

RAJKOT PUMP CLUSTER



Background

One of the largest MSME clusters in the country is located in Rajkot, Gujarat. As per industry estimates, there are an estimated 14,000 MSME units in the cluster. The major engineering-based industries in Rajkot are

of pump sets, foundry and forging, machine tools, auto components, building hardware, kitchenware, plastics and diesel engines.

Pumps are widely used in the agricultural, municipal, domestic and industrial sectors. Rajkot is one of the largest producers of submersible pumps for the agricultural and domestic sectors, as well as centrifugal pumps for domestic and industrial usage. The growth of pump industry in Rajkot is a relatively recent phenomenon: in 1994, there were only 10 pump manufacturing units in Rajkot. However, in the years that followed, the number of pump set units increased rapidly, matching the growth in demand for submersible pump sets in the agricultural sector due to depletion of groundwater levels all across the country and lack of surface water irrigation facilities. By 2010 there were about 350 pump manufacturers in Rajkot, and this number has grown to about 1000 in 2015! Due to the relatively lower manufacturing costs in Rajkot, some pump manufacturers even from Coimbatore are sourcing components from this cluster.

Rajkot Engineering Association (REA) is the apex industry association in the cluster, with a membership of over 1000 engineering units. Most of the larger pump manufacturers are members of REA.

BIS and BEE certification

The major policy frameworks for pumps are the Bureau of Indian Standards (BIS) label for quality, and BEE star labelling scheme (BEE-SLS) for

energy efficiency. The BEE label is based on BIS certification, but is presently applicable to a limited number of pump models. Each small-scale pump manufacturer makes a large number of pump models (200 or more in many cases). However, due to financial implications (e.g., testing and marking fees charged by BIS and BEE) and other complexities (periodic renewal, changes in group certification etc), only about a third of the manufacturers obtain BIS certification for their products—and that too for a limited number of models (5–20 models).

Technology status and energy use

Common pump models

Four main categories of submersible pump sets are produced in Rajkot: V3 (i.e. for 3-inch bore well) V4 (for 4-inch bore well), V6 (for 6-inch bore well) and V8 (for 8-inch bore well). The power rating of the electrical motor in commonly produced pumps



Pump manufacture in progress



ranges from a few horsepower (HP) up to 10 HP. The most common models produced are V6 8 stage (7.5 HP) and V6 10 stage (10 HP) radial flow pumps. The former models are capable of delivering 350–400 litres of water per minute from a depth of 96 m; the latter, from a depth of 120 m. For arid regions where the water table is very low, large diameter models like V8 and even V10 (for 10-inch bore well) are produced, with power ratings that can go as high as 100–200 HP.

The motors of submersible pumps can be either water-filled or oil-filled. Oil-filled motors are capable of operating at low voltages. Almost 80% of the submersible pumps produced in Rajkot are of water-filled type.

Quality of pumps

Some leading pump manufacturers produce pumps that have efficiencies even higher than the 'five star BEE label' and could theoretically qualify for 'seven or eight star' BEE label!

About 350 pump manufacturers have at least a few BIS-certified pump sets in their product range. About an equal number of units are capable of

reaching BIS quality standards with some technical support. The remaining 300–400 units in the cluster are very small and in the unorganized sector; they manufacture very low cost, low quality pump-sets.

The pump manufacturers in Rajkot produce pump sets of two different levels of quality—colloquially referred to as 'premium' (or BIS equivalent) and 'commercial' (below BIS quality). According to industry estimates, roughly 50% of the pumps manufactured in the cluster are of commercial quality. There is a market for commercial quality pumps as they are about 30% cheaper than the premium quality models. Also, there is a market for premium quality pumps as they are equivalent in quality to BIS-labelled ones, yet cheaper (due to lower testing and marking fees).

Often, the pump and motor designs are developed by trial and error. The motors are often not designed to withstand voltage fluctuations, which are quite common in India. Small manufactures lack the capacity to invest in testing equipment. Few manufacturers have proper testing facilities for the electric motors. Inadequate design and overloading of the motor often leads to high rates of burnout.

Establishment of a common pump testing facility

SIDBI, under a multi-donor supported project, engaged TERI to support SME foundry and pump set units in Rajkot to improve access to finance and business development services (BDS) during 2009–2011. At that time, the pump manufacturers in Rajkot were facing difficulties obtaining BIS certification: the Rajkot cluster had only one BIS-approved lab, which was overburdened with applications by pump units for testing their products, leading to delays.

The project focused on strengthening the availability of local BIS pump certification services through the establishment of a Common Facility Centre (CFC), which will be of immense benefit to the Rajkot pump manufacturers. TERI requested a suitable agency (GITCO) to prepare a DPR for the proposed CFC; a Special Purpose Vehicle (SPV) named 'Rajkot Engineering, Testing and Research Centre' was formed with the partnership of local industry, state and central government; and land for the CFC was provided by REA. The CFC project, with a total cost of about Rs 7.2 crores, was approved in March 2014. Over Rs 74 lakhs was contributed by 62 local industries; Rs 3.82 crores by the central government towards testing equipment; and Rs 2.45 crores by the state government towards the building. The civil construction of the CFC is almost complete; ordering of the testing equipment will commence soon.





View of a pump manufacturing unit



Testing of pumps

Promotion of BEE labelled pumps

Star rating of pump sets under BEE-SLS is presently voluntary. However star rating is beneficial to the manufacturer in terms of branding and marketing of the product to the consumer. Obtaining a BEE Star Label also enables a pump manufacturer to compete for government and other tenders, which specify a minimum energy efficiency standard.

In the year 2009, when TERI was engaged by SIDBI to implement the BDS project, not a single pump manufacture in Rajkot had a BEE star-labeled pump. The local manufacturers could not perceive the need for testing and declaring the energy efficiency of their pump sets. In order to create and sustain awareness on the benefits of BEE star labeling, TERI identified a local BDS provider, and arranged for his training at BEE, New Delhi on all aspects of BEE-SLS—technical verification of the efficiency factor, testing of the pump set in an independent laboratory recognized by BIS, obtaining an ISI mark, and so on. The development of the BDS provider in Rajkot has contributed substantially to the steady growth of BEE labelled pump sets produced in Rajkot cluster.

Options for energy saving

Interactions with the local industry reveal that there is a large scope to revisit the present BIS specifications for pump sets, as well as the methods of implementation of BIS and BEE-SLS. A comprehensive upgradation of the BIS specifications, as well as implementation of BIS and BEE-SLS, has the potential to incentivize the manufacture of energy efficient pump sets in India. This will in turn yield substantial energy savings in agriculture and all other sectors where pump sets are widely used.

There is also a great potential to improve the design of the pumps and motors manufactured in the cluster, and make them more energy efficient and reliable (i.e., reduce failure rates during operation). A few broad areas in which to improve energy efficiency options are:

- Optimize design of the motor: e.g., stamping length; quality of stamping; quality of the copper wire in motor windings; etc.
- Optimize the manufacturing process (e.g. fabricated SS impeller) and material of construction (MOC) of different pump parts (e.g., impeller, shaft, bearing bush, quality of thrust bearings and motor component stampings, cooling medium, etc.), which are not specified in the BIS standards. ●●●

