various institutions including:

- Multilateral and national development banks
- Commercial banks
- Microfinance Financial Institutions
- Specialized financial institutions and NGOs
- Equity investors

NWSDB should become familiar with different FIs because some target different types of projects or clients, and many have different types of lending depending on the needs and qualifications of the applicant. Additional financing for energy efficient projects may be available through institutions that buy the carbon credits that can result these projects. An illustrative list of carbon buyers includes: Agrinergy, Climate Investment Partnerships, PricewaterhouseCoopers (PwC), IFC, and the World Bank.

Action Path:

A) Documentation Package for Financing**:**

NWSDB can develop a project presentation package for potential FIs. Different FIs might require different documents or formats for such a package so it is best to contact a prospective FI to find out what its application requires. Regardless of the loan application format, a standard package includes the documentation listed below. The "applicant" refers to whatever entity is applying for the financing, be it the Water Board or ESCO.

Letters

- Letter of Intent from the applicant to the FI
- Letter of approval for the project from the Water board (if ESCO is applying for financing)

Financial Information on the Applicant

- Tax return of the applicant for the last three years
- Applicant's audited financial statements for past three years (if available)
- Applicant's articles of incorporation and corporate resolution in case of a private company
- Financial Analysis Report that includes a cash flow analysis, internal rate of return (IRR), depreciation, payback period, tax summary sheet, and various ratios that indicate the financial health of the applicant:
    - ✓ Current assets/current liabilities
    - ✓ Long-term debt ratio (total long-term debt/total long-term debt + shareholders equity)

- ✓ Debt to equity ratio [total liabilities/(total liabilities + shareholder debt)]
- ✓ Debt coverage ratio (the ability to service debt, defined as annual cash flow before interest and taxes divided by the interest and principal payment x [1/(1-tax rate)]
- ✓ Total debt ratio (annual cash flow before interest and taxes divided by average total liabilities)
- ✓ Information relating to creditworthiness such as assets for collateral and any credit guarantees

Project Financials:

- Project pro forma, a report on the viability of the project that gives a revenue and expense projection showing anticipated costs and income over the duration of the project
- Cost-benefit analysis for the project
- Project Financing Structure Document or Resource Mobilization Report (optional; a schematic version of project financing showing loan and payment flows)

Project Documents and Proposal:

- A summary of the audit results
- Performance Contract
- Project proposal describing the objective, scope and management team, and providing the following financial basics on the project: project cost, loan amount, payment mechanism, procurement guidelines, project execution, and loan allocation.
- Social and economic analysis detailing the economic and social benefits of the project.
- Any supporting documentation, such as a savings verification review report reviewed by an independent engineer, assignments agreements, acceptance notices, and references from suppliers and customers.

Recommendations for Successful Project Financing**:**

- Keep the presentation to investors simple and have all required documentation ready, including support documents that verify the financial analysis
- Make the timeline achievable
- Choose responsible project partners
- Ensure that the monitoring and verification (M&V) protocol is clearly defined
- Do not agree to contract terms that are not enforceable
- Ensure that supply contracts are in place with fixed prices
- Ensure that all agreements and legal documents are in place.
- Always be aware of what the risks are and allocate them when feasible to the appropriate parties. Lowering these risks will make the project more viable for FIs' financing.
- Consider probability of default by the parties and its impact on the financial statement.

- Ensure that an operation and maintenance plan is in place along with a plan to ensure that facility personnel are properly trained to implement it.
- Utilize known technologies in early projects
- Plan for cost over-runs by establishing a contingency fund.

Action Path 5: Communication of EE program results

Objective: Top managements' commitment and support to EE Program at NWSDB.

Discussion:
It is important that a formal management reporting system be established to keep top management and other stake holder informed of the progress of the EE and cost reduction efforts at NWSDB.

Action Path-

A) Result Reporting:

- The ESU should develop Energy Monitoring and Reporting system that will collect, analyze and report information on energy consumption and costs.
- The Reporting system should summarize periodic reports on the major activities and the results in terms of energy savings and cost reductions achieved.

B) Management Reporting:

- The ESU should provide quarterly reports to top management to keep them abreast of savings achieved.
- The ESU can make presentations to Top Management and other stakeholders at the end of every year and showcase EE efforts undertaken and achieved results.

C) Communication:

- Dedicated space to be allocated for ESU articles in every issue of the NWSDB newsletter.
- ESU should utilize this medium to communicate its energy efficiency activities and its results to all NWSDB staff.

D) Staff Motivation:

- ESU can motivate the staff and create incentives for them by organizing competitions between regions.
- ESU can develop a certification program and issue 'Certificate of Achievement' for employees that have implemented energy efficiency in their stations.

Action Path 6: Training of NWSDB Engineers

Objective: Sensitize each and every employee of NWSDB on EE and create awareness on energy management and conservation.

Discussion:
NWSDB has officially recognized the Energy Saving Unit formed voluntarily by a few senior engineers who had been actively advocating energy optimization initiatives and carrying out training programs for officers in charge of water supply stations. NWSDB has developed the TOR for the ESU that lists out the tasks that should be undertaken by ESU. The Roadmap is a tool for ESU to define its strategies for setting and achieving their targets for optimizing energy usage, improving water supply.

Action Path –

A) In-house Training Module:
One of the ways of ensuring that EE awareness is built across all sections of the NWSDB staff is to inculcate EE in the training curriculum. The Alliance will provide a copy of the Energy Audit Guidebook for Water Utilities in the Philippines as a reference document for ESU. The ESU can prepare a training module in local language by referring to all available EE training materials and then carry out training. The ESU can also procure measurement instruments for carrying out Energy audits. The training could be imparted to staff at various levels of different departments such as:

A. Managers
B. Engineers
C. Engineer Assistants (officers in charge (OIC))
D. Operators

The focus of this initiative aimed to build the capacity at various levels of officials, finance department heads, water board engineers and managers, officers in charge. The training institute will compile all the training material available with additional inputs provided by the Alliance into a manual and this manual will be available as a reference material in the library. It is envisaged that the trained water board engineers and energy auditing firms can carry out the audit and implementation activity at the other pumping stations over a period of time. In this manner, the water board would have in-house capacity to develop, implement and sustain water and EE programs.

B) Calendar for Training;
The ESU will plan and complete the training of all engineers and managers in a period 2 years. The rest of the 70 OIC's will be trained in by early 2007. OICs will further impart knowledge to operators and second level employees.

C) Energy Conservation Fund (ECF) training program:
ESU can coordinate with ECF to facilitate participation of their operators in the General EE program that ECF conducts in all regions of the country.

D) In-Country and Overseas Training Program: NWSDB can consider deputing their engineers to specific EE training programs in country and abroad as and when time and resources permit.

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