ENERGY DEMAND FROM IRRIGATION

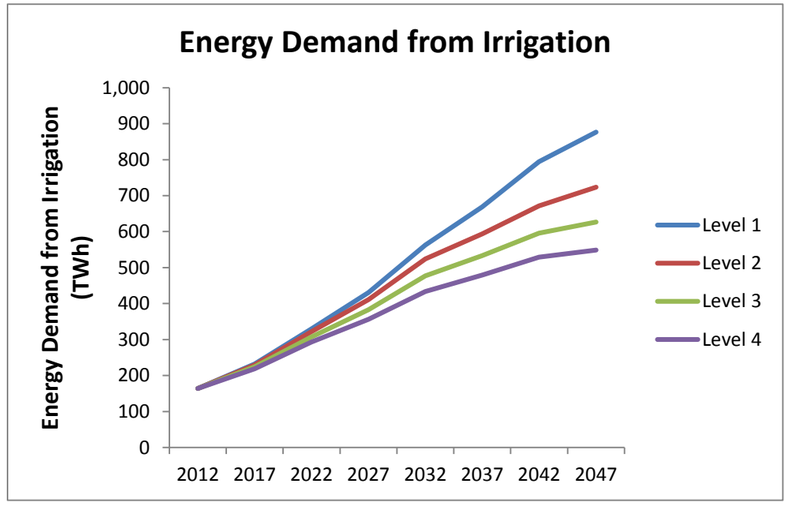
The service demand for irrigation from pumping is based on several factors including the growth of the sector, cropping patterns, other irrigation facilities, and water management practices. These influence the ownership of pump-sets and the average hours of operation of a pump-set. Efficiency of pump-sets in turn determines the energy requirement to meet this service demand. This, along with the demand from mechanization constitutes the overall demand from the agriculture sector. These energy demand scenarios along with the choices for fuel mix for irrigation will determine the aggregate energy demand for irrigation.

LEVEL 1

This is a pessimistic picture for the sector whereby electrical pumping efficiency improves by merely 7 percent as pump replacements don't pick due to lack of support mechanisms, while diesel pumps don't improve at all. At the same time, higher HP pumps are employed for greater hours in response to depleting water table, exacerbating the problem. Micro irrigation and advanced water management practices (AWMPs) are still employed at less than 5 percent of their potential (Rajput & Patel, 2012). All this coupled with increase in gross cropped area (GCA) to meet the requirements of growing population results in demand growing by 7.25 percent till 2022, reducing to around 2 percent till 2047. Aggregate demand so obtained is 877 TWh in 2047.

LEVEL 2

In Level 2, electrical pumping input improves by 18 percent and diesel pumping by 8 percent, yielding an average improvement of 17 percent. Ag-DSM, and various complementary watershed development programmes meet with limited success and micro-irrigation facilities are expanded, yielding an overall reduction of 27 percent from level 1 in 2047. Energy demand grows by 7 percent till 2022, and growth rate declines to 1.5 percent by 2042 and stabilise thereafter, yielding an aggregate demand of 723 TWh in 2047.



LEVEL 3

Further improvement of 29 percent in pumping input requirement results from aggressive replacement of old pumps, slow increase in agricultural tariffs and improvement in reliability of power supply. Micro-irrigation is extensively used to 50 percent of its potential. At the same time, complementary schemes of inter-basin transfers reduce pumping needs and hours of use. All these result in a reduction of 45 percent from level 1 in 2047. Energy demand grows by 6.5 percent till 2022, and the growth rate declines to 1 percent by 2042, yielding an aggregate demand of 626 TWh in 2047.

LEVEL 4

Level 4 envisages modern practices such as mulching (GHG technology) and vertical farming to optimise on water-use in response to scarcity of water resources. Government fast-tracks support to rain-fed areas, and increase in pumping demand from these areas slows down. Electrical pumping takes place at optimum loads, reducing losses and resulting in best efficiencies. Electricity supply is augmented and monitored for consistency. Diesel pumps achieve optimum efficiencies too, and weighted improvement in pumping input is 38 percent. As a result, energy demand grows by 6 percent till 2022, and growth rate falls to 0.75 percent in the 2040s. Overall demand reduces to 549 TWh.