



Enriching Lives

ENERGY AUDIT

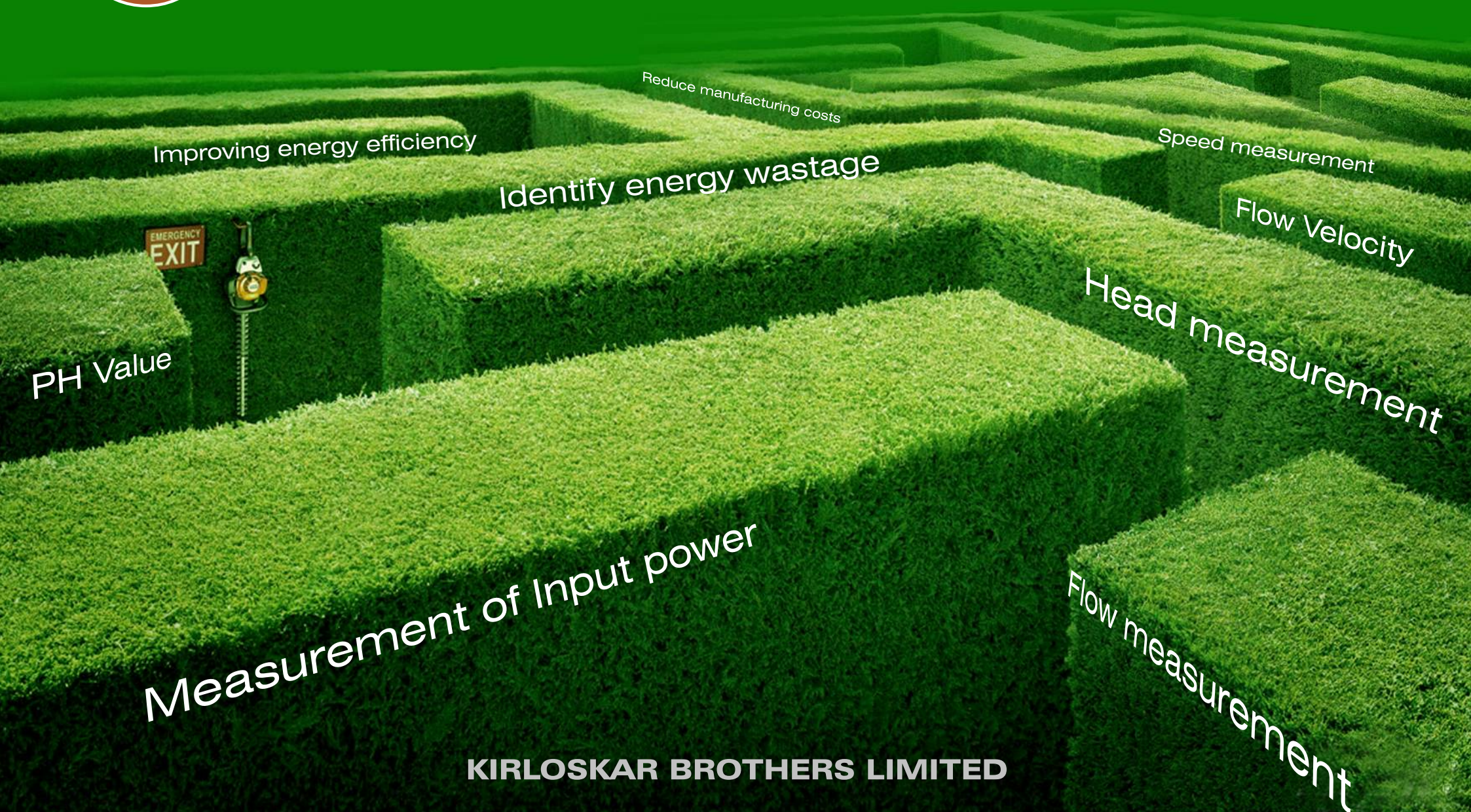
Make your business a sustainable one...



KIRLOSKAR BROTHERS LIMITED



Enriching Lives



Reduce manufacturing costs

Improving energy efficiency

Speed measurement

Identify energy wastage

Flow Velocity



PH Value

Head measurement

Measurement of Input power

Flow measurement

KIRLOSKAR BROTHERS LIMITED

THE 'WHY' AND 'HOW' OF ENERGY AUDITS

What Is Energy Audit?

An energy audit is an inspection, survey and analysis of energy flows for energy conservation in a building, process or system to reduce the amount of energy input into the system without negatively affecting the output(s). Industrial Energy Audits monitor consumption and locate the source(s) of wastage so they can be plugged.

Even as industry today thirsts for more and more energy there is need to use it less and less as it brings with it increasing cost of the product as well as pollution; and curtailing both can have a make or break impact on any organization.

Keeping Energy Crisis At Bay

Energy conservation has therefore become a very important part of any industrial activity. The focus is on increasingly efficient usage of energy with decreasing energy consumption from conventional, non-renewable sources of energy.

Energy conservation initiatives are implemented to reduce quantity of energy used. It supports an eco friendly life-style by saving and generating renewable, non polluting energy, which saves money and at the same time spares the earth of environmental disasters. Efficient use and generation of energy have a direct, positive impact on the environment by curtailing, amongst other natural calamities the global warming phenomenon. Experience shows that energy savings are best achieved by performing an energy audit.

A pioneer in manufacturing of engineering equipment with expertise in the production of fluid handling equipment, KBL has to its credit, clients in core sectors across the world. Keeping pace with global trends KBL too is committed to green ways of doing things, KBL pursues many initiatives for conservation of natural resources. As the world faces the calamity of climate change, every organization on the globe will need to contribute and define the norms for sustainable business. Although the challenge is great, each step we take in this direction will take us to the goal. One such step is KBLs service offering in the form of Pumping Energy Audit for Pumps and Motors, which take the world closer towards achieving the final goal of doing business in a socially and environmentally responsible way.

Towards A Sustainable Energy Future

The world is moving towards a sustainable energy future with an emphasis on energy efficiency and use of renewable energy sources. A finite planet cannot support infinitely increasing consumption of resources and hence the motto of present times must be to REDUCE, REUSE, RECYCLE.

KBL Shows The Way

KBL has set up an Energy Conservation Cell wherein our team of Certified Energy Managers and Auditors undertake energy audit which evaluates actual performance measurement of pumps and motors. The results are compared against the designed performance level or the industry best practice. The difference between observed performance and "best practice" is the potential for energy and cost savings. Specifically, the audit helps to

- ◆ Identify actions for improving energy performance;
- ◆ Prioritize projects; and
- ◆ Track progress

Recommendations for suitable pumps, motors and improvement in the pump piping layout are suggested based on the findings. Energy audit also helps decide on how to budget energy use, plan and practice feasible energy conservation methods that will enhance their energy efficiency, minimize energy wastage and thereby reduce energy costs.

During the past one year, about twenty organizations approached KBLs Energy Conservation Cell to conduct energy audits. Some amongst these have already implemented the recommendations and have slashed their energy costs up to 30%. This has helped save 11 million KWH electricity and more than Rs 40 million in energy bill. Many more organizations are convinced about the audit outcome and are in the process of implementation of audit recommendations. These customers are from various types of industries like automotive, manufacturing, chemical, process, Water supply, lift irrigation schemes, etc. The payback period of the investments made for these improvements have been in the range of 2 months to 2 years depending upon type of industry, type of pumps, pump working hours, etc.

KBLs list of satisfied customers features Godrej & Boyce, Godrej Industries Ltd, Vita Nagarpalika, Cummins India Ltd and many more.

Pumping Energy Audit – Step by Step

Preliminary audit

This is the basic step devoted to collection and collation data existing pumping system, pumps, their installation and application along with energy consumption pattern, etc. The saving potential is estimated based on this information and a proposal for detailed audit is worked out.

Commercial Proposal

A suitable proposal is made on cost to cost basis. Charges are based on any of the following parameters as preferred by the customer.

- ◆ Percentage of achievable savings
- ◆ Per day basis
- ◆ Per pump basis
- ◆ Per Kw reduction in connected load for pumping
- ◆ Lump sum charges for audit depending upon estimated time required

Detailed Audit

Audit is taken up after the written confirmation from customer. This audit involves:

- ◆ Determination of actual pumping requirement at each location from process point of view
- ◆ Study the current installations vis-à-vis actual requirement by observing the basic running parameters and measurement of actual reading of total operating head, discharge and power consumption for each location. High accuracy, calibrated equipments are used for all measurements.

Recommendation Report

- ◆ Based on the above data the existing energy consumption for each location is computed
- ◆ The saving potential is calculated
- ◆ Cost effective modifications are recommended based on the requirement and observations
- ◆ Report on recommendations is submitted



The detailed recommendation report provides complete information on improvements suggested, total potential for energy savings, investment to be made and payback period which facilitates the decision making at the customer's end. It focuses on Life Cycle Cost of the proposed pump which is critical from the user point of view. This is because the pumping system accounts for nearly 20% of world's electrical demand and ranges between 20% to 50% of pump energy usage. For majority of set ups lifetime energy and maintenance cost dominates life cycle cost. (The life cycle cost of equipment is the total 'Lifetime' cost required to purchase, install, operate, maintain and dispose off that equipment)

Besides, on most industrial sites about two-thirds of the energy is consumed by electric motors. In its lifetime the cost of energy consumed by an electric device may be 100 times its purchase cost. Many pumps and motors are operated at full power constantly, irrespective of process needs, and in some sites this offers the potential of large cost reductions. An energy audit will

identify all these issues and calculate the potential savings to be made. It is important that a thorough log of consumptions on each spur is made because excessive energy is sometimes used in the most unlikely places.

Comparison of Life Cycle Cost Pump with Competitor Pump

MODEL		UP 300/46	
	KBL LLC Range	Competitor	
Flow m ³ /hr	1315	1315	
Head m.	51.4	51.4	
Pump Eff. %	88.5	89.5	
Motor Eff.%	95	95	Difference
Total Energy Cost First Year	Rs. 11506014	11441376	-64,638
Total energy Cost After 3 years	Rs. 34518042	34684698	1,66656
Total Energy Cost After 10 Years	Rs. 115871765	119956820	40,85,055
Offered Price	Rs. 4,77,250	2,20,000	2,57,250

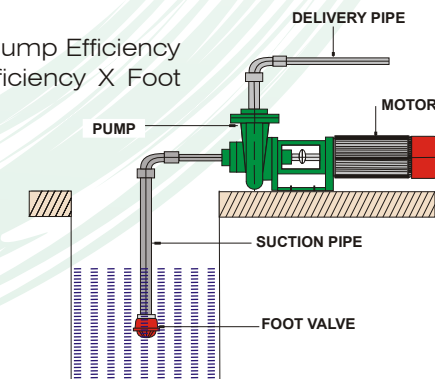
Cost of operating a pump is much higher than buying and maintaining it because 95% cost of operation is incurred by electricity consumption.

e.g. A 20 KW pump requires

- 20 KWH i.e. ₹ 90/- per hour @ ₹ 4.50/- per KWH
- ₹ 2160/- per day
- ₹ 64800/- per month
- ₹ 7,88,400/- per year

The initial cost of pump + motor is about Rs 60,000/- i.e. only 8% of the running cost.

Pumping System Efficiency = Pump Efficiency X Motor Efficiency X Piping Efficiency X Foot Valve Efficiency

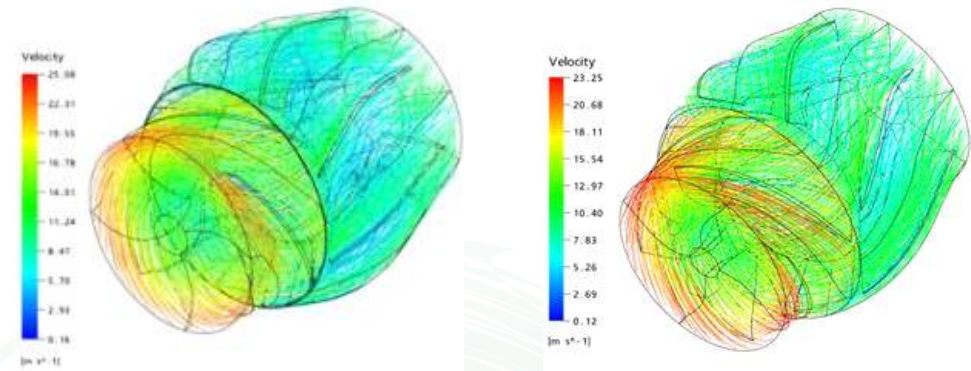
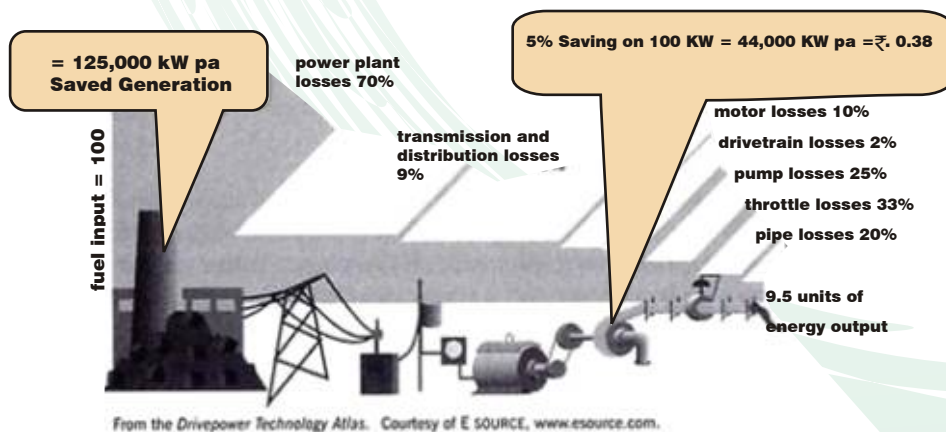


The below shows rise in pumping cost due to drop in efficiency for 20 KW pump set during the period of operation.

Sr. No.	No of Years	Efficiency(*)	Pumping Cost	
			INR Per Day	INR Per Annum
01	1st Year	80.0%	2160	788400
02	2nd Year	79.2%	2187	798380
03	3rd Year	78.4%	2215	808615
04	4th Year	77.6%	2244	819117
05	5th Year	76.8%	2274	829895
06	6th Year	76.0%	2304	840960
07	7th Year	75.3%	2335	852324
08	8th Year	74.5%	2367	864000
09	9th Year	73.8%	2400	876000
10	10th Year	73.0%	2434	888338

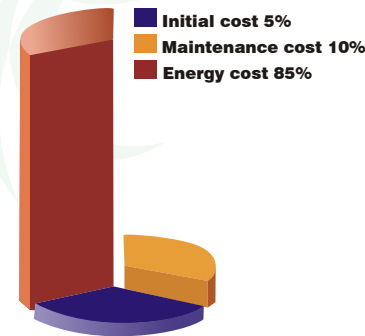
Normally pump efficiency drops at 1% per annum for drinking water application due to erosion and corrosion.

A TYPICAL INDUSTRIAL PUMPING SYSTEM



Original Pump Eff. 83%

Modified Design Pump Eff. 89.5%



Efficiency curve rises to a peak value and then again falls with increase in discharge. Hence calculation of Total Head (Static Head+Frictional Head), Pump discharge, Piping Size & Layout, Properties of Liquid (being handled by pump), etc are very important and critical while making the Pump Selection. The right choice is made without compromising customer's latest requirements on pump deliverables.

Selecting the Right Pump

- ◆ Calculate total head & required discharge
- ◆ Choose suitable pipe diameter, material and layout to limit frictional losses to max. 10%
- ◆ Choose suitable foot valve with 'K' factor less than 0.8
- ◆ Choose the suitable type of pump set to be used
- ◆ Select a suitable pump with maximum efficiency at Duty Point i.e. matching of Best Efficiency Point with Operating Point so that efficiency zone for the maximum period of pump operation and also ensure that pump works at Peak Load Conditions

Our Energy Audit Team helps customers to select the Pump which operates in the most efficient zone, with the help of Pump Selection Software, ultimately helping customers to save energy.

Some misconceptions / wrong practices followed by customers while achieving energy savings

The table as under lists some misconceptions and wrong practices followed by customers in their quest to achieve energy savings –

Misconceptions / Wrong Practices	Correct Approach
Old pump should be directly replaced with an equivalent new pump (new pump of the same model and make)	Energy audit of existing installation, and mapping of latest requirements as against actual head/discharge once should be done and new pump model should be selected accordingly
Refurbishment of old pump increases efficiency	Refurbishment improves pump efficiency only by few percentage points and does not replicate its best potential
Reduction in HP of existing pump hampers pump output, affecting the user's production and process requirements	Energy audit should be conducted and new pump should be selected in line with the latest requirements
Efficient working and adequate size/capacity of a pump can be gauged by the amount of water. Sufficient water signifies the appropriate capacity and working	Energy audit may reveal that the required pumping requirements can be adequately handled by a pump of lower sized/capacity
Pump of a size bigger than required should be procured to address future expansion plans	Pump addressing current requirements should be procured
Pump of a size bigger than required ensures enhanced safety by addressing inconsistent water flow or discharge	Multiple pumping options should be considered to ensure enhanced safety
Pump should be selected on the basis of HP and not on actual head and discharge requirements	Multiple models of the same HP and hence pump should be selected on the basis of head and pump discharge requirements
Pumps of bigger sizes are more beneficial than that of smaller sizes	Big and small pumps serve different purposes and hence both are indispensable. Multiple pumping options provide flexibility and help in saving power depending upon process requirements
Standardization on Pump Models (i.e. use of pumps of a particular make and specifications in most of the facility) benefits in smaller inventory and facilitates ease of maintenance and interchangeability	Standardization may lead to wrong pump selection, and subsequently energy wastage. Pump model must be selected based on duty requirements
A BEE Star Label on pumps certifies their energy saving quality and hence head and flow/discharge requirements can be overlooked	Pumps, when selected based on head & flow/discharge conditions, improve optimization. BEE Star Label will affirm further energy savings

Come, let us join our hands together

To conserve our nature

In the national interest

In the business interest

Leave your worries to us a pump expert and rest assured that your saving's account grows continuously.....

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